

Port Cooperation in China, Korea and Japan: From the Perspective of Shipping Network and Port Development

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1. Introduction

During the last decade the vigorous expansion of international trade in East Asia generated 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 East Asia has been on the rise dramatically, expediting the shift of the center of global container traffic from Europe and the U.S. to the region of East Asia.

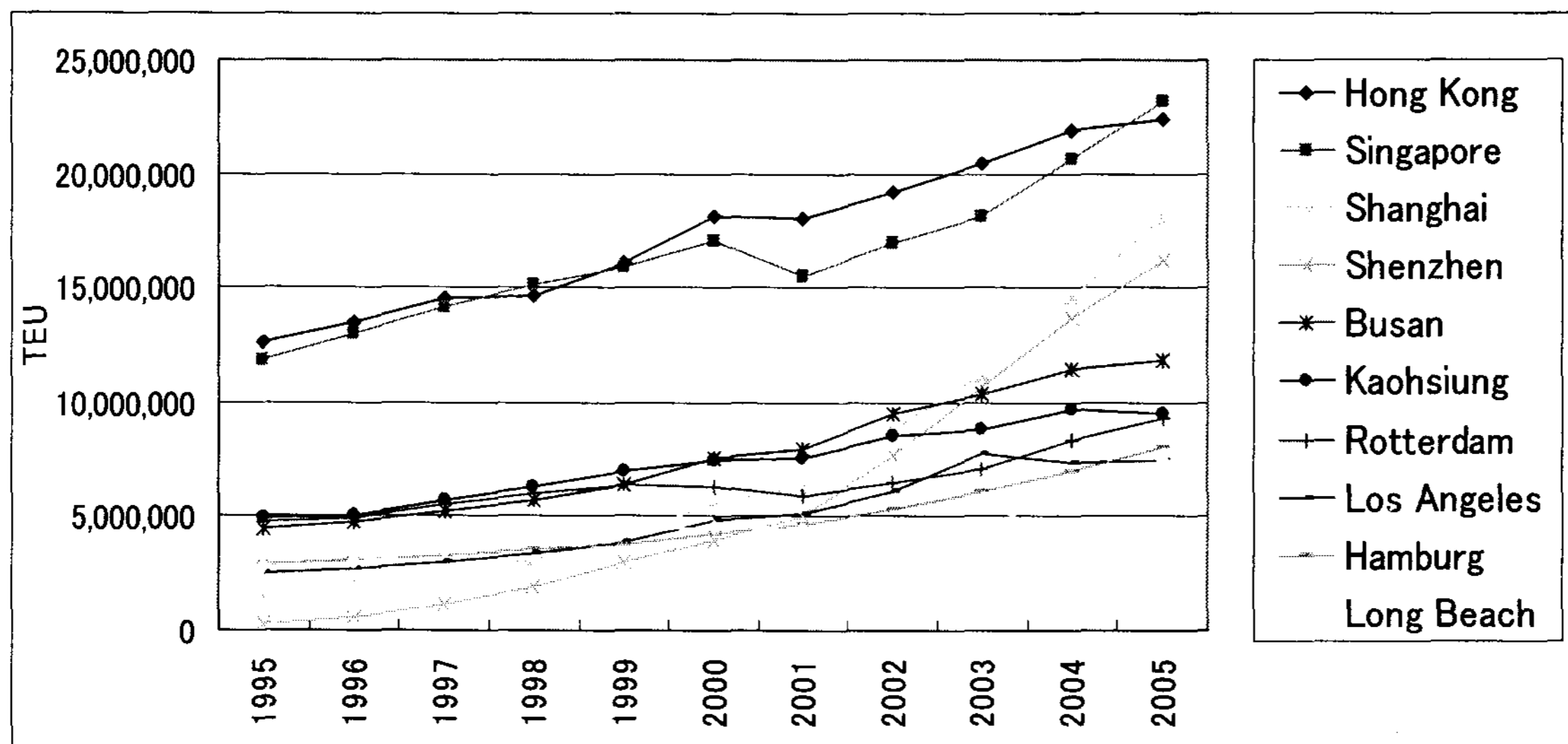
Triggered by this force, the volumes of shipping have risen steeply, generating a large concentration of container tonnage in East Asia. For years, ports in East Asia have been accounting for half of the world top 10 container ports. Of particular note, taking year 1997 for instance, the container throughput of four hub ports (Korea, Taiwan, Hong Kong, Singapore) in the Asian NIEs accounted for almost one fourth of the global total. What's more, Chinese main ports, like Shanghai in year 2001, and Shenzhen (Yantian, Chiwan, Sekou) in year 2003 has surpassed port of Rotterdam joining port of Hong Kong, Singapore, Kaohsiung, and Busan as the top five out of the world top 10 container ports (see figure 1). Under the momentum of this unstoppable force of ever increasing container cargoes handling in the East Asian region, in year 2005, the East Asian main ports have accounted for three fifths, namely 60 percent out of world top 10 container ports.

In association with the dynamic container flow, for years, from the port cooperation point of view, main ports like Dalian, Qingdao, Tianjin, Shanghai, Yantian in China, Busan, Gwangyang in Korea, and Hakata, Osaka, Kobe, Nagoya, Yokohama, Tokyo in Japan have been playing the crucial role in jointly accelerating the transport of container cargoes on the Asia/North America, Asia/Europe trunk lanes and well as the

region of intra-Asia, though, to some extent, undoubtedly, the competition is inevitable among China, Korea and Japan (hereinafter referred to as CKJ) in terms of shipping lines attracting policies.

This report falls into four main sections. The first explicates the rise of container tonnage in East Asia. The second analyzes the shipping lane network in CKJ, The third, introduces the current port development in CKJ, while the final section concludes by discussing the role of main ports in CKJ from the point view of port cooperation.

Figure 1 Annual Throughput of World Top 10 Container Ports (1995-2004)



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

Source: 1) *Containerisation International Yearbooks*, 1992-2005.

2) *Containerisation International*, March 2006.

2. The Rise of Container Tonnage in East Asia

As was stated earlier, during the last decade, container tonnage in East Asia has been on the rise in parallel with the booming international trade expedited by the foreign direct investment from overseas, particularly from Japan, into the same region. The phenomenal change has been drawing a great concern in the world.

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

Country	1985	1990	1995	2000	2004	2004/1985
Japan	5,517	7,956	10,604	13,621	15,937	2.9
(%)	9.9%	9.3%	7.7%	6.0%	4.7%	
Asian NIEs	8,309	18,124	36,748	54,181	70,620	8.5
(%)	14.9%	21.2%	26.8%	24.0%	21.0%	
ASEAN 4	1,657	4,298	7,977	15,351	25,360	15.3
(%)	3.0%	5.0%	5.8%	6.8%	7.5%	
China	446	1,204	4,682	17,383	74,540	167.0
(%)	0.8%	1.4%	3.4%	7.7%	22.1%	
East Asia	15,928	31,582	60,011	100,536	186,457	11.7
(%)	28.5%	36.9%	43.7%	44.6%	55.4.0%	
U.S.A.	11,533	15,245	19,104	27,301	35,613	3.1
(%)	20.6%	17.8%	13.9%	12.1%	10.6%	
EU10	14,782	19,697	26,846	43,892	60,212	4.1
(%)	26.4%	23.0%	19.6%	19.5%	17.9%	
World	55,903	85,597	137,239	225,294	336,858	6.0

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

Source: *Containerisation International Yearbook*, 1983-2006.

Table 1 demonstrates the container throughput by port, region and country basis as well as their weight in comparison to the world's total container traffic from 1985 to 2004. As is evident from the table, during the period the container throughput in East Asia rose from 15.9 million TEUs to 186.5 million TEUs accounting for 55.4 percent out of the world's total container tonnages respectively.

If looking more minutely into the hub ports of the Asian NIEs, it can be realized that during the same period the weight of ports in the Asian NIEs out of the world's container throughput rose from 14.9 percent to 21.0 percent. In comparison, ports in the ASEAN 4 rose from 3.0 percent to 7.5 percent; ports in China rose from 0.8 percent to

22.1 percent; while the U.S. declined from 20.6 percent to 10.6 percent; the EU 10 declining from 26.4 percent to 17.9 percent. It is apparent that those hub ports in the Asian NIEs have contributed largely to the substantial growth of container traffic tonnages in East Asia as a whole [1] .

Figure 2 indicate the volume of container traffic handled by East Asia, the U.S. and the EU 10, as well as their weight in the world's total container traffic volume during the period of 1980-2004. As can be seen from the figure, during the period of 24 years the volume of container traffic handled by East Asia, particularly the Asian NIEs, has been demonstrating conspicuous increase annually. 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), and has been increasing drastically ever since to become the hub of the world's container concentration which is unmatched by any country or region in the world [2] .

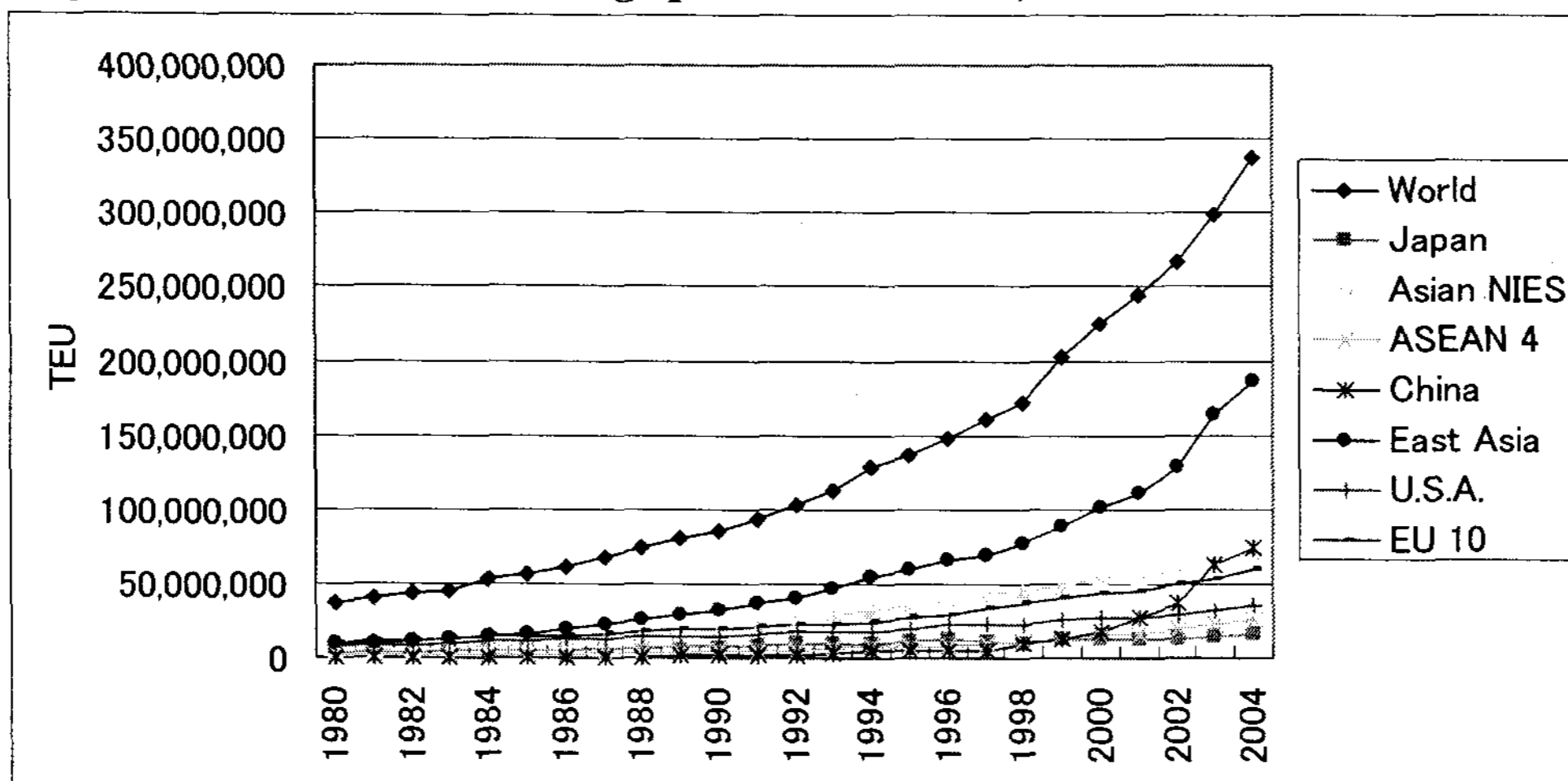
In contrast, during the same period, the traffic volume in the EU 10 and the U.S. (10.9 million TEUs) has been demonstrating slow growth, ranking 2nd and 3rd in container tonnage respectively. As a consequence, the gap of traffic volumes between East Asia and the EU 10, as well as the U.S. became ever larger since 1984. In 2004, the differences in container traffic volumes between East Asia and the EU 10, as well as East Asia and the U.S. were among the largest becoming 124.2 millions TEUs and 150.8 million TEUs respectively, which was unprecedented in maritime history. As a result, the percentage of East Asia in the world's total container traffic volume has reached astonishing 55.4 percent in 2004 compared to its 24.4 percent in 1980 (see figure 3).

Also, special attention should be paid to the percentage of container traffic of the Asian NIEs out of world's total container traffic volume. In 1986, they demonstrated a drastic increase to 17.4 percent, a 27.7 percent increase over the previous year (1985) in which the G5 agreement expedited Japanese enterprises' foray (labor intensive production) in the Asian NIEs, thus, by exporting the plant equipment, parts and etc., generating a substantial container concentration in this region. The percentage reached to 21.0 percent in year 2004. In comparison, during the period from 1985 to 2004 the

percentage of container traffic of the EU 10 out of world's total container traffic volume dropped from 26.4 percent to 17.9 percent, and the U.S. from 20.6 percent to 10.6 percent.

From this phenomenal change as mentioned above, it can be construed that the center of global container traffic has been shifting from Europe and U.S. to East Asia.

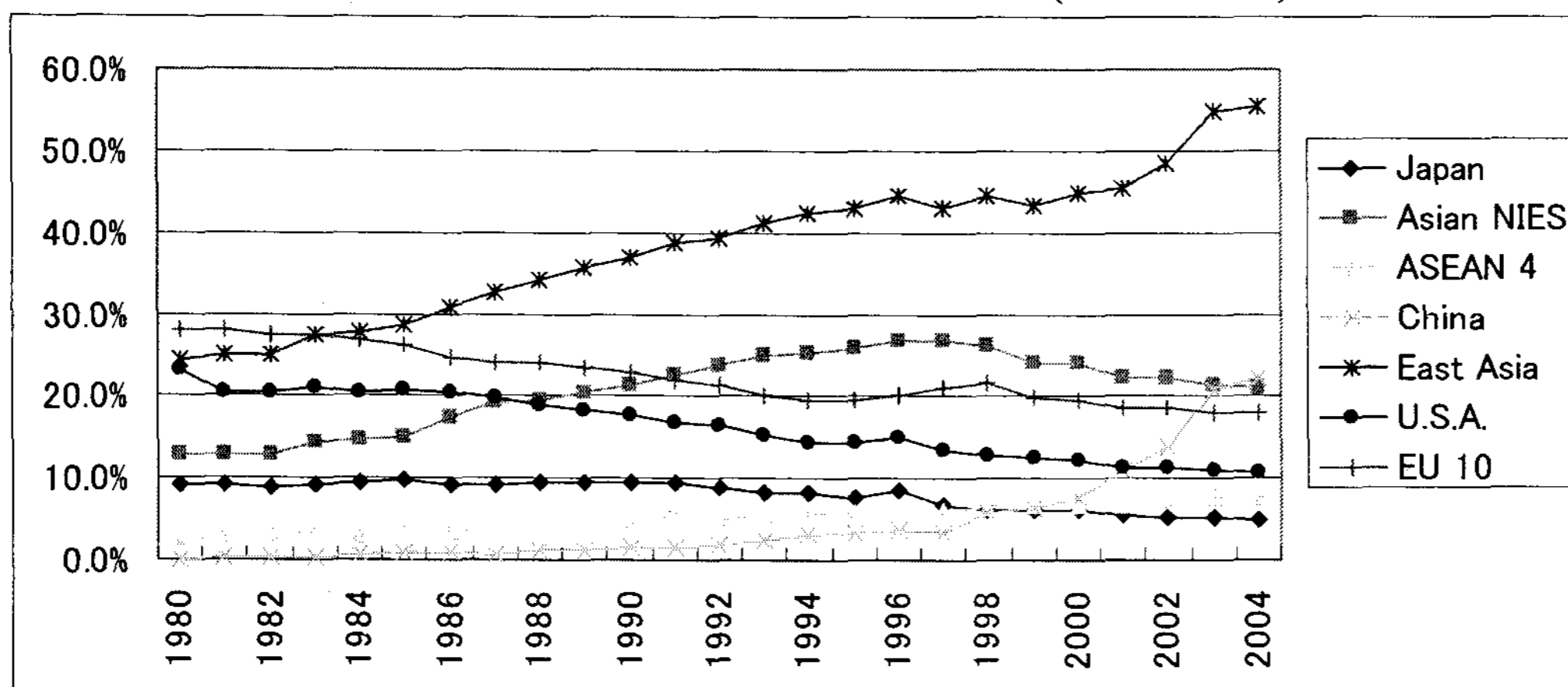
Figure 2 Container throughput in East Asia, the U.S. and the EU 10 (1980-2004)



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

Source: *Containerisation International Yearbook*, 1983-2006.

Figure 3. The weight of East Asia, the U.S. and the EU 10 in World Container Traffic Volume (1980-2004)



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

Source: *Containerisation International Yearbook*, 1983-2006.

3. Shipping Network among China, Korea and Japan

During the recent year, as the Asian trade has been coming in at a very bullish increase regionally and globally, the container transport between China/Korea, Japan /Korea, as well as Japan/China has been demonstrating buoyant growth. Major shipping lines have been trying to gain their foothold into the region by deploying feeder service to shuttle between the trades.

Presently, there are 58 container ports for international trade in Japan. Among them, 53 ports provide fixed sailing routes linking main ports, such as Incheon, Busan, GwangYang, Wulsan and Masan, in Korea.

Currently, the container feeder service between Korea and Japan is exclusively provided by the KNFC (Korea Narseas Freight Conference) organized in 1991. It consists of 22 shipping companies (15 container subcommittees) in Asia including Korea, Japan, China and Russia aiming in maintaining appropriate rates, adjusting surcharges for transportation, as well as encouraging cooperation between members [3] . For example, Kampu Ferry (Ro/Ro vessel)—a joint venture between Nippon Express and Korea Express in 1972, provides the service between Shimonoseki port in western Japan and Busan on daily basis (13 sailing hours). In addition, Japanese Camellia line (Ro/Ro vessel) offers the shuttle service between Hakata/Busan on six sailings per week basis (5.5 sailing hours).

Turning the eyes on Japan/China trade, taking export cargo from North America destined for China for example, currently, container vessel will be calling at main ports in Japan first where feeders service are provided for linking the mains port located on the coastline of eastern China, like Daian, Qingdao, Tianjin in the north, Shanghai, Nanjing, Ningbo, Nantong in the center. Of particularly note is that in November 2003, Shanghai Super Express—a joint venture among Sumitomo Shoji, Nippon Express, Kamigumi and MOL, introduced the service between Shanghai/Hakata shuttle service by deploying speedy RoRo (cargoes are then delivered to final destinations in Japan or China) by truck or railway) on 2 sailing per week basis. The service emphasizes the speedy delivery of the import cargo. For example, it will only take two days

transporting LCL (or FCL) cargo from Shanghai CFS (or CY) to Hakata CFS (or CY), and cargo will reach the importers on the third day after shipment. In comparison, it will take three days from Hakata CFS (or CY) to Shanghai CFS (or CY), and the cargo will reach the importers the fourth day.

On the other hand, the feeder service between China/Korea container traffic is highly hefty and hectic. By far, there has been substantial export cargo shipping from port of Dalian, Qingdao, Tianjin via port of Incheon, Busan, and Gwangyang destined to North America and Europe in addition to ASEAN countries, and vice versa.

In 2003, Incheon opened routes to five more Chinese cities besides Qingdao, Dalian, Shanghai, Yantai, and Weihai which is a boon for China-bound merchandise as previously containers had to be moved by road to Pyongtaek, which took an hour, or to Busan and Gwangyang, which took six hours.

As can be realized from the above mentioned feeder and RoRo shuttle services as well as the surging growth of the import/export cargo in CKJ, the main ports in the region, undoubtedly, will be continuing to play the crucial roles as the hub and spoke network collectively [4]

4. The Port Development Strategy in China, Korea and Japan

As container shipment growth both from and within Asia goes into overdrive, so has the number of planned port developments. Expansion of ports in East Asia is coming along much faster than that in the developed countries of the world, particularly on the US West Coast and in Europe.

The Korean government, with a view to attaining balanced national land development and to smoothly cope with the drastic increase of container volume resulting from brisk Korean economic growth, in 1994 consigned Korea Container Terminal Authority (KCTA) to launch an intensive middle and long term port development projects. Those projects incorporated into the middle term projects include port development and expansion projects in Gamman port known as Busan port

phase four development (1991-1997)—an unprecedented case in the history of port development in Korea by inviting the capital from private sectors—carriers). In addition, the development of Port of Kaddo—Pusan New Port (2001-2007, 30 berths) and Port of Gwangyang (phase one :1987-1997, phase two:1995-2003) located some 50 kilometers and 170 kilometers to the west to Busan city respectively , as well as South port of port of Incheon (2001-2003) are also incorporated. The long term projects are the phase three (1999-2008) and the phase four (2002-2011) of Port of Gwangyang [5] .

On completion of phase four development in 2011, the Port of Gwangyang will have capacity to handle 930 million TEUs annually.

As South Korea adds container capacity, this will fuel the preference for container lines to use Port of Busan and Gwangyang as the shipping hubs to avoid expensive Japanese facilities and also access the increasingly attractive mainland China market.

Fukuoka city in western Japan, with an aim to become the hub port in northeast Asia, has been aggressive in developing the port and the hinterland infrastructures. The newly developed Island City container terminal (one berth) began operation in September 2003 with 14 meter draft allowing 60,000 DWT container vessels to call alongside the quay. In addition, the logistics zone behind the terminal plays the function as an area for import, export, sorting, distribution, processing, as well as display and sales. On May 22, 2006, Switzerland's MSC (Mediterranean Shipping Corporation) Charleston (8,085 TEUs)—one of the largest container vessel in the world owned by MSC made her maiden call at the Port of Hakata when routing the Asia/Europe service. It became the largest commercial vessel that the port has ever welcomed.

In line with the port development in Hakata, Kitakyushu city has invited PSA International to jointly develop the Hibikinada deepwater port by introducing PFI (Private Finance Initiative) which is the unprecedented case in the maritime history in Japan in terms of port management and operation [6] . The four berth container terminal (12 meter draft two berths, 15 meter draft two berths) began operation in May 2004 aiming to attract the transshipment cargo from main ports in northern China destined to North America and Southeast Asia.

Special attention should be paid to the port developments in China. In recent years, as Chinese exports have moved into high gear to supply the needs of swelling world trade, so along the length of the Chinese coast the phenomenal array of port development projects are coming up. The most well known Chinese port development is the massive Yangshan project in Shanghai.

The port of Shanghai is a big beneficiary from a huge expansion in trade to the East and West Coast of the U.S. Container throughput at Shanghai was surprisingly resilient in 1998, it handled 3.05 million TEUs in 1998, up 21% on the previous year's 2.53 million TEUs, placing Shanghai tenth in the world ranking. And in 2005, it demonstrated a 24.2% increase in box traffic to 18 million TEUs, registering 3rd in the world rankings [7]. The remarkable nature of this achievement is attributed to the development of Waigaoqiao port on the south bank of the Yangtze River mouth.

However, with utilization levels edging past the red line, Shanghai city government has been forced to expand its container handling capacity, and far from the fast-growing metropolis the foundation of China's grandest ever port venture are being poured into the sea 32 km offshore, the giant Yangshan deepwater port project.

The first phase, running up a tab of around US\$2 billion, coming online in 2005 will take Shanghai's annual capacity to 25 million TEUs, including the Waigaoqiao phase five expansion that added more than 2 million TEUs in 2005. By 2020, Yangshan is projected to comprise 52 berths which, at a cost of over US\$10 billion, will be capable of accommodating container vessels not even on the drawing boards yet.

Phase two had evoked keen interest from lines such as COSCO (China Shipping Ocean Shipping Co.), CSCL (China Shipping Container Lines) and Maersk Sealand, in addition, it also attracts the world renowned container terminal operators like HPH, Modern Terminals and PSA International. A global port footprint has the inside track, good news for HPH and PSA International. The Hong Kong-listed arm of the state owned China Merchants Group late 2004 acquired a 30 percent stake in Shanghai International Port Group (SPIG) for US\$670 million. Following the China Merchants Holdings deal there was talk of SPIG launching an IPO (International Procurement Office) to raise funds for the Yangshan development which was merely one of the

several money-raising operations [8] .

Close to Shanghai, the natural deep-water port of Ningbo, the second busiest port in China after Shanghai in cargo tonnage, is also growing rapidly and is well in the world top 20 in terms of volume. Port development have attracted shipping lines including MSC, Evergreen Marine, OOCL, CMA CGM, Hutchison Whampoa, parent of the world's top container terminal operator, and COSCO Pacific.

While there is much focus on the area around the Yangtze, the Pearl River Delta (PRD) remains a center of much development. A number of operators are interested in Nansa, opposite Guangzhou, which aims to have four berths with a capacity of 1.5 million TEU by 2007.

To the north, phase two container terminal in Dayao Bay of Dalian port is now in the works with a partnership between AP Moller-Maersk, COSCO Pacific, Dalian Port Group and PSA International. Container terminal operator giants, such as P&O Ports, AP Moller-Maersk and COSCO Pacific have also gone piling in with a combined US\$1 billion in the investment in Qingdao port's Qinwan Container Terminal. Qingdao port is looking to outstrip port Busan which has traditional relied heavily on transshipment traffic to China.

5. Conclusion

During the recent years, 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 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.

Geographically, port of Busan and Gwangyang in Korea, being located at the Southern tip of South Korea along the main arteries of Northeast Asia as well as between Northeast China and Japan, are playing the pivotal roles as the transshipment hubs in Northeast Asia providing feeder network linking ports in Japan, China and

Russia. This role will take the form of value-added logistics where the hinterlands of the two ports are being created to drive the country's northeast hub aspiration.

From the world shipping traffic's point of view, port of Dalian, Qingdao, Tanjin in northern China, and port of Hakata and Kitakyushu (including Hibikinada) together with port of Busan and Gwangyang in Korea, are cooperative in forming the "Hub and Spoke" network in Northeast Asia by accelerating the smooth flow of container in the region. And with the imminent arrival of the super panamax container vessels on the main trunks, shipping lines are upgrading feeder services. Under such circumstances, the Hub and Spoke network in CKJ, undoubtedly, will be greatly enhanced.

However, from the port authority' viewpoint in terms of shipping lines wooing strategy, main ports in CJK, undoubtedly, are competing with each other due to the geographical proximity and difference in port charges.

For example, port of Busan and Gwangyang have the edge over port of Hakata and Kitakyushu in Japan in terms of geographical location. And with the development of port of Hibikinada in Kitakyushu and new container terminal in Island city of port of Hakata, a certain portion of sea cargo originally being handled by port of Busan and Gwangyang might probably be shifted to those two ports.

According to author's analysis report—"The Competitive Advantages of Northeast Asia Hub Port—Kobe and Busan: From the Viewpoint of Global Container Transportation", published by Japan Maritime Research Institute, on *The Bulletin*, No.381, March 1998, the port charge in port of Busan was only 41.4 percent of that in port of Kobe. And the Ministry of Transportation in Japan, with an aim to make Japanese main ports to be more internationally competitive, in 2002 proposed the "Super Hub Ports" fostering policy. In the policy, next general high standard container terminal, current port charge 30 percent cut-off, 24 hour operation, and one day lead time for import cargo delivery, are incorporated for those main ports targeting for the status [9] .

To conclude, shipment of full containers on the China/Japan, China/South Korea sea route will be continuing to grow in line with the worldwide increase in volumes moving over the China marketplace [10] . And as for Korea/Japan trade, without

exception, it will also be ever prospering because South Korea's role as a shipping hub for north Asia becoming more and more realistic through the new ports development strategy.

Main ports in CKJ will keep playing the critical roles in the region as container tonnage in Asia region will be ever increasing due to the Asian manufacturing hub—China will keep importing and exporting substantial volume of cargo globally. For this, main ports in CKJ, though the competition is highly inevitable, should be cooperative for future co-existence in efficiently disposing the container traffic under the current hub and spoke network towards the 21st century.

Notes and references

1. Mariner Wang, (2000), *The Global Logistics System in East Asia*, Bunrigaku (Kyoto, Japan).
2. Mariner WANG, "The Status of East Asian Hub Ports in Global Logistics", *Ports & Harbors*, International Association of Ports and Harbors, Vol.48, No.3, April 2003.
3. Mariner WANG, "The competitive Advantages of Northeast Asia Hub Port—Kobe and Busan: From the Viewpoint of Global Container Transportation", *The Bulletin*, No.379, January 1998, Japan Maritime Research Institute.
4. The mainline of hub/feeder structure focuses on large flows of containers and shipping capacity on to a small number of extremely efficient ports; this, combined with the further distribution capacity of these ports, gives East Asia particular significance at both a global and a regional scale.
5. Korea's Ministry of Maritime Affairs and Fisheries (MOMAF) has allocated some US\$120 million - or 70 percent of the budget to develop Busan and Gwangyang port.
6. At final stage, the consortium, including PSA International as the core investor, held 34 percent of the stake in the development of Hibikinada deepwater port.
7. *Containerisation International*, Lloyd's List, March 2006.
8. *Cargonews Asia*, Marshall Cavendish Business Information (HK) Ltd., March 21,

2005.

9. In 2004, Port of Tokyo, Yokohama, Nagoya, Kobe and Osaka have been chosen to be the ports.
10. In 2005, the weight of import and export amount of Kyushu area in Japan accounted for 4.3 percent and 4.4 percent respectively. The biggest trade partner for Kyushu area in Asia is China in terms of both import and export. In 2005, the import and export amount was 656 billion yen and 535 billion yen respectively.