

The Status of East Asian Hub Ports in Global Logistics

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1. Introduction

The 1990s saw the vigorous expansion of international trade in East Asia, generating a remarkable record of high and sustained economic growth unmatched by any other region in the world. In line with this, container tonnage in the region has also shown a continuous annual rise. By 1996, the year before the onset of the Asian financial crisis, East Asia's share in the world container market had risen to 42.7 percent from 28.5 percent in 1985, the year when the Plaza Accord allowed the appreciation of the yen against the U.S. dollar. In the light of the drastic surge in container tonnage in East Asia, the governments in the main ports of the region have made substantial investments in expanding and developing new container terminals to cope with the ever-increasing import and export cargoes to and from this region. The year 2000 also saw an economic rebound in East Asia. World trade grew by 7.1 percent, compared with 4.5 percent in 1999, and East Asia's share in the world container market rose to 50.2 percent in the same year. By 2010 its share is forecast to rise to around 52.4 percent, making East Asia the world center of container shipping operations.

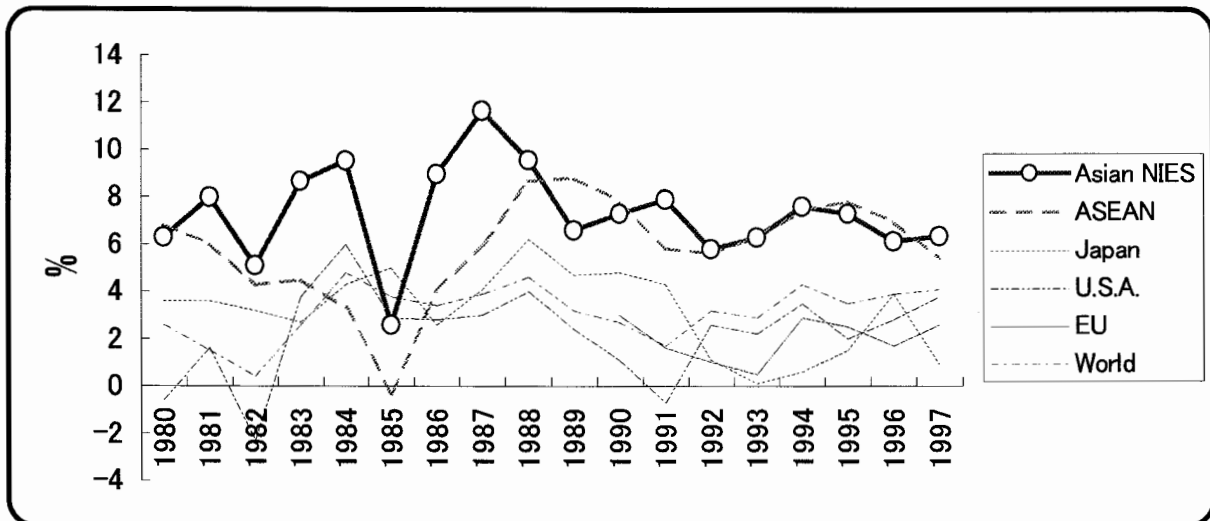
Since World War II, East Asia, consisting of Japan, China, the Asian NIEs (Hong Kong, Singapore, South Korea and Taiwan), and the ASEAN 4 (Philippines, Malaysia, Thailand, Indonesia), has enjoyed a remarkable record of rapid and sustained economic development, with rates of growth higher than in any other region of the world.¹ East Asia's economic prosperity can be shown by its real GDP growth rates. In the period between 1980-1997, the Asian NIEs the ASEAN 4 and China experienced average real GDP growth rates of 7.3, 5.9, and 9.9 percent respectively, compared to an

¹ Major elements which contributed to the phenomenal economic development of East Asia were: (i) In most countries of East Asia there was a strong national aspiration toward development which was shared not only by the government but also by the vast majority of the people. (ii) In the process of realization of national aspirations, public and private business sector successfully maintained an efficiently cooperative division of labor and established an export-oriented industrial structure. With few exceptions, East Asian governments demonstrated enlightened leadership with a correct set of policy objectives. And at the same time, there was also market-oriented private sector dynamism, with abundant innovative entrepreneurship. Furthermore, public and private sectors did not confront each other, but rather supported each other. (iii) Most East Asian countries enjoyed a high savings ratio, which enabled vigorous accumulation of domestic capital. Additionally, labor ethics in general were sound, which generated high productivity. (iv) East Asia enjoyed favorable external support. In the first place, the U.S. provided a vast open market for the East Asian exports, while also guaranteeing the security of the region. Japan also played a crucial role in stimulating East Asian economic development by supplying capital, technology and managerial know-how from the 1980s onwards.

average of 3.2 percent worldwide, 2.7 percent in Japan, and 2.0 percent in the U.S. and the EU (see Fig. 1).

The contrast is even more pronounced when the growth of per capita income is compared across developing regions. The economic growth in East Asia (particularly in the Asian NIEs, which showed a high real GDP growth rate in comparison with other regions or countries during the period between 1980-1997) is, in fact, closely related to the boom in international trade both regionally and globally, imparting to East Asia an extraordinary dynamism which has greatly changed the shipping environment in East Asia.

Fig. 1. Real GDP Growth Rate of Asia in Comparison to Other Countries/Regions in the World



Note: Real GDP growth rates are calculated by simple average.
 Source: *International Financial Statistics Yearbook*, 1998, IMF.

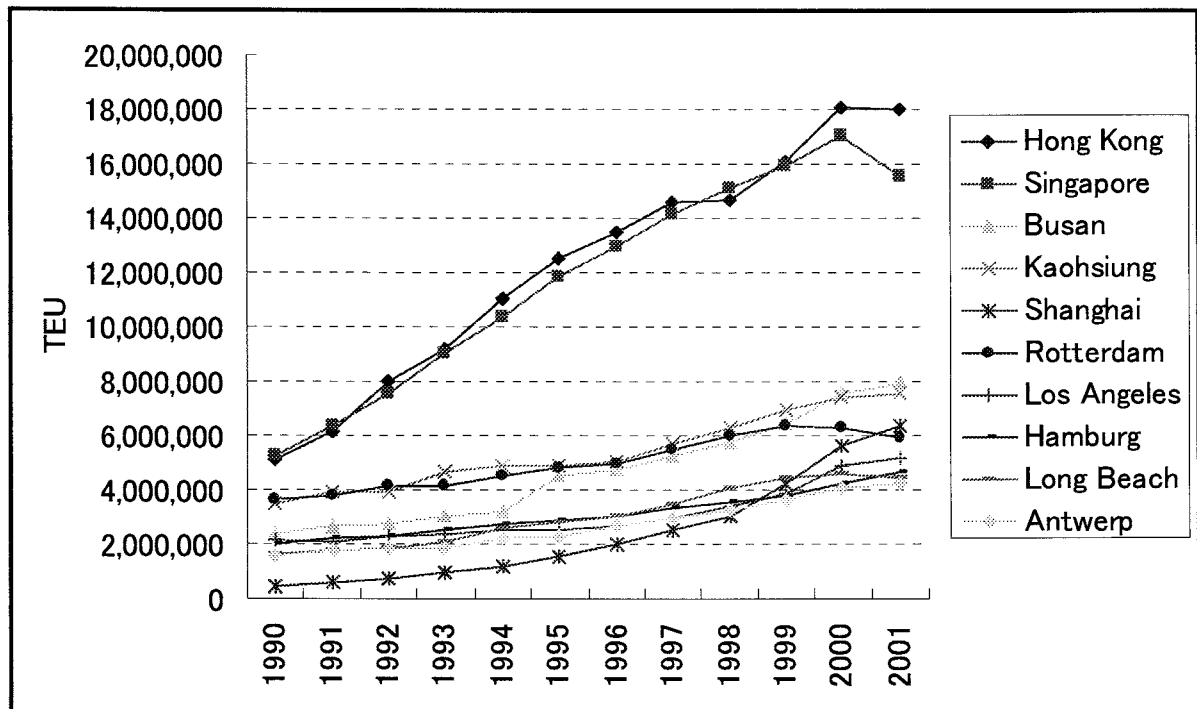
The economic rise of East Asia was certainly not accomplished overnight. In the 1960s, Japan became the focus of global attention as an emerging economic power as it caught up with the U.S. and Europe. The economic growth in Japan was soon followed by the Asian NIEs (particularly, Taiwan and Korea), and then by some of the ASEAN countries, as they came to realize their economic potential. Next, China started to make giant strides. In other words, in East Asia, one country after another has taken over the role of pacemaker, stimulating rapid economic growth in the entire region. This is the single most important factor behind the rapid upswing of East Asia on the global scene (Wang, 1999).

East Asia's more recent economic prosperity can be dated back to the "Plaza Accord" of September 1985, the agreement by the "Group of 5" ("G5," i.e. the U.S., Germany, Britain, Italy, and Japan) to intervene in the currency markets. The effect of this agreement was to drive the dollar drastically lower against the Japanese yen, expediting a second wave of overseas forays by Japanese enterprises in Asia region.

Other factors included the substantial appreciation of the Korean and Taiwan currencies, labor shortages which led to soaring wages after 1988, as well as the drastic appreciation of the yen during the period 1991-1995, a factor which also helped Taiwanese and Korean enterprises to survive in international competition. In response to these factors, Japanese, Taiwanese, and Korean enterprises were forced to shift their production from the Asian NIEs to the ASEAN countries and China. As a consequence, both the value of international trade and the ratio of trade reliance in East Asia grew enormously, thereby generating a remarkable record of high and sustained economic growth unmatched by any other region in the world.

Triggered by these forces, the volumes of shipping rose steeply, generating a large concentration of container tonnage in East Asia. For years, half of the world's top ten container ports have been located in East Asia. By 1997, the container throughput of the four main hub ports in the Asian NIEs (Hong Kong, Singapore, Kaohsiung, and Busan), accounted for almost one fourth of the global total, while in 2001 Shanghai overtook Rotterdam to join the top five (see Fig. 2).

Fig. 2. Annual Throughput of World Top 10 Container Ports (1990-2001)



Note : The 2001 drop in Singapore's throughput was due to Maersk Sealand's terminal shift to the Port of Tanjung Pelepas (PTP), Malaysia in December 2000.

Source: 1) *Containerisation International Yearbooks*, 1992-2001; 2) *Containerisation International*, March 2002.

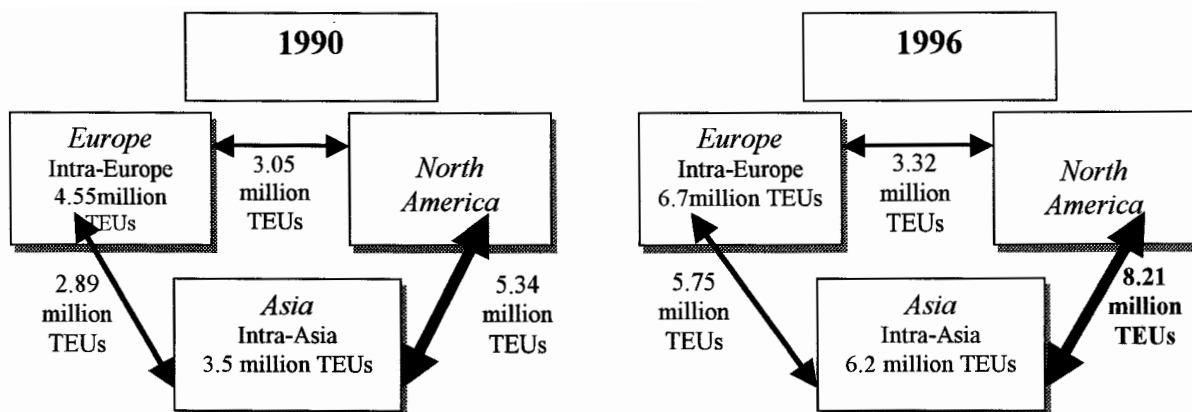
This paper falls into four main sections. The first describes the surge of container transportation in East Asia, the second analyzes the significance of East Asia in global container tonnage, the third illustrates the expansion and development of container

terminals in the main ports of East Asia, while the final section concludes by discussing the sustainability of container tonnage in East Asia in the twenty-first century.

2. The Surge in Container Transportation in East Asia

Fig. 3 illustrates the world's container traffic flow in 1990 and 1996. In 1990, the world's top trade route, the trans-Pacific (Far East/North America) service, handled 5.34 million TEUs. By 1996, the traffic volume had reached 8.21 million TEUs, an increase of 54 percent over 1990. In 1990, the container volume handled in the Far East/Europe service, which is second to the trans-Pacific service in terms of container tonnage, was 2.89 million TEUs. However, by 1996 the traffic volume had reached 5.75 million TEUs, almost double the figure for 1990. In 1990, the container traffic volume handled in the intra-Asian service, covering Japan, China, the Asian NIEs, and the ASEAN 4, was 3.5 million TEUs, accounting for 15 percent of the world's total container traffic. In comparison, in the same year the container traffic volume handled in the trans-Pacific service was 5.34 million TEUs and the volume in the intra-European (EU) service was 4.55 million TEUs, accounting for 22.8 percent and 19.4 percent of the world's total container traffic respectively.

Fig. 3. The Importance of the Intra-Asian Service in World Container Traffic



Source : Nippon Yusen Kaisha Research Division.

It is understandable that the scale of container traffic handled in the intra-Asian service in 1990 was less than that in the trans-Pacific and the intra-European (EU) services; however, it did surpass the traffic volume in the Far East/Europe service (2.89 million TEUs) and the trans-Atlantic service (3.05 million TEUs), which accounted for 12.3 and 13 percent of the world's container traffic respectively. However, in 1996, the container traffic volumes in the intra-Asian service reached 6.2 million TEUs accounting for 16.6 percent of the world's total container traffic.

This was still smaller than the figure for the trans-Pacific service of 8.21 million TEUs, or 22 percent of the world's container traffic. But it was now nearly as large as

the intra-European service (6.7 million), and was larger than the Far East/Europe service (5.75 million TEUs, or 15.4 percent of the world total) as well as the trans-Atlantic service (3.32 million TEUs, or 8.9 percent of the world total). Clearly, the intra-Asian service, with its buoyant economic growth, has emerged as a major new force in the world container traffic services (Wang 1997).

3. The Weight of East Asia in Global Container Tonnage

Table 1. The Position of the Ports of East Asia, the U.S. and the EU 10 in the World Total Container Throughput (Unit: 1,000 TEUs)

Country	1985	1990	1991	1992	1993	1994	1995	1996	1997	1997/1985
Japan	5,517	7,956	8,782	8,965	9,349	10,417	10,604	11,033	10,892	1.97
(%)	9.9%	9.3%	9.4%	8.7%	8.3%	8.1%	7.7%	7.3%	6.7%	
Port of Hong Kong	2,289	5,101	6,162	7,972	9,204	11,050	12,550	13,460	14,567	
Port of Singapore	1,699	5,224	6,354	7,560	9,046	10,399	11,846	12,944	14,135	
Port of Kaohsiung	1,901	3,495	3,913	3,961	4,636	4,900	5,053	5,063	5,693	
Port of Busan	1,148	2,348	2,571	2,751	3,071	3,826	4,503	4,725	5,234	
Asian NIEs Hub Ports	7,037	16,167	19,000	22,244	25,957	30,175	33,952	36,192	39,629	5.63
(%)	12.6%	18.9%	20.3%	21.6%	22.9%	23.5%	24.7%	24.0%	24.2%	
Taiwan	3,075	5,451	6,130	6,179	6,795	7,310	7,849	7,866	8,516	
Korea	1,246	2,348	2,571	2,751	3,071	3,826	4,503	5,078	5,637	
Asian NIEs	8,309	18,124	21,217	24,462	28,116	32,585	36,748	38,995	42,452	5.11
(%)	14.9%	21.2%	22.7%	23.8%	24.8%	25.4%	26.8%	25.9%	25.9%	
Philippines	638	1,408	1,441	1,158	1,663	2,016	1,892	2,336	2,507	
Thailand	400	1,078	1,172	1,337	1,492	1,772	1,962	2,052	2,100	
Indonesia	229	924	1,153	1,397	1,611	1,912	2,048	1,764	1,920	
Malaysia	389	888	1,074	1,218	1,398	1,746	2,075	2,550	2,976	
ASEAN 4	1,656	4,298	4,840	5,110	6,164	7,446	7,977	8,702	9,503	5.74
(%)	3.0%	5.0%	5.2%	5.0%	5.4%	5.8%	5.8%	5.8%	5.8%	
China	446	1,204	1,506	2,011	2,785	4,064	4,682	5,238	5,788	12.98
(%)	0.8%	1.4%	1.6%	2.0%	2.5%	3.2%	3.4%	3.5%	3.5%	
East Asia	15,928	31,582	36,345	40,548	46,414	54,512	60,011	64,321	69,038	4.33
(%)	28.5%	36.9%	38.8%	39.3%	41.0%	42.5%	43.7%	42.7%	42.2%	
U.S.A.	11,533	15,245	15,546	16,889	17,390	18,442	19,104	21,777	23,758	2.06
(%)	20.6%	17.8%	16.6%	16.4%	15.4%	14.4%	13.9%	14.4%	14.5%	
EU 10	14,782	19,697	20,848	22,134	22,872	25,046	26,846	28,848	33,187	2.61
(%)	26.4%	23.0%	22.3%	21.5%	20.2%	19.5%	19.6%	19.1%	20.3%	
Others	13,660	19,073	20,907	23,335	26,536	30,320	31,278	35,807	37,761	3.47
(%)	24.4%	22.3%	22.3%	22.7%	23.4%	23.6%	22.8%	23.8%	23.1%	
World	55,903	85,597	93,646	102,906	113,212	128,320	137,239	150,753	163,744	2.93

Note: The EU10 refers to United Kingdom, Germany, France, Holland, Italy, Spain, Belgium, Portugal, Greece, and Denmark.

Source: *Containerisation International Yearbook*, 1983-1999.

As has been already mentioned, the container traffic tonnage in intra-Asian service, particularly in the Asian NIEs, has been increasing substantially during the last decade.

In this section, we would like to look into the position of East Asia as well as the Asian NIEs in the world in terms of container tonnage.

Table 1 shows the container throughput by port, region and country from 1985 to 1997, and as a proportion of the world's total container traffic. As is evident from the table, during these 12 years the container throughput in East Asia rose from 15.9 million TEUs to 69.0 million TEUs, and from 28.5 percent to 42.2 percent of the world's total container tonnages.

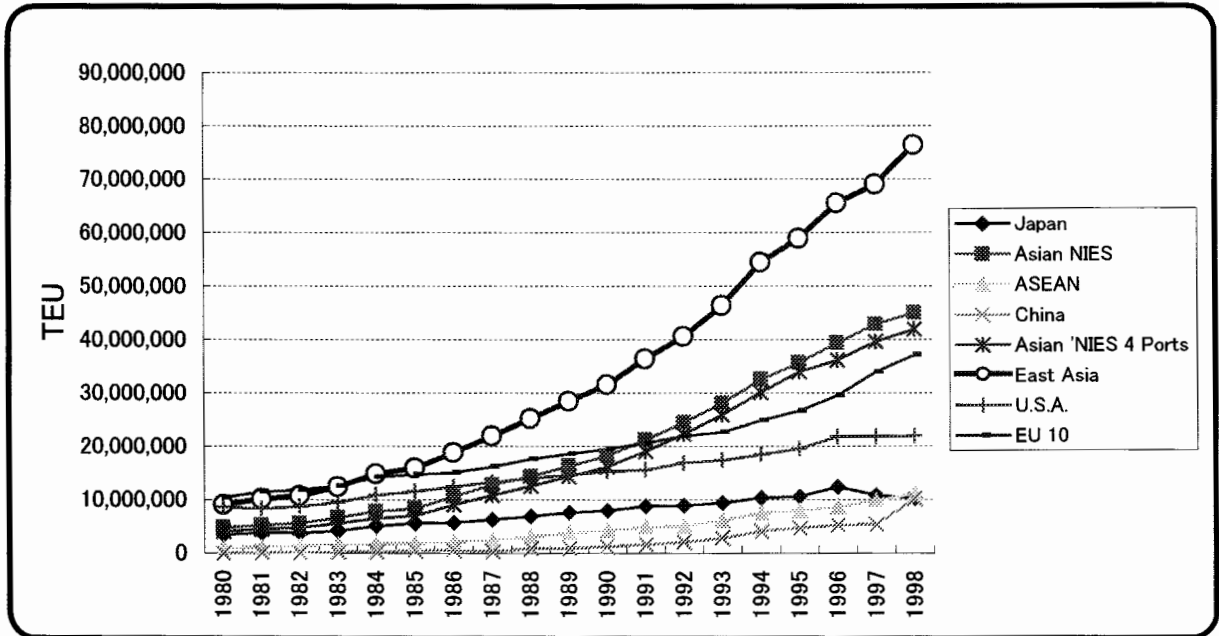
If looking we look more in more detail at the hub ports of the Asian NIEs, it can be seen that during the same period their share of the world's container throughput rose from 14.9 percent to 25.9 percent. It is also surprising to find that during the same period the percentage of total container throughput in the Asian NIEs' main ports (Hong Kong, Singapore, Kaohsiung and Busan) rose from 12.6 percent to an astounding 24.2 percent, accounting almost for one fourth of the world's container tonnage. In comparison, the share of ASEAN 4 ports rose from 3.0 percent to 5.8 percent, and the share of ports in China rose from 0.3 percent to 3.5 percent. Meanwhile the share of U.S. ports declined from 20.6 percent to 14.5 percent, and the share of ports in the EU 10 declined from 26.4 percent to 20.3 percent. It is apparent that these hub ports in the Asian NIEs have contributed greatly to the growth of container traffic tonnage in East Asia as a whole (Wang, 2000).

Figs. 4 and 5 indicate the volume and percentage of container traffic handled by East Asia, the U.S. and the EU 10 during the period 1980-1998, as well as their share of the world's total container traffic volume. As can be seen from Fig. 4, the volume of container traffic handled by East Asia, particularly the Asian NIEs, showed a conspicuous annual increase over these years. In 1980, the EU 10, East Asia, and the U.S. were the top three container traffic regions in the world; however, in 1984 the container traffic volume of East Asia (14.84 million TEUs) began to surpass that of the EU 10 (14.31 million TEUs). It has been increasing rapidly ever since to become the main hub of the world's container industry, unmatched by any other country or region.

In contrast, during the same period, the traffic volume in the EU 10 and the U.S. (10.9 million TEUs) has been demonstrating slow growth, ranking second and third in container tonnage respectively. As a consequence, the gap in traffic volumes between East Asia and the EU 10, as well as the U.S., has become ever larger since 1984. In 1995, the difference in container traffic volumes between East Asia and the EU 10 (32.22 million TEUs), as well as that between East Asia and the U.S. (39.52 million TEUs) were the largest in maritime history. As a result, East Asia's share of the world's total container traffic volume reached 43.8 percent in 1995, compared to 24.4 percent in 1980.

Also, special attention should be paid to the percentage of the Asian NIEs. In 1986, they demonstrated a dramatic increase of 27.7 percent over the previous year, thanks to the G5 agreement, which stimulated overseas production by Japanese enterprises in the Asian NIEs, especially in labor-intensive industries. The subsequent exports of plant, equipment, parts etc. resulted in a substantial container concentration in this region. In comparison during the same period, the percentage of the EU 10 and the U.S. dropped from 30 percent to 19.9 percent, and from 23 percent to 14.5 percent respectively. From this phenomenal change, it can be construed that the center of global container traffic has been shifting from Europe and the U.S. to East Asia.

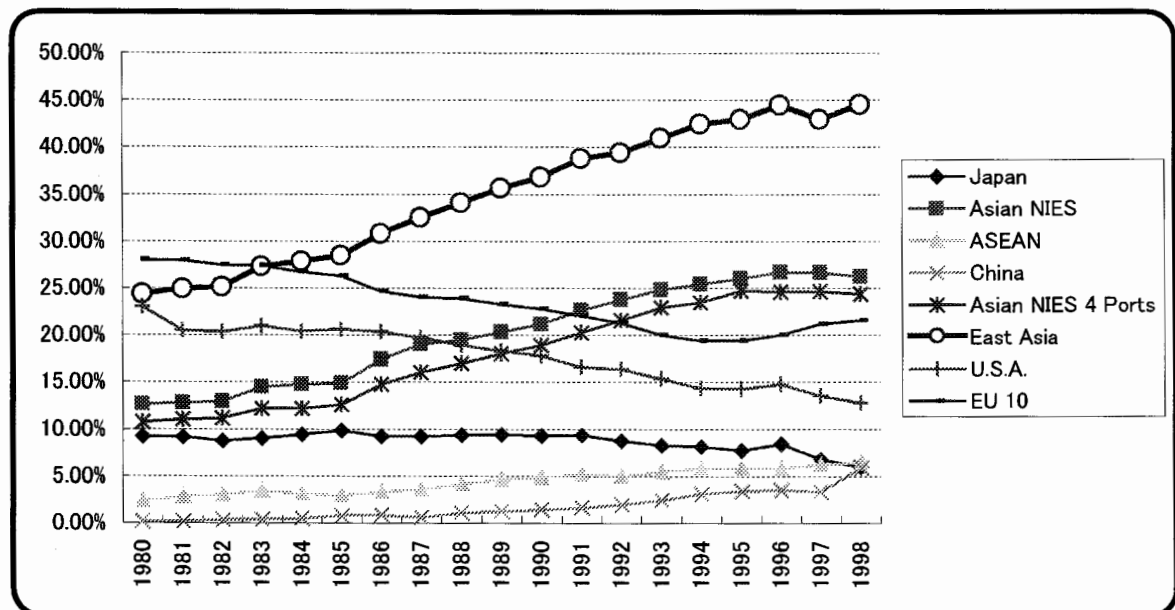
Fig. 4. Weight of East Asia, the U.S. and the EU 10 in World Container Traffic Volume (1980-1998)



Note: The EU10 refers to United Kingdom, Germany, France, Holland, Italy, Spain, Belgium, Portugal, Greece, and Denmark.

Source: *Containerisation International Yearbook*, 1983-2000.

Fig. 5. Volume Percentage of East Asia, the U.S. and the EU 10 in World Container Traffic (1980-1998)



Note: The EU10 refers to United Kingdom, Germany, France, Holland, Italy, Spain, Belgium, Portugal, Greece, and Denmark. Source: *Containerisation International Yearbook*, 1983-1999.

4. The Expansion and Development of Container Terminals in East Asia

Through the early 1970s Japan consolidated its economic and trade position, spurring shipping services to expand substantially. In contrast, it has been the emergence of East Asia as a whole – particularly the Asian NIEs from the 1960s to the present, and the more recent rapid economic growth in Southeast Asia – that underlies containerization and the development of container handling capacity in the region's ports. Over the last decade, the shipping market in East Asia has emerged as an exceptional generator of container traffic. The Asian NIEs are among the most successful industrialized countries in the developing world.

The rapid and sustained growth of international trade and container tonnage in East Asia, and particularly of Hong Kong, Singapore, Kaohsiung and Busan as the hub ports in the mid-1990s, can be attributed to the foreign direct investment boom in this region, particularly from Japan.

The port of Hong Kong, as a major mainline or regional transport mega-hub, dominates the central cluster, and its continuing high growth reflects the rapid economic development in southern China, as well as its central position and significance. Given its business friendly environment and world class infrastructure, the port of Hong Kong is not only blessed with a unique geographical location in relation to its hinterland in mainland China, but it also plays a vital role as an entrepôt for container transshipment for both the Asia/North America and Asia /Europe traffic routes. Additionally, it provides feeder services for export and import cargoes between inland China and the adjacent Pearl River Delta. For those reasons, the port of Hong Kong has been the leading container port in the world for many years. Growth at the port will be boosted by the time the \$2 billion Container Terminal 9 comes on stream. Once completed, the new facility will occupy an area of 70 hectares of reclaimed land and will consist of four deep-sea berths and two feeder berths.

The port of Singapore is the load center of container ports in Southeast Asia. The focus of expertise in the port of Singapore has mainly been in the fields of containerized freight and logistics. As a maritime hub encompassing the whole range of services, Singapore will become an even bigger attraction for carriers, thanks to on-going liberalization of financial and telecommunication services.² The globalization efforts of the Ports of Singapore Authority (PSA) have now become a significant part of the group's business. Despite the global economic slowdown in 2001, PSA's international throughput grew by 32.8 percent over 2000. Since embarking on its first project in the

² Singapore's successful formula in constantly upgrading port facilities has been adopted by its neighbors. Singapore now is facing competition from Malaysia, with its new container ports, airport, highways, railway, and multimedia corridor. However, the Transport Ministry of Malaysia is going to introduce legislation compelling local exporters to use Port Klang. The policy is to increase the RM200 Causeway levy on Malaysian lorries leaving the country. The levy for lorries leaving via the Causeway might be increased by 100 percent to RM400 or more. The proposed law may not require local exporters to immediately use Port Klang for 100 percent of their cargo, but it may compel them to reduce the amount dispatched via Singapore within a given time frame. Currently, 40 percent of an estimated 3 million TEUs of local cargo are being exported via Singapore. Of this volume, 45 percent originated from the Klang Valley. For further details, see "Efforts to increase use of Port Klang," *New Straits Times*, July 17, 1998, p. 8 and "Malaysia vs. Singapore: A new spin in the anti-complacency drive," *Asiaweek*, January 17, 1997, p. 20.

Port of Dalian, China in 1996, PSA's international business has achieved tremendous growth. From 0.2 million TEUs in 1996, the throughput handled outside Singapore reached 3.61 million TEUs in 2001, a compounded growth of 78.3 percent per annum. Up to March 2002, PSA was involved in developing, managing and operating thirteen overseas ports in eight countries around the world: Brunei, China, India, Italy, Portugal, South Korea, Yemen and Belgium.³ The eleven ports already in operation were expected to handle a throughput of 7.5 million TEUs in 2002. The other two, Sines Container Terminal in Portugal and Incheon Container Terminal in South Korea, are due to come on stream in 2003 and 2004 respectively.

PSA's global network widened significantly when Belgian terminal operator Hesse Noord Natie (HNN) was brought into the fold in March 2002. The acquisition of 80 percent of HNN, is PSA's largest single foreign investment to date and gives it a strong foothold in the North European market. Additionally, in 2001, PSA also began port developments on green field sites in South Korea and Portugal.⁴

These projects are expected to contribute significantly to PSA's growth and have attracted international attention to the group (see Table 2). Moving ahead, PSA plans to pursue overseas expansion and the development of its information technology services vigorously. In 1999, PSA and Hong Kong's China Merchants Holdings Group (CMH) formed a new logistics company in China named the China Merchants-PSA Logistics Network Co. Ltd. Aiming to be a full-fledged logistics providers, the company has since secured a number of logistics contracts in major cities including Shanghai, Guangzhou, and Tianjin, as well as with multi-national companies and their representatives, such as Philips Lighting and Tiat Trading, the distributor for Heineken Beer and Evian Natural Spring Water. It is actively looking for prospective partners to set up regional logistics centers so as to build up a pan-China logistics network.

On the technology front, the year 2000 saw PSA spin off its IT/e-commerce arm into a separate subsidiary company, Portnet.Com. This company aims to introduce a system called PORTNET, an industry-wide e-business network embracing both shipping and ports, to ports and around the world.⁵ It has successfully implemented customized versions of PORTNET in Dalian, China, and in Italy, and is developing another for the Port of Seattle, USA.

³ This is a 25-year contract with the government of Negara Brunei Darussalam to manage, develop and operate the Muara Container Terminal (MCT). The agreement, with an option for a five-year extension, was signed between the Brunei Government and PSA Muara Container Terminal. The latter is a joint venture company between PSA and Brunei's Archipelago Development Corporation. MCT is the first fully equipped container terminal on the island of Borneo and is well positioned as a regional trans-shipment hub to serve the growth BIMP-EAGA (Brunei, Indonesia, Malaysia, Philippines and the East ASEAN Growth Area) region.

⁴ See *The PSA Corporation Annual Report 2001*, 42-43 for further details.

⁵ PORTNET is PSA's unique user-friendly Internet system, it provides end-to-end e-commerce from the point of booking to the point of billing for shipping lines, shipping agencies, freight forwarders and shippers/consignees. Functions include track and track of cargo, submission of electronic bay plans, management of berthing schedules, submission of billing. It was developed in 1984 and was officially launched in 1989. With PORTNET, virtually every aspect of shipping can be managed online. In June 1999, it was moved to an Internet global platform.

Table 2. PSA Corporation's Overseas Container Terminals Investments

Container Terminal	Voltri	Venice	Aden	Muara
Country	Italy	Italy	Yemen	Negara Brunei Darussalam
No. of Berths	4/2*	3	2	1
Total Quay Length	1,400 m	510 m	1,700 m (Phase 1)	250 m
Draft	15.0 m	9.0 m	16.0 m	12.5 m
Stacking Area	350,000 m ²	54,600 m ²	350,000 m ²	62,000 m ²
Container Handling Equipment	8 quay cranes 13 yard cranes	4 quay cranes 8 yard cranes	4 post panamax quay cranes 8 yard cranes	2 quay cranes 5 reach stackers
Terminal Capacity	870,000 TEUs	300,000 TEUs	500,000 TEUs	220,000 TEUs
Operation	1998+	1998+	1999+	1999+
Container Terminal	Dalian	Fuzhou Quingzhou	Fuzhou Aofeng	Fuzhou Jiangyin
Country	China	China	China	China
Number. Of Berth	4	2	1	--
Quay Length	1,113 m	519 m	156 m	--
Draft	12.0-14.0 m	11.7 m	6.5 m	--
Stacking Area	392,000 m ²	66,000 m ²	6,300 m ²	--
Container Handling Equipment	7 quay cranes 23 yard cranes	2 quay cranes 8 yard cranes	1 fixed crane 2 reach stackers	--
Terminal Capacity	1,500,000 TEUs	340,000 TEUs		--
Operation	1996+	1998+	2002+	2002+
Container Terminal	Guangzhou	Tuticorin	Pipavav	Zeebrugge
Country	China	South India	India	Belgium
Number of Berth	6	2	2** /1***/1 ****	3
Total Quay Length		370 m	975 m	--
Draft		11.9 m	13.5 m	--
Stacking Area		55,000 m ²	100,000 m ²	--
Container Handling Equipment	--	2 quay cranes 4 rubber-tyred gantry cranes	2 quay cranes 5 yard cranes for phase 1	--
Terminal Capacity	1,000,000 TEUs	200,000 TEUs	200,000 TEUs	--
Operation	2001+	1999+	1998+	2002
Container Terminal	Antwerp	Hibikinada	Sines	Incheon
Country	Belgium	Kitakyushu, Japan	Portugal	Korea
Number of Berth	3	4 (1st phase)	3	3
Total Quay Length	--	1,400 m	940 m	900 m
Draft	--	2 berth × 15 m 2 berth × 10 m	16.0-17.0 m	12.0-13.0 m
Stacking Area	--	360,000 m ²	--	--
Container Handling Equipment	--	--	--	--
Terminal Capacity	--	500,000 TEUs	1,400,000 TEUs	--
Operation	2002+	2003++	2003++	2004**

Note 1: * denotes car carrier and Ro-Ro Berth, ** denotes general cargo berth, *** denotes bulk berth (to be converted to container berth in phase 1), **** denotes liquid berth.

Note 2: + denotes ports under operation; ++ denotes ports plan to operate,

Source: PSA Corporation.

PSA has also teamed up with P&O Ports to acquire a stake in P-Serve Technologies (PST), a provider of internet-based track-and-trace solutions. Under an agreement signed by the three parties, PST will provide the infrastructure and project management while PSA and P&O will market the system, eLogicity, to their customers through their respective ports and logistics businesses.

The port of Kaohsiung, with its geographical location on the southwestern coast of Taiwan on the key trade lanes running through the Taiwan Strait and the Bashi Channel, is the largest international seaport in Taiwan and also an ideal hub port for the transshipment of export cargoes between the west coast of North America and Southeast Asia. Furthermore, owing to the opening of direct sailings between Kaohsiung and the ports of Xiamen and Fuzhou (Fujian Province) in China in 1997, Kaohsiung is now able to attract more trans-shipment cargoes from North America and China. In the past two decades, Kaohsiung has made significant contributions to the ROC. (Republic of China) economy. For instance, the Export Processing Zone (EPZ), situated on the Chungtao Peninsula in the harbor, is a huge complex of factories and offices that brings in raw materials and parts duty free for manufacturing and export. In addition, Kaohsiung possesses one of the world's largest shipwrecking facilities. Of particular note was the privatization of stevedoring services in January 1998, which was regarded as one of the reasons for its double-digit growth (11.4 percent) in container throughput, reaching to 6,985,361 TEUs in 1999 and 7,425,831 TEUs in 2000.⁶

Table 3 provides data illustrating the double-digit growth in inbound/outbound vessel numbers, container throughput at the container terminal and cargo throughput (container +general cargo), as well as the hourly handling capability at the conventional terminal after the privatization of stevedoring services in the port of Kaohsiung.

The port of Busan, lying on the southeast coast of Korean peninsula facing the Korea Strait, plays a pivotal role as the transshipment hub in northeast Asia, providing a bridge between the ports of Vladivostok and Vostochny in Russia, the ports of Dalian, Qingdao, and Lianyungan in north China, and 58 ports (8 main ports and 50 domestic ports) in Japan, as well as with Southeast Asia, North America and Europe. This geographical advantage has allowed the port of Busan to join the league of the top ten container ports in the world.

The 2000 jump of 17.1 percent in the number of containers handled in South Korea was the largest increase since the 1995 Kobe earthquake when South Korea won a large share of Japan's trans-shipment cargo. Container throughput is expected to increase annually because South Korea's role as a logistics hub for north Asia is becoming more and more significant.

Additionally in 1994, the Korean government commissioned the Korea Container Terminal Authority (KCTA) to launch intensive short, medium and long term port development projects, in order to cope smoothly with the drastic increase in container volume resulting from brisk Korean economic growth, and to help achieve balanced development of the country's land. Medium term projects included the Busan port fourth phase development (1991-1997), consisting of development and expansion projects in Gamman Port. This project was unprecedented in the history of port development in Korea as the Korean government invited capital investment from the private sector, including the carriers. Other medium term projects included the Port of

⁶ See Chen Shu-Ling (1998), "The Privatisation of Port of Kaohsiung", *KaoPort 21* International Conference on Shipping Development and Port Management for further details.

Kaddo or Busan New Port (2001-2007), located 50 km to the west of Busan; the Port of Kwangyang (first phase 1987-1997, second phase 1995-2003), located about 170 kilometers to the west of Busan; and the South Port of Inchoen (2001-2003). The long term projects are the third phase (1999-2008) and the fourth phase (2002-2011) of the development of the port of Kwangyang (see Table 4).

Table 3. Comparison in Inbound/Outbound Vessel, Cargoes and Throughput before and after the Privatization of Stevedoring Services at the Port of Kaohsiung

Items		Unit	Performance during January-March, 1998	Percentage Increase over January-March, 1997
Vessels	Total	Number	8,312	+13.09%
		Tonnage	140,987,381	+11.33%
	Inbound	Number	4,160	+13.29%
		Tonnage	70,662,313	+11.17%
	Outbound	Number	4,152	+12.89%
		Tonnage	70,325,068	+11.49%
Container Cargo	Throughput	TEU	1,401,739	+12.85%
Container + General Cargo	Throughput	Ton	28,447,909	+20.36%
Conventional Terminal	Throughput	Ton/hour	98.5	+13.00%

Note: MPH=Movement Per Hour.

Source: Kaohsiung Port Bureau.

Table 4. The Development of Kwangyang Container Terminal

	Total	1 st phase	2 nd phase	3 rd phase	4 th phase
Period	1987-2011	1987-1997	1995-2003	1999-2008	2002-2011
Number of Berths	33	4	8	1999-2007 (4) 2005-2008 (3)	14
Quay Length (m)	11,700	1,400	2,300m	2,450m	5,500m
Vessel Calling Capacity (DWT × Vessel)	50,000 × 24 20,000 × 4	50,000	50,000 × 4 20,000 × 4	50,000	50,000
Draft (m)	15	15	15	15	15
Annual Handling Capability (TEU)	8,280,000	960,000	1,440,000	1,680,000	4,200,000

Source: Korea Container Terminal Authority.

Upon completion of the second phase of development in 2002 (four berths for 50,000 dead weight tonnage [dwt] class vessels, and four berths for 20,000 dwt class vessels), the port of Kwangyang will have the capacity to handle 2.4 million TEU annually, compared with a total capacity of 8.28 million TEU once the whole project is completed in 2011.⁷

⁷ See Mariner Wang (January-March 1998), "The Competitive Advantage of Northeast Asia Hub Ports—Kobe and Pusan: From the Viewpoint of Global Container Transportation" *The Bulletin of Japan*

The construction of Busan New Port, exclusively for containers, will cost a total of 6.15 trillion won. The consortium of builders and operators includes Samsung (27.5 percent), Hyundai (16.5 percent), Hanjin (12.5 percent) and KCTA (9.0 percent). The consortium will construct a container terminal capable of accommodating seven 50,000 dwt and three 20,000 dwt container vessels in the first phase of development, as well as eight 50,000 dwt and six 20,000 dwt container vessels in the second phase of development, together with backup facilities. In comparison, the third and fourth phases of development, costing 844.6 billion won, will allow the accommodation of ten 50,000 dwt container vessels. By the year 2011, when the long-term Busan port development plan is completed, there will be 65 berths, with an annual container handling capability of 15.75 million TEUs coming into operation. Another upgrade for the entire Busan complex involves spending 58 billion won on deepening the quayside channel from the current 13 meters to 15 meters. As South Korea adds container capacity, container lines will increasingly prefer to use Busan as a hub, in order to avoid the more expensive Japanese facilities, and also to access the increasingly attractive mainland Chinese market. A rapprochement and the restoration of rail links between North and South Korea⁸ would provide a further opportunity to strengthen the Korean Peninsula's claim to be the major hub of northeast Asia.⁹

Special attention should be paid to the ports in China.¹⁰ In recent years, Chinese exports have moved into high gear to supply the swelling needs of world trade, and the Port of Shanghai has been a major beneficiary from the huge expansion in trade to the East and West Coasts of the U.S. Container throughput at Shanghai was surprisingly resilient in 1998, despite the Asian economic crisis: it handled 3.05 million TEUs in 1998, up 21% on the previous year's figure of 2.53 million, placing Shanghai tenth in the world ranking, the first time in recent memory that the port had been placed among the world's top ten largest ports (see Fig. 6). Despite a growing concern that its operational capacity is being squeezed, the Port of Shanghai has retained its position as the mainland's leading container port. In 2001, it demonstrated an 11 percent increase over 2000 in box traffic, to 6.33 million TEUs, placing Shanghai port as the fifth in the world rankings. The remarkable nature of this achievement is due to the sustained investment in new terminals and the introduction of world-class expertise in the port management of Shanghai Container Terminals (SCT) through Hutchison Port Holdings. These factors have fuelled the rapid ascent of Shanghai Port in the world rankings.¹¹[14]

Furthermore, throughput at the South China port complex of Shenzhen district, including Shekou, Yantian and Chiwan ports, cannot be ignored. In 1999, they posted a huge 53 percent rise in throughput, to 2.98 million TEUs. In 2000, containers transported in and out of Shenzhen district reached 3.99 million TEUs, up 33.8 percent over the previous year. This collectively pushed the Shenzhen complex, comprising Shekou Container Terminals (SCT), Kaifeng Terminal (KFT) and Yantian International

Maritime Research Institute, No.379-381, Japan Maritime Research Institute, and *Toward New Era of Two Hub Port System*, 1998, Korea Container Terminal Authority for further details.

⁸ The 318 km rail line from the South's capital of Seoul to the North's Sinuiju city bordering China, will lay the groundwork for an international railway. Not only will inter-Korea business generate more container throughput, but shippers in Japan and Korea will also get a faster, cheaper route to Europe initially via Pusan or Kwangyang Port, then via the Trans-Siberian Railway.

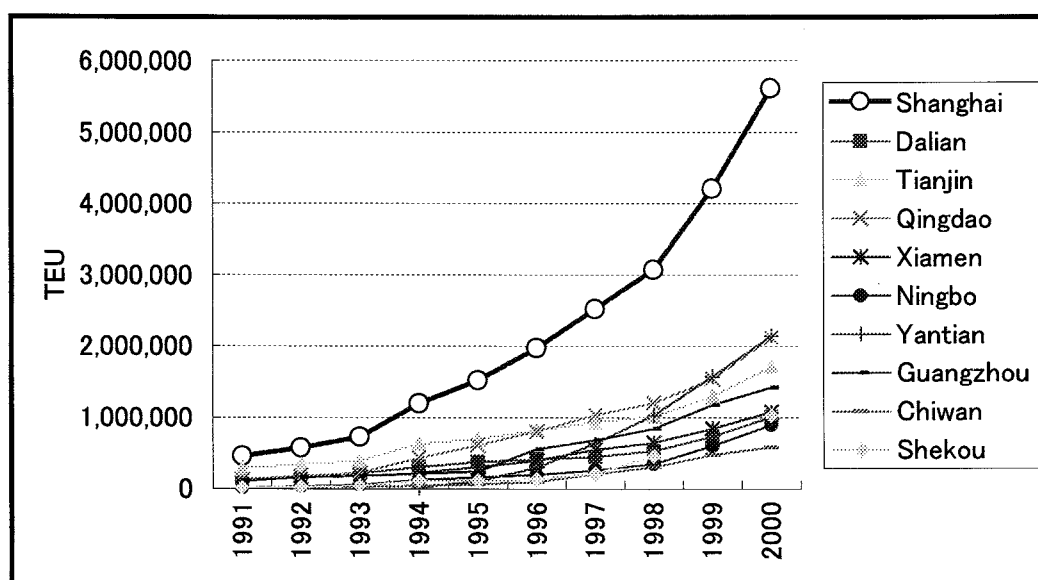
⁹ *Lloyd's List Maritime Asia*, October 2000, LLP Limited, 6-7.

¹⁰ China has 106 coastal ports and 485 inland ports capable of handling vessels of 10,000 tonnages.

¹¹ *Lloyd's List Maritime Asia*, April 1999, LLP, 32.

Container Terminals (YICT), into the top eleven of the world's container ports in 2000. The Shenzhen ports are expected to handle around 5.2 million TEUs in 2001. Undoubtedly, Shenzhen will continue to be a major challenger for Hong Kong's market share.¹²

Fig. 6. Container Throughput at the Major Chinese Ports (1991-2000)



Source: Ministry of Transportation, China.

Additionally, attracted by the buoyant economic growth in southern China as well as the opening of direct sailings between Taiwan and China, and as it expanded capacity in line with the strong growth, Maersk-Sealand revamped its China-Europe routes in 2000 to include the ports of Xiamen and Fuzhou. These ports, which are located across the Straits of Taiwan, have benefited from a mix of new direct-call liner services to and from Europe and North America, and the growing relay trade to and from Taiwan. The container throughput of those two ports increased by 30.7 and 28.0 percent respectively in 1999, and by 27 and 25 percent in 2000.¹³ On the basis of China's continuing economic development and its admission into the World Trade Organization (WTO), this growth seems set to continue.

5. Conclusion

The concentration of container tonnage in East Asia and the intensity of operations are significant not only in regional but also in global terms. Nor is it only the simple magnitudes involved that make regional concentration significant. It is also the way in which the ports are linked together into global and regional shipping networks. The main hub and feeder structure is based on large flows of containers and shipping capacity to a small number of extremely efficient ports. This, combined with the further

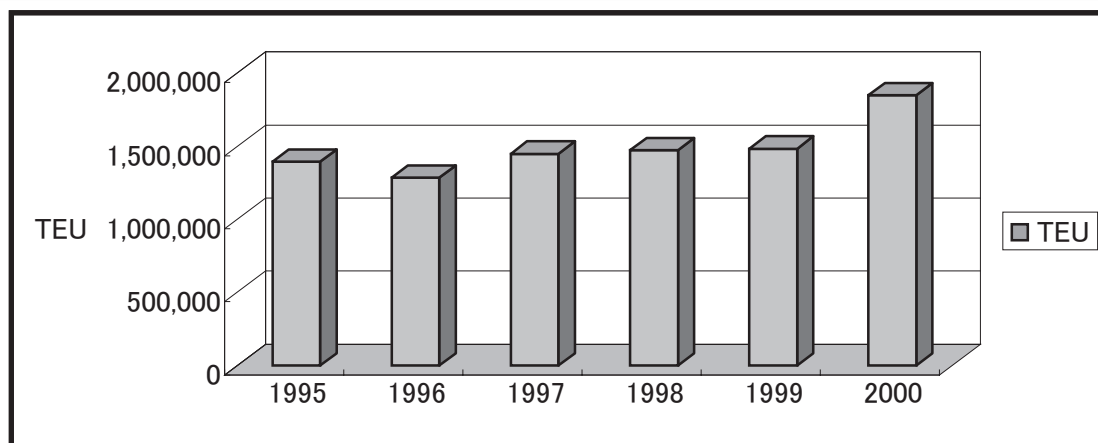
¹² *Lloyd's List Maritime Asia*, December 2000, LLP Limited, 26.

¹³ *Containerisation International*, March 2000, 2001, Emap Business Communications.

distribution capacity of these ports, gives East Asia particular significance at both the global and the regional level.

1999 saw an economic rebound in Asia following the financial crisis which originated from the devaluation of the Thai Baht in July 1997, and the end of the period of economic stagnation which followed. The Asian region has generally turned the corner and is now heading towards economic recovery.¹⁴ World economic growth and world trade began to improve once more, with estimates for world trade growth at 7.1 percent in 2000 against 4.5 percent in 1999. Presuming that a sustained economic cyclical upswing is now underway, the robust performance can be attributed to the acceleration of Asian economic recovery, plus an upturn in trans-Pacific shipments in the second half of 1999.

Fig. 7. World Container Output (1995-2000)



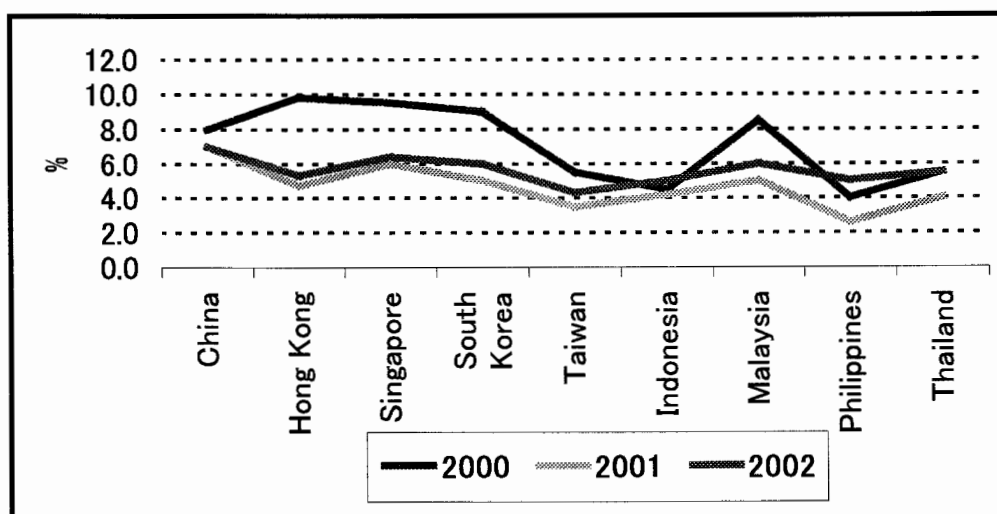
Note: Totals include maritime and regional container types.

Source: *Container International*, February 2001.

According to the analytic report from *Containerisation International Market Analysis* "The World Container Census 2001," global container output, after remaining largely static for several years, increased by 25 percent in 2000 to a new record high of more than 1.85 million TEUs (see Fig. 7). The rise in container production was firmly underpinned by improved global trade growth during 2000 and a record delivery of over 600,000 TEU of additional vessel slots in the same year. Additionally, the world fleet of containers will grow by 40 percent over the next three years, to reach 20.9 million TEUs by 2005, representing a year-on-year growth of 8.5%.

¹⁴ There are two reasons accounting for slowing in economic growth. The first is the failure to reform across the region and the lack of a civil society. The second is the dramatic blow to growth that Asia will suffer from a fast and furious hi-tech recession in the U.S. In addition, Asian countries remain saddled with bad assets and debts. Most have dysfunctional institutions and markets to allocate capital.

Fig. 8. Forecast Real GDP Growth in East Asia, 2000-2002



Source: DB Global Markets Research.

Fig. 8 illustrates the forecast real GDP growth in East Asia from 2000 to 2002 surveyed by *DB Global Markets Research*. It reveals that the East Asian real GDP growth in 2000 outside Japan increased by from 4.0 percent in the Philippines to 8.0 percent in China, 9.0 percent in South Korea, 9.5 percent in Singapore, and 9.8 percent in Hong Kong respectively, signaling an upward revision of economic expansion in the region. However, East Asian real GDP outside Japan and China was expected to increase by about 5 percent in 2001, down from 7 percent the previous year, and China was expected to turn in figures of around 7 percent. The reason for the regional slide was due to the fact that there was not sufficient domestic demand to offset the feared export slump as consumer spending in Asia weakened. However, East Asia is more resilient and its vulnerability to global deceleration is fairly limited.

As predicted by *Ocean Shipping Consultants*, the share of East Asia in the world container market rose from 43.7 percent in 1995 to 50.2 percent by the year 2000, despite strong growth in other world markets. By 2010, its share is forecast to rise to around 52.4 percent, equal to a massive 244 million TEUs, making it the world center of high intensity liner shipping operations. During the current decade, China and the second tier of industrializing countries will really begin to make their mark.¹⁵

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¹⁵ *Lloyd's List Maritime Asia*, March 1996, LLP Limited, 3.

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