▣論 文▣

Port Competition in East Asia and Korean Strategy

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Contents

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ABSTRACT

This paper aims to describe port competition in East Asia and the Korean government's port strategy. In doing so, the paper provides an overview of global changes in international trade, the shipping industry and the port business. It also delineates the status of port competition in the region. Particular examples are taken from the competition among the ports of Hong Kong, Singapore, and Malaysia, as well as those of Pusan and Kwangyang, Kaohsiung, Kobe, and Shanghai and Yantian. The port competition in East Asia is reviewed and classified in two groups: north-tier competition among traditional major players, such as Kobe and Pusan, and dark horses such as Shanghai, Kwangyang and perhaps Yokohama; and south-tier competition among the three traditionally big players Kaohsiung, Hong Kong and Singapore, and the relative newcomers of Yantian in China, and Tanjung Pelepas in Malaysia. Due to the enlarging of ships and expansion of port activities, the boundary between the two tier frontiers breakdown, or they may even merge, into one grand frontier, in the foreseeable future. Although it appears that Asian ports are not being very aggressive in preparing for the future of mega-carrier in their plans, it is true that China, Korea and Taiwan are moving full steam ahead in comprehensively developing their container ports on a large scale. It therefore seems to be the perfect time for rival ports to explore a port alliance strategy to fight against the trend toward alliances between of many shipping lines.

I. Introduction

Ports have been facing numerous challenges arising from various factors including changes in international trade pattern, shipping companies' evolving strategy and networking of different transportation modes. Contemporary ports are particularly concerned with handling longer distance cargoes for global carriers, intermodal demand for the ports, port financing for expansion and environmental issues. These require ports to provide more efficient, faster and clean services for the customers. To respond to these challenges, some ports have taken ambitious steps toward large-scale long-term development plans whereas others seem relatively stagnant. Intermingled with hub-and spoke phenomena, port may have two ways in their future destiny: expansion into being hub strategy or shrinking into residing as spoke in the network. This observation can be more vividly found in the East Asian region, where economic growth is higher than any other region, thus more international cargoes are generated and economic dynamism puts the ports in the region into more competitive situation.

This paper aims to describe port competition in East Asia and Korean government's strategy. Basically this paper intends to overview port competition in the region, explain Korean strategy and provide a platform for the participants of this conference to discuss about the competition through this conference. To this end, the paper will overview global changes in international trade, shipping industry and port business. The, port competition in the region will be delineated. Particular examples are taken from the competition among Hong Kong, Singapore, Malaysian ports, Pusan and Kwangyang, Kaohsiung, Kobe, Shanghai and Yantian. Next sections are structured to explain what the current issues are in Korea's port arena and how the government formulates the strategy to handle the issues. Discussions and implications are followed prior to concluding the paper.

II. International Trade and Maritime Industry

1. Overview of International Trade

To set the scene on global level, we should look at snap shots on international trade and what impacts the trade has on our domain - that is maritime industry. International trade has ever been increasing since Adam Smith authored "the Wealth of Nations" and follow-up scholars proved that all nations participating at international trade have mutually benefited.

World output has increased steadfastly in the past two decades, recording slightly more than 3 % of annual average (see Table 1). Advanced economies show annual growth rate of 3.1 % and 2.9 % in 1980s and 1990s, respectively. During the same period, developing countries show 4.3 % and 5.6 %. From the table, we can see that Japanese economy flourished during 1980s then stagnated during 1990s. In contrast, US economy boomed during 1990s after passing through a long tunnel of slump in 1980s. Developing countries show much higher growth rates than advanced economies. This growth was led by Asian region. Table 2 shows rather recent years' figure. Global economy has continued to strengthen in recent years, with GDP growth projected to increase in all major regions of the world. World output in 1999 has increased by 3.4 percent from 1998 and the annual increase is expected to be further bigger in coming years, somewhere between 4.2 % and 4.7 %. World trade volume (goods and services) in 1999 has increased by 5.1 % from 1998 and the increase by 2001 is projected by the range of 7.8 % to 10 %. This economic growth has been led by the continued growth of the U.S. economy; the robust upswing in Europe; the consolidation of the recovery in Asia from financial crisis (IMF 2000).

Table 1. Summary of World Output - Real GDP Base

(Annual percent change)

Year	1982 -1991	1992 -2001	1992	1993	1994	1995	1996	1997	1998	1999
World	3.3	3.5	2.0	2.3	3.7	3.6	4.1	4.1	2.6	3.4
Advanced economies	3.1	2.9	2.1	1.4	3.3	2.7	3.2	3.4	2.4	3.2
USA	2.9	3.7	3.1	2.7	4.0	2.7	3.6	4.4	4.4	4.2
EU	2.6	2.2	1.2	-0.4	2.8	2.4	1.7	2.6	2.7	2.4
Japan	4.1	1.1	1.0	0.3	0.6	1.5	5.0	1.6	-2.5	0.2
Others	4.3	4.4	3.4	4.1	5.8	5.0	4.1	4.7	1.0	5.5
Developing countries	4.3	5.6	6.3	6.4	6.7	6.1	6.5	5.7	3.5	3.8
Africa	2.3	2.6	-0.7	0.2	2.3	3.1	5.7	2.8	3.1	2.2
Asia	6.9	7.5	9.4	9.3	9.6	9.0	8.3	6.5	4.1	5.9
M.East & Europe	3.3	3.7	5.7	3.8	0.6	4.3	4.5	5.1	3.1	0.8

Source: IMF (2000).

Table 2. Overview of the World Economic Outlook Projections

(Annual percentage change)

Year	1998	1999	Projections	
			2000	2001
World output	2.6	3.4	4.7	4.2
USA	4.4	4.2	5.2	3.2
Japan	-2.5	0.2	1.4	1.8
Euro area	2.7	2.4	3.5	3.4
NICS	-2.3	7.8	7.9	6.1
China	7.8	7.1	7.5	7.3
World trade volume	4.3	5.1	10.0	7.8

Source: IMF (2000).

Several factors can be attributed to the increase and transformation in the international trade. Among these, the first set of major players can be globalization of international/multinational corporations, introduction of World Trade Organization system and more forming of regional economic bloc. As countries opened their trade barriers increasingly and new economies emerged on international trade, for instance, China, more resources and services have been transferable more freely and cheaply among countries than previous period and the size of consumer's market has expanded from regional/sub regional level to global scale. The second important factor that influenced the international trade was the paradigm shift from mass production to lean production. The traditional economies of scale was not any more proper approach to the current customers, who have various types of tastes and preferences in products, therefore, not complacent with reliable goods. The third factor should be the emergence of digital economy due to the rapid development of information technology. No doubt, we cannot ignore the importance of influence by this IT industry in every day's life.

2. Change in Maritime Industry

While international trade has experiencing new environmental changes, maritime industry has also had to adapt itself to the change. By reading the literature and meeting the industry people, the author of this paper framed the relationship of demand and supply between shippers, shipping lines and ports as in figure 1.

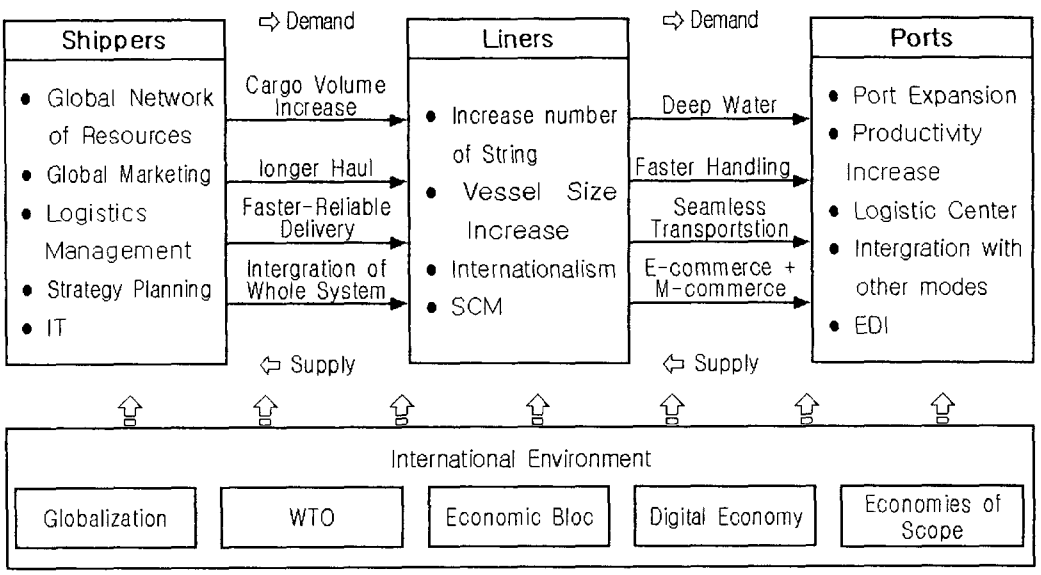


Figure 1. Contemporary Demand and Supply Relationship Between Shippers, Lines and Ports

As the environment of international trade has changed influenced by those factors explained in the above, shippers might well have shaped their business in conformity with the changes. So they seem to have devoted themselves to five areas: global network of resources; global marketing; logistics management; strategy planning; and how to use IT.

To meet this demand, shipping lines have to increase their capacity of providing services either by increasing the number of strings or by upsizing their vessels. For instance, Lloyd's Shipping Economist shows a recent structure of strings in Asia/North America routes by major liner operators (*Lloyd's Shipping Economist*, April 2001 p. 17). Major lines are operating the strings of minimum 6 to 9. Of these, many strings are expanded to Europe to cover global passage. Considering the same number of strings in other areas, today's shipping lines have to own a great deal of vessels and run offices around the world. This is not easy for even biggest shipping lines to provide the needed capacity. In addition, there seems to exist some degrees of barriers to penetrating or entering new markets in other regions than the lines' traditional home ground for expanding their services. Therefore, major shipping lines have explored to find some ways to resolve these problems. This takes the fashion mode of global/strategic alliances by major shipping lines. The purpose of participants in strategic alliances is to establish cooperative agreements on a global basis.

Shipping lines' concerns become naturally demand for the ports as in the diagram. Bigger vessels require ports to provide deep waters in approach channels and berths, and faster handling service of cargoes in terminals. Likewise, intermodal dimension forces ports to guarantee seamless transportation among different modes. In addition, IT factor generates a new dimensional cargo handling type of work to ports, so called, E-commerce so that ports have to handle traditional M-commerce (material) and new E-commerce. To respond to these demand forces, ports exert their utmost in various ways depicted in the diagram as supply. To begin with, a definite answer, to the question of deep-water port must be port expansion in the direction of deepening, widening and lengthening channels, berths and turning basins as well. Major container terminals have already the water depth of 15-16 meters in the berths and some of them have plans to deepen this to the depth of 18.5 meters (Wilhemsshaven[1] in Germany and Sepetiba[2]). The second solution by the ports should be increasing productivity before or concurrently with trying the port expansion, focusing on cargo handling equipment, stacking areas and gate system for operational efficiency. In increasing the productivity in terminals, faster larger cranes are the first thing explored. Currently, a discharge rate of at least 35-40 moves per crane/hour is needed when handling large ships. Top more effectively work even larger vessels this level of productivity must be improved upon. One obvious way to increase productivity is to deploy more cranes per ship. At present the practical limit in handling the Maersk K class ships is 6 quay cranes. However, several ports are unable to allocate six cranes to the one ship; only four quay cranes can be used at Southampton and Gothenburg, for example. This is partly because available quay length can only allow for up to four cranes. With the upsized vessel, number of boxes across on deck is also increased so that the outreach of crane should be lengthened long enough to reach this width. Today's PostPanamax vessels can load 16-18 boxes across on deck and the outreach for this vessel should be 44-48 meters from seaside rail. Major transport hub port has already ordered cranes with a 22-container (50+m) outreach, suitable for handling vessels of 8000-10000 TEU. Cranes of 60m outreach are planned for installation at the new Altenwerder terminal in Hamburg on its completion within the next 2-3 years (Baird 1999). Similar developments are explored in trolley speed and hoist capacity. Alternatively, a ship could be served from both sides; with six double trolley cranes per side and each dual hoist crane producing 55 moves per hour, it is estimated that productivity could be as high as 660 moves per hour (Jordan 1997

1 Wilhelmshaven is a new deep-water container port in Germany by 2010, chosen by Hamburg, Bremen and Lower Saxony states. It plans to accommodate vessels over 10,000 TEU size and provide up to 24 berths. See *Containerization International*, May 2001, p. 35.

2 See Baird (1999).

and recited from Baird 1999). A significant majority of respondents in Baird's survey thought that ports should provide more cranes per ship and also lager faster ones and introduction of more terminal automation was not deemed to be supported by them (Baird 1999). Similar concerns can be found from a research in North American context (Chang et. al. 2001).

Modern container ports tend to provide comprehensive logistics service within their areas. Port is not only the place to load and unload cargoes, but also the one for manufacturing, processing, warehousing, distribution and customs service. Examples are numerous in this area around the world and nowadays, ports become introducing Free Trade Zone within or in the vicinity of their boundary to promote more cargo works for the logistics service. Port is also exploring to have efficient intermodal linkage with other modes for inland transportation and/or relayed transportation to neighboring ports. The type of intermodal linkage depends upon ports' geographical structure, the relationship between foreland and hinterland, cost effectiveness and customer preferences and history.

Concurrently with the logistics and intermodal service, ports should also provide high-tech EDI (Electronic Data Interchange) system both within port boundary and beyond it for their customers such as shipping lines, shippers, banks, insurance companies and governments. Real time transaction using the EDI among these parties and cargo tracking system are on the surge.

Thus far, global environmental change in international trade has made shippers, lines and ports more integrated with each other by physical transportation network composed of various modes, and also electronic data network thanks to the rapid development of IT industry in an unprecedented wider comprehensive scope. Every perspective of involved parties in the global network should be global whether their role in the entire network is central or peripheral. Major world class shippers seem to be already in this mode since their approach to this challenge is supply chain management, covering ambit of logistics, strategy planning and integrated IT system. Shipping lines have experienced similar adaptation strategy, illustrated by global alliances, longer haul and bigger vessels as well as more comprehensive intermodal link, with all embodying advantages of current IT technology. Compared with these two parties (shippers and lines), ports seem to have been relatively less affected so far, however, new tides of globalization perception appear to be on the surge among forerunners of hub-class ports in the world. The height of this new tide looks the highest in East Asia due to the regions the most active economic dynamism. Therefore, we focus on the current scene of this region in the next section, particularly concerned with port competition in the region.

III. Port Competition in East Asia

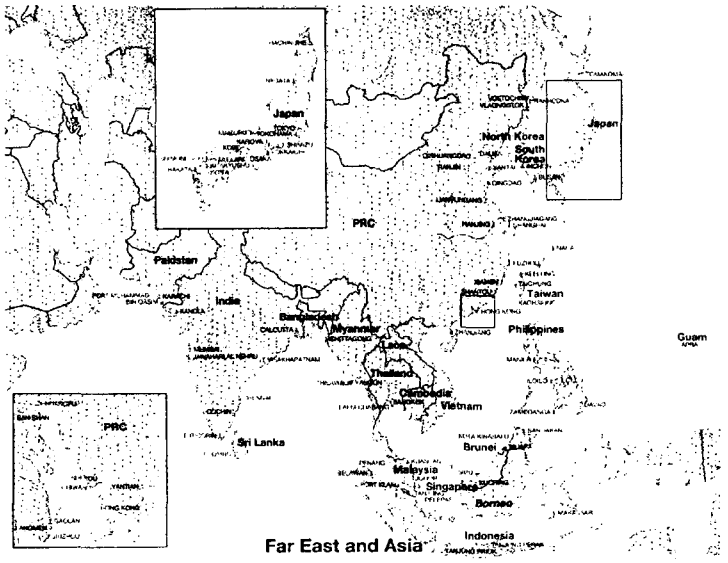
1. Container Throughput and Transportation Infrastructure in East Asia

World container trade in 2000 was 68 million TEUs (6.8% increase than 1999) and the lifts in world ports were 209 million TEUs (see Table 3). The container trade in 2001 is expected to reach 73 million TEUs then 79 million TEUs in 2002 and the lifts in 2001 would be 225 million TEUs then 241 million TEUs in 2002. The annual growth rate during this period would be 9% for the container trade and 8% for the lifts in the ports. Of the lifts, Asia takes 47% of the world total by handling 99 million TEUs in 2000 and is expected to reach 106 million TEUs in 2001 and 114 million TEUs in 2002. Since the world container trade shows strong growth rate in recent years and to be so in coming years, and Asia handles almost half the world container lifts, Asian ports are likely to take leading roles continuously in container throughput in the near future. At present, world four biggest container ports are all located in East Asia (see Table 4 and Figure 2) and the importance of the Asian ports is more likely to be further amplified in the near future due to economic growth in the region. The table shows most Asian ports handled impressive increase of container cargoes in 2000 except Kobe. The most remarkable increase was at the Port of Tanjung Priok in Jakarta with 60% growth.

Table 3. World Container Activity

Year	1998	1999	2000	2001	2002	98-02 % p.a.
Europe	42	45	49	52	56	7%
Asia	80	88	99	106	114	9%
N. America	24	26	29	32	34	9%
Others	28	29	32	35	38	8%
Total, m.teu lifts	174	189	209	225	241	8%
Total trade, m teu	57	62	68	73	79	9%
% growth	4.6%	9.1%	9.8%	7.8%	7.6%	

Source: Clarkson Research Studies (2001).



Source: *Containerization International Yearbook,* 2001.

Figure 2. Ports in East Asia

Table 4. Selected Container Port Throughput in Asia

port \ year	M. TEU lifts				Year-on-year growth
	1997	1998	1999	2000	
Colombo	1.69	1.71	1.70	1.73	2%
Dubai	2.60	2.80	2.84	3.06	8%
Hong Kong	14.54	14.65	16.10	17.8	11%
Kaohsiung	5.69	6.27	6.99	7.43	6%
Keelung	1.98	1.71	1.67		
Kobe	1.94	1.85	2.18	2.03	-7%
Laem Chebang	1.12	1.53	1.83	2.20	20%
Manila	2.94	2.69	2.98		
Nagoya	1.50	1.42	1.57	1.89	21%
Osaka	1.20	1.16	1.27		
Port Klang	1.65	1.80	2.52	3.21	27%
Pusan	5.23	5.73	6.31	7.54	19%
Shanghai	2.53	3.05	4.21	5.61	33%
Singapore	14.14	15.10	15.90	17.04	7%
Tanjung Priok	1.91	1.90	2.11	3.37	60%
Tokyo	2.38	2.20	2.40	2.96	23%
Yokohama	2.33	2.06	2.13	2.40	13%

Source: Clarkson Research Studies (2001).

Like the bloc economy movements of the EC and NAFTA, the Northeast Asian[3] region is increasingly discussing the need of the regional cooperation. The economic importance of the region in the world is rather significant. The Northeast Asian economies' share in world merchant trade was 18.1 percent and 14.5 percent of world export and import, respectively in 1998. Three Northeast Asian countries - Japan, China and Korea- explain approximately 12.9 percent ($ 704 billion) of total world exports and about 9.2 percent ($515 billion) of total world imports. Their intra-regional trade (exports and imports among them) shares are about 9 - 31 percent of each country's total exports or imports[4].

Since the early 1970s the rapid growth of economies in the Northeast Asian region has been accompanied and stimulated by the establishment of a supra-regional transport network. Hubs occupy a key position within the networks, offering a variety of opportunities for global and regional marketing facilitated by frequent services and comparatively low distribution costs. During the 1980s, Tokyo emerged as a global, multimodal network hub on a par with London and New York. At a regional level, Hong Kong and Singapore have battled for the right to become the single network hub in the Asia-Pacific region.[5]

In recognition of the importance of the infrastructure, all countries in the region have been developing their transport network systems to become major logistic centers of Northeast Asia in one way or another. For instance, major ports of Japan appear ready to become regional hubs and a few ports of Korea, such as Pusan, Kwangyang, Inchon and Pyoungtaek (new port), are on the way to becoming a hub port. Likewise, China, Russia and North Korea are rushing into taking the initiative in the Tuman River Project, whereby they can develop strong emerging logistic centers in the region through port and inland transport developments as well as a free industrialized zone. Upon completion of the project, it is projected that this area will function as a kind of 'economic corridor[6]' in this region. In line with this movement, Russia and China have already developed transcontinental railway networks (see Figure 3) in order to meet the demand for the cargoes between Europe and Asia and the plan of the two Koreas through the reconnection of Korean railways[7] is under construction.

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3 In this paper, Northeast Asia denotes Japan, China, Korea, Taiwan, Hong Kong.

4 Nam, Sang-yirl, "Competition and Complementarity in Northeast Asian Trade: Korea's Perspective," Working Paper 200-02, KIEP, 2000.

5 Rimmer, Peter J., '*Taiwan's Future as a Regional Transport Hub*', monograph, 1993.

6 This concept was developed by Professor Rimmer, Peter J., of Australian National University and means , in general, the most economically central area of region.

7 The two Koreas agreed in the accord of South-North exchanges and cooperation, taking effect on Feb. 19, 1992 (Chapter III, Article 19) that the two sides shall reconnect railroads and roads that have been cut off and shall open South-North sea and air transport routes. (source: the Korea Herald Feb. 20, 1992) Then, while exploring two-Koreas' cooperation again recently during Kim, Dae-Jung regime. Sept. 18, in 2000 witnessed

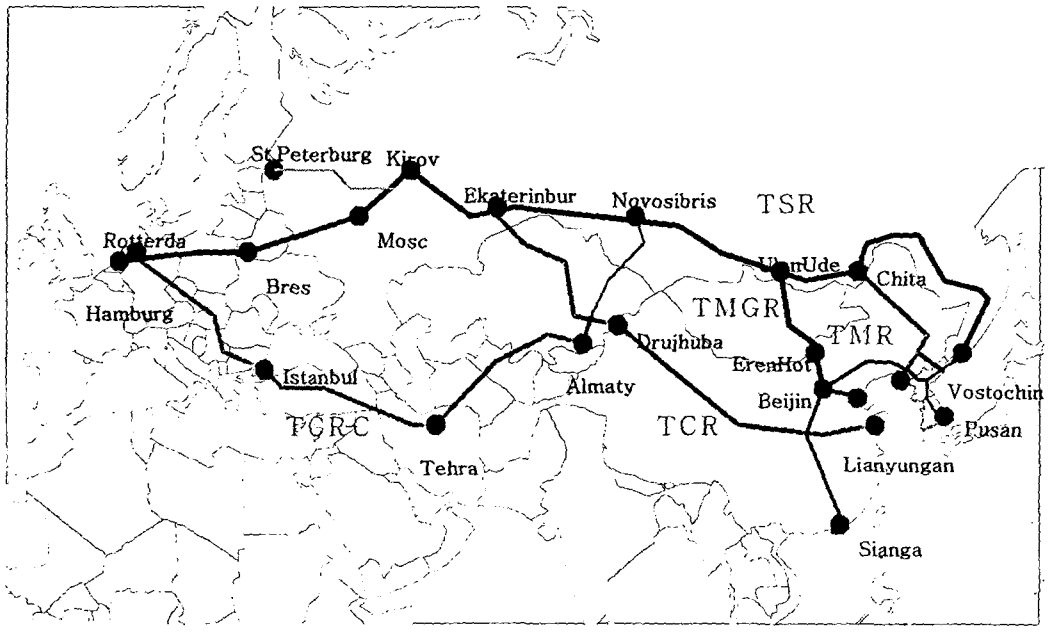
Thus far, all the tramper routes have been established in the region and container routes are either in active operation between Japan, China and Korea, or at developing stage among China, Russia, Japan and Korea. Container routes to and from North Korea are, at present, underdeveloped. However, they are likely to be open sooner or later.

As for the transcontinental railways, it is noteworthy that since the inception of service in 1972 handling 2,000 TEUs, TSR (Trans Siberia Railway) carried 138,000 TEUs in 1983. Then, remarkably declined to 8,000 TEUs in 1998 and slightly bounced back to 25,000 TEUs in 1999 (MOMAF). The decline was caused by sudden unsettlement after the collapse of former Soviet Union, and the frequent delay of cargoes (For instance, it was common to have a 1 to 2 week delay). TCR (Trans China Railway) with TMR (Trans Manchuria Railway) and TMGR (Trans Mongolia Railway) started competition with TSR from the mid-1990s in transporting cargo between Europe and Asia.[8] The Koreas are also planning to have an access to TSR and TCR via a reconnection of the Korea railways - that is TKR (Trans Korea Railway)[9]. As for the China Land Bridge, the TCR was connected with the TSR in Novosibirsk in August, 1990, when a new rail of 460 km was constructed from Urumqi to Alataw Shankou (borderline of China to Kazakhstan). It became possible for the cargo between Europe and Far eastern Asia to pass through the Chinese railway, then to be connected with the TSR destined for Europe and/or Asia. The total length of the railway is 10,700 km inclusive of the TSR. China covers 4,111 km encompassing six provinces, (Jiangsu, Anhui, Henan, Shaanxi, Gansu and Xinjiang) from Lianyungang /Shanghai through Xian, Lanzhou, Urumqi to Alataw Shankou (See Figure 3).

ground-breaking ceremony to continue disconnected railway between South Korea and North Korea. This construction for disconnected part will be completed by Sep. 2001 and eventual connection with TSR and TCR will be completed by 2005.

8 TCR very often includes TMR and TMGR.

9 On completion of the TKR, two lines in Korea are connected with the transcontinental railways. The first line along the west coast of Korea, called Kyoung-Ui-Sun meaning 'Seoul-Sinuiju-Line', can be connected with TMR. The second line along the east coast, called Kyoung-Won-Sun meaning 'Seoul-Wonsan-Line', can be connected either with TSR or with TMR.



Notes: Trans Siberia Railway (TSR): Vladivostok/Nakhodka - Novosibirsk – Europe
Trans China Railway (TCR): Lianyungang/Shanghai - Urumqi - Novosibirsk with TSR
Trans Manchuria Railway (TMR): Dalian - Harbin - Chita with TSR
Trans Mongolia Railway (TMGR): Tianjin - Ulaanbaatar - Ulan-Ude with TSR

Figure 3. Transcontinental Railway System and Major Ports in Northeast Asia

In sum, future trade and investment prospects will be strongly influenced by the evolution of the pattern of trade specialization among the Northeast Asian economies and the policy framework from which these trade and investment flows occur.

As far as port competition in East China is concerned, there have been five major players traditionally: Kobe, Pusan, Kaohsiung, Hong Kong and Singapore. These five ports and other new comers have forced the port competition in the region to become very fierce over recent years. The new comers are Kwangyang in Korea, Shanghai and Yantian in China, Klang and Tanjung Pelepas in Malaysia (see Figure 2). The Port of Tanjung Pelepas (PTP) is living up to its claim of being the fastest growing transshipment hub in South East Asia, scouting Maersk-Sealand line from Singapore. Just as PTP intimidates Singapore, Shanghai does so to Pusan and Kobe and Yantian does to Hong Kong. This is likely that short-term competition is happening among port of vicinity like the cases of competition between Pusan, Kobe and Shanghai, another competition between Hong Kong, Kaohsiung and Yantian, and the other between Singapore and Tanjung Pelepas,

on the one hand and long-term competition seems taking the initial shape among all these ports one way or another on the other hand. In spite of the importance of the long-term competition, the ports in the region seem more concerned with the short-term competition with the vicinity ports for some years. Along this line, the competition in the region can be grouped into two: north tier among Pusan, Kobe and Shanghai and south tier among Kaohsiung, Hong Kong, Singapore, Yantian and Tanjung Pelepas. Further, as ship size increases from current 9000 TEU ship on order basis to 12,000 TEU ship in the near future, these ships will reduce the number of calls on a trunk route considerably. Lloyd's Shipping Economist shows in its recent publication (vol. 23, April 2001) major operations on Asia/North America routes as at March 1, 2001. The ship size in the publication is mostly PostPanamax and the ships are calling at least five ports and in some cases nine or ten ports. However, as most academic and business people expect, the future 12,000 - 15,000 TEU ships are more likely to call only two or three ports in East Asia. This size vessels are expected in service before 2010 by leading scholars and representing business executives (see Baird 1999) and if so, only two or three will survive as the hub in the region whereas others have to serve the winners as the feeder ports, losing their market shares enormously. Therefore, the major players together with the new comers seem ushering into fierce survival game by sharpening their swords- that is ambitious port expansion plan in the future. Table 5 shows current expansion plan of the major players.

Table 5. Port Expansion Plan of Major Players in East Asia

Port	Current no. of berth	Planned no. of new berth (2002-11)	Total no. of berth
Hong Kong	22	23	45
Singapore	41	39	80
Kaohsiung	27	23	50
Kobe	37	10	47
Shanghai	18	56	74
Pusan	19	33	49
Kwangyang	8	25	33

Source: KCTA.

2. North-Tier Port Competition

First, we can focus on the north-tier competition among Korea, Japan and China. Of these, China's growth is noteworthy both in cargo generation and port

development. China handled 17.7 million TEUs in 1999. Of these, Shanghai handled 4.2 million TEUs and other major ports were Yantian, Qingdao, Tianjin, and Gungzhou. The total container cargo grew sharply even reaching almost a fifty percent growth rate in 1997 (See Table 6). Table 7 shows major characteristics of five container ports in China. It shows that Shanghai port has been most developed, but the water depth is very shallow, limiting its potential future growth. Yantian port, however, is emerging as a new hub port, capitalizing on its natural deep-water depth.

Table 6. Container Throughput in 10 Major Ports of China

(Unit: 1000 TEU)

Port	1996	1997	1998	1999
Shanghai	1,923	2,530	3,066	4,200
Yantian	353	638	1,040	1,580
Qingdao	810	1,031	1,213	1,500
Tianjin	823	935	1,018	1,300
Guangzhou	547	687	848	1,177
Xiamen	400	546	654	840
Dalian	416	455	525	700
Shekou	90	214	463	601
Ningbou	202	257	353	600
Fuzhou	165	225	253	320
Total	7,400	10,774	13,158	17,710
Growth rate (%)		45.64	22.09	34.59

Note: Up to 1998, *Containerization International Yearbooks* were used. Year 1999 was based on Cargo Systems (July 2000) and1999 Total is estimate.
Source: Kim, Hyoung-Geun, Weekly Maritime Information, KMI (Korea Maritime Institute), Nov. 20, 2000.

Table 7. Major Characteristics of Five Container Ports in China

	Shanghai	Tianjin	Qingdao	Dalian	Yantian+
No. of Terminal	3	1	1	2	2
No. of Berth	18	4	5	7	6
Quay Length(m)	2,281	1,300	1,189	918	1,900
Water Depth(m)	9.4-12.5	12	6-13	12-14	15-15.5

Ship/shore cranes(Ton*No)	35.5T*1 35T*5 30.5T*3 30T*6	40T*2A	40.5T*2 45.5T*1	30.5T*2 superpost Panamax*7	41T*62
Yard Storage Capacity(TEU)	60,800	22,100	6,840	30,566 plusB	25,000 plusC

Note: Phase II container terminal was due by end of 1999 and so it is assumed that this terminal is completed as planned.
A: In addition to ship/shore container cranes, there are 5 mobile cranes (40t*1;25t*4) and 13-yard cranes (40t*7; 40.5t*6).
B: No data were available about storage of Dayaowan Container Terminal.
C: 2nd phase data were not available.
Source: *Containerization International Yearbook.*

It is noteworthy that Shanghai Port Authority formed 50-50 equity joint ventures (Shanghai Container Terminals Limited: SCT) with one of Hong Kong's largest companies, Hutchison Whampoa Limited and its subsidiary, Hong Kong International Terminals in August, 1993. SCT's total projected investment was 5.6 billion RMB with 2 billion RMB in registered capital. The joint venture term would last 50 years. The joint venture company took over operation of Shanghai's three main container terminal facilitates - Zhang Hua Bang, Jun Gong Lu, and Bao Shan and its top priority was the conversion of five general cargo berths (two in Zhang Hua Bang and three in Jun Gong Lu) to container berths, thus totaling twelve berths on the completion (See Table 8).

Then, the company looked into potential sites in the municipality for new container terminals, including Wai Gao Qiao in Pudong and Jin Shan Zai along Hangzhou Bay. Shanghai Port Authority has been developing Wai Gao Qiao (hereafter WGQ) as a new main container terminal since 1991, completing its first and second phase development plan. The WGQ terminal is scheduled to be expanded in two more phases through year 2003, providing a capacity of 2.4 million TEUs.

Table 8. Shanghai Container Terminal Facilities

Terminal	Zhang Hua Bang	Jun Gong Lu	Bao Shan	Total
Quay Length(m)	783	858	640	2,281
Total Area(sq.m)	303,000	337,000	218,000	858,000
CFS Shed Area(sq.m)	6,841	6,841	10,426	24,108
Yard Capacity (TEU)	22,000	23,000	15,800	60,800

Gantry Cranes	5	6	4	15
Water Depth(m)	12.5	10.5	9.4	9.4-12.5

Source: *Containerization International Yearbook.*

Shanghai's weakest point used to be the shallow water so that any vessel of 2,000 TEUs could call upon the port only in the high tide. The Ministry of Communications and the Shanghai Municipal Government ordered a technical study on the improvement of the fairway at the mouth of the Yanzi Jiang River and the deepening of the Hangzhou Bay fairway up to the water depth of 12.5 meters in order for third - and fourth-generation container vessels to pass.[10] Consequently it deepened the water depth from 10.5 meter to 12.5 meter in the Zhang Hua Bang Terminal and from 8.5 meter to 9.4 meter in the Bao Shan Terminal during late 1990s. However, the water depth in the approach channel was only seven meters deep so the port deepened the channel to 8.5 meters by 1.5 meters from July 1st, 2000. But the water depth is still not deep enough to accommodate super Post-Panamax vessels like the 5000-6000 TEUs class, which require 15 meters water depth. Shanghai expects container growth of 1 million TEUs every year for five years. The container volume in 1999 already surpassed the capacity by one million TEUs and this lack of capacity is to be further worsened in the future without a breakthrough development plan. To resolve this problem, the port authority has been considering a new site for a deep-water port in Daxiao Yangsan islands area for some years, with a capacity of 22.4 million TEUs by 2020. This area is, at present, composed of two small islands: Dayangshan and Xiaoyangshan. Lloyd's List Maritime Asia publishes in its recent article (June 2001) that Shanghai will soon announce tenders for its Yuan 150bn (US$18.1bn) bid to become the world's busiest port, connecting the two islands with a capacity of 20 million TEUs over 52 berths just outside Shanghai waters. It is now full steam ahead for the project, which should be accepting its first loads in 2005. Reclamation and construction are still in the planning stages while dredging on a 50 ft-deep approach channel to the berths has already started. Shanghai Port Authority will operate the new port though foreign investments are welcomed within 49% stake due to a recently adopted government policy on foreign direct investment in Chinese ports. The new port can only be built requiring a great deal of land filling and dredging so that the islands can be connected to be used as the quay structure of the port (See Table 9).

10 Liu, Hai Hu, "Shanghai Port Greeting the 21st Century," Asia-Pacific Ports Symposium Proceeding, Kobe, 1993. p. 243.

Table 9. New Terminal Developments in Shanghai Pudong and Daxiao Areas

Terminal	Period	Quay length (m)	Gantry cranes	Water depth (m)	Total area (m2)	Capacity (1000 TEU)
WGQ I	'91-93	900	7	12.5	500,000	1,200
WGQ II	'97-99	900	6	12.5	1,000,000	1,200
WGQ III	'99-01	700	7	12.5	600,000	800
WGQ IV	'00-03	1,250	12	13.0	1,000,000	1,600
DAXIAO	'01-20	-	-	15.0	-	20,000
Total		3,750	42		3,100,000	24,800

Source: A shipping company's meeting report on Shanghai terminals.

Crossing the waters from China, Korea and Japan are reached. Since Korea's port plan is explained in the next section in detail, this section only handles Japanese plan. The Port of Kobe is estimated to handle 2.03 million TEUs less than 2.18 million TEUs of 1999. Therefore, year-on-year growth rate is –7%. The port is only one having minus growth rate among major Asian container ports (see Table 4). Since the earthquake of 1995, Kobe has been suffering from losing cargoes to Pusan and Kaohsiung. It strives to attract former customers back to them, however, prescription so far seems ineffective as can be seen from stagnating cargo throughput. The port has three terminals with 37 berths at present and expansion plan of 10 berths in the future with six berths in Enterprising Zone and four berths in Roco Island. According to a study in Korea (KMI 1999), Kobe charges more than twice of Pusan and 36% more than Kaohsiung. The same charging rate was done only by Hong Kong among competing ports in East Asia. The high cost in transshipment, in particular of Chinese cargoes to Europe and North America, has made the port left behind Pusan, Kaohsiung and Pusan (KCTA 2000). Kobe leases most of the berths to major shipping lines. Due to the stagnation of the Port of Kobe, Japanese government seems to develop other ports as regional hub as is the case with Yokohama. The Port of Yokohama officially opened Minami Honmoku: Pier Container Terminals MC-1 and MC-2 in early April this year. The new terminals, each with one berth, are the first in Japan to offer 16m draft, thereby enabling Yokohama to handle container ships up to 12,000 TEU in size. With an overall area of 35 ha, storage space of 17,000 TEU and five new super Post-Panamax gantry cranes, the terminals are claimed to be the largest and best equipped in Japan. Maersk Sealand has taken a keen interest in the development of the new terminals and now exclusively leases the berth at MC-2. The 6,600 TEU vessel the Chastine Maersk., operating on the transpacific trade, made its inaugural call at Yokohama in April, 2001. The other terminal (MC-1) is a public facility. Development at Japanese ports has been static in

recent years compared with other Asian countries, and this is a step towards attracting more cargo towards Japanese hub ports previously lost to Kaohsiung and Pusan. In 2000, Yokohama handled 2.26 million TEU, a year on year increase of only 6.2% (*Containerization International May* 2001, p. 37.).

In response to requests and to facilitate imports, Japanese government has decided to carry out their improvements in harbor and airport infrastructure. The primary objective of establishing Foreign Access Zone (FAZ) is to smoothly connect international and domestic distribution systems, providing further means of access to imported goods for the Japanese people and companies, and to assure quick and efficient deliveries of foreign goods to meet user. Yokohama Port Cargo Center (YCC) is the largest and most advanced comprehensive logistics center in Japan with its total floor space of approximately 320,000 square meter. It is located on Daikoku Pier, one of the two main piers of the Port of Yokohama. YCC is capable of meeting every possible need of the users such as cargo storage, cargo sorting, distribution processing, display and sale, delivery, etc. It aims to strengthen logistics function of the Port of Yokohama and activate the economy of Japan (Lu 2000).

3. South-Tier Port Competition

The north-tier competition is among Kaohsiung, Hong Kong[11], Singapore, China and Malaysia.

Taiwan has three major international container ports: Kaohsiung Harbour, Keelung Harbour and Taichung Harbour. Kaohsiung is the largest container port in Taiwan, which accounted for 67% of the total container traffic. It has remained in the top 5 position in the world since 1980, and Keelung has remained in the top 10 position since 1986. Total container cargo tonnage in Taiwan reached 36 million tons and 9,757,651 TEUs in another term. This was 899,431 TEU more than the previous year. The average container trade growth between 1973 and 1999 was 14.5%, however, there was only 6% of growth rate in the period from 1995 to 1999. It is noted that transfer container traffic has tremendously increased from 0.66% of total container traffic (2,439 TEUs) to 40.2% (3,919,377 TEUs) in the period from 1973 to 1999. Kaohsiung is the major transfer port in Taiwan, over 90% of total container transshipments were transferred by it since 1988. Due to the rapid growth in transshipment, the government of Taiwan decided by decree to nominate Kaohsiung as a regional operations center in 1994. Kaohsiung has five container terminals: Terminal no. 1 to 5. Most berths are known to have

11 Despite the fact that Hong Kong was transferred to China, it is separately treated here from China due to its independent status regarding the port development decision.

the water depth of more than 14 meters. Shipping lines are renting most of the terminals and Terminal 1 is the only public use. The Port of Kaohsiung now has 80 warehouses and shelter buildings whose total capacity is 708,932 tons. It has 19 locations of open squares whose total capacity is 70,890 tons. Recently, Taiwanese government is engaging in developing Taiwan as an Asia-Pacific Regional Operations Center (APROC). At the same time, the government is seeking for membership of the World Trade Organization (WTO). Furthermore, it is speeding up its pace of internationalization and economical liberalization. Kaohsiung Port Authority and Yang Ming Marine Transport Company have signed a contract on 22 August 2000 and will build mutually a global distripark (Lu 2000). In spite of these efforts, Kaohsiung has been surpassed by Pusan in 2000 giving ranking the third to Pusan by a slight margin.

Whereas in the past shippers had little choice as to whether to use Hong Kong as the transshipment center for their cargoes, with the continuing improvement of transport infrastructure and the embracing of more modern logistics concepts and practices in the Chinese mainland, this is increasingly not the case. Shenzhen ports have been massively and very speedily developed in the past few years. Approximately half of Chinese mainland exports are handled through Hong Kong and around 90 % of cargo emanating from South China passes through Hong Kong. But, two major ports at Shekou and Yantian are now in position to compete directly with Hong Kong. Hutchinson Whampoa and Shenzen Dongpen Industries operate Yantian as a joint venture.[12]

In fact, since 1985, China has invested more in its port development than the rest of the world combined (Frankel, 1998). Yantian, which is operated by Hutchison Whampoa and Shenzhen Dongpen Industries in a joint venture, has five quays, each of which is capable of handling the latest generation of container ships. Shekou is operated on a joint venture basis between China Merchants, P&O, Swire Pacific and Modern Terminals Ltd. It has 2 berths with a total of 600,000 TEU annual capacity. Both ports have been built with additional space for container storage and future development and both are well connected to road and rail links within the Chinese mainland (Cullinane, 2000). It is noteworthy that Yantian has enough water depth for big size vessels and well equipped with a great deal of container cranes. What is more, the Port of Yantian has on-dock railway track link up, with Yantian and Pighu Nan Railway station, which connects JingGuan railway at Pinghu Nan and Jingjiu railway at Chang-Ping.[13] In short, the Port of Yantian has advantageous factors to be a hub port in: 1) water

12 Kevin Cullinane. "The Competitive Position of the Port of Hong Kong," Proceedings of KASS and KOMARES' International Symposium: Challenge of the World Shipping and Response of the Korean Shipping in the 21st Century, Nov. 10-11, 2000, Seoul. Korea.

13 *Containerization International Yearbook*, 2000. p. 139.

depth, 2) modernized cranes, 3) on-dock railway system for long-distance inland transportation. It appears, therefore, to have great potential for full-fledged function in Chinese container transport network in the near future.

In 1990, 28 shipping lines called directly to China and 55 to Hong Kong. By 1998, 91 lines called directly to China and 47 to Hong Kong (Drewry Shipping Consultants, 1999). According to an estimate made by the Hong Kong Port and Maritime Board in 1997, in terms of cost, exporting a 40 foot laden container originating in the PRD direct from Shenzhen to America saves US$ 175 compared to transshipping through Hong Kong and for a 20 foot laden container to Europe, US$ 30 can be saved. However, Chinese ports have a reputation for the clumsiness and bureaucratic complexity of its Customs procedures. Indeed, according to Shekou's own publicity, the traditionally complex Customs procedures in China are being rationalized and simplified. When this really does prove to be the case, the disincentives for using Chinese mainland ports for the entry or exit of cargoes will decrease significantly (Cullinane, 2000).

Kwai Chung Container Port in Hong Kong has one of the most advanced freight distribution centers in the world. The Hong Kong International Distribution Center (HIDC) Office Tower is dedicated, ultra-modern, ten-floor grade office building designed with a separate entrance. Each floor has a gross floor area of 23,128 square feet divisible into smaller units, with sizes ranging from 913 to 2,873 square feet (Lu 2000). Compared with PSA, Hong Kong is congested at the terminal gates caused by bustling with trucks, whereas in Singapore, thy tend to be orderly to the point of being dull. The reason is that in Singapore, 80% of containers leave the same way they arrived - by boat - whereas in Hong Kong, almost all of the containers are driven through the gates, to and from the hinterland. In a word, Singapore is a "trans-shipment hub", whereas Hong Kong is a "local cargo port" (The Economist 2001). Cullinane (2000) argues that Hong Kong cannot rely solely upon the beneficial influences of present port choices, but must strive to ensure that it maintain its non-cost advantage in terms of high levels of productivity and service quality, while at the same time seeking to minimize the price which is charged to its customers.

GHK (2000) have produced port cargo forecasts for Hong Kong up to the year 2020. The figure reveals that the predicted average annual growth rate for the cargo base over the next twenty years is 8.6%, while the equivalent figure for the port of Hong Kong is only 4.4%. All other things being equal, what this implies is that the market share of Hong Kong's main competitor ports in South China will grow from 16% as of 1999 to 55% by 2020 (Cullinane 2000).

A new Malaysian port, the Port of Tanjung Pelepas (PTP) has taken over the cargoes by Maersk-Sealand lines from PSA. Volumes in PTP surged to 386,394 TEUs during the first quarter of 2001, representing an increase of 46%

over the last quarter of 2000. The main reason for the increase is the completed transfer of Maersk Sealand's traffic from Singapore in December 2000. The port claims to be on course for the projected two million TEU throughput by the end of 2001.[14] PTP plans to increase its productivity by purchasing reachstacker, forklifts and 10 quay cranes as well as 36 RTGs by year-end of 2001 (CI 2001). PTP is believed to provide the same service as PSA, but at a 30% discount (The Economist 2001).

PSA Corporation sees its future as lying in the leveraging of IT to ensure it stays ahead of the competition. Unlike the views on the competition with PTP, PSA takes a rather different view and believes that it competes with a much wider range of ports than just those next door. They realize that Singapore's traditional advantage in location is not any more enough for the port to dominate the region. Rather, it seems more important to ensure three factors of primary service: connectivity; customized service; and the IT back up it provides. In this regard, PSA's terminal connect to more than 300 shipping lines and 700 ports worldwide, while it provides customized agreements to customers achieving berthing on arrival for more than 90% of all ships calling at the port. PSA invests around S$ 100m a year in IT research and development. Due to the limitation of space, PSA cannot provide dedicated berths, which resulted in Maersk's shift to PTP, to some extent. PSA attempts to provide 'catch up service' for any delayed ship in its schedule. With in excess of 200 moves per hour on an individual ship the vessel is able to make up for lost time. This high productivity will be largely based on IT development. Recent developments include remote controlled bridge cranes at Pasir Panjang Terminal, which enable up to five cranes to be controlled by a single operator. Currently, berths at the terminal can handle 750,000 to 800,000 TEUs per year, but PSA has set a target of 1m TEUs per year per berth (Lloyd's List Maritime Asia, 2001). PSA has 4 major Distriparks totaling 600,000 square meters of warehouse area within the Singapore distribelt. They cater to the distribution requirements of manufacturers, central distribution center operators, freight forwarders, trader and specialized warehouse operators (Lu 2000). Meanwhile, PSA attempts to expand its international portfolio in container terminal operating business with China. It has already invested for operation in Dalian and Fuzhou and recently signed a joint-venture deal with Guangzhou Harbour Bureau. Major terminal operators are very keen to invest in Chinese ports because of the forecast 49-65% trade growth, equating to 61.3 million TEUs, over the next four years (*CI* 2001).

The port competition in East Asia was reviewed classified in two groups: north-tier competition among traditional major players - Kobe, Pusan -and dark

14 *Containerization International*. May 2001, p. 33.

horses such as Shanghai, Kwangyang and perhaps Yokohama; south-tier competition among traditional three big players - Kaohsiung, Hong Kong and Singapore- and new comers from Yantian in China, and Tanjung Pelepas in Malaysia. The boundary of divided battle ground between the two tier-frontiers may be loosen and finally merged into one grand frontier in the foreseeable future due to upsizing of ships and expansion of port activities. For instance, most of the competing ports in the region tend to consider all others in the range of possible competitors when planning their future port plans. As such, next section deals with the Korean perspectives in this context.

IV. Korean Strategy

1. Container Throughput and Port Facilities in Korea

In Korea, the total cargo containers were about 8.8 million TEUs in 2000. The Port of Pusan handled 7.42 million TEUs in 2000 (including coastal container trade, it was 7.54 million TEU), eighty four per cent of the nationwide total, which ranked third in the world, surpassing the Port of Kaohsiung. The portion of containers handling at the Port of Pusan out of national container total has been deceasing slightly. This trend is believed to be augmented as the Port of Kwangyang (new port) is developed according to its development plan (See Table 10).

Table 10. Container Throughput by Port in Korea

(Unit: TEUs / %)

Year	National total	Pusan	Inchon	Oolsan	Kwangyang	Others
1995	4,800,977 (100.0)	4,502,596 (93.8)	236.641 (4.9)	42.567	-	19,173 (0.4)
1996	5,202,898 (100.0)	4,760,507 (91.5)	348,727 (6.7)	47,003 (0.9)	-	46,661 (0.9)
1997	5,820,725 (100.0)	5,233,880 (89.9)	432,795 (7.4)	93,009 (1.6)	-	61,041 (1.1)
1998	6,371,535 (100.0)	5,752,955 (90.3)	401,536 (6.3)	125,829 (2.0)	32,135 (0.5)	59,080 (0.9)
1999	7,393,323 (100.0)	6,310,664 (85.4)	447,162 (6.0)	149,493 (2.0)	415,399 (5.6)	70,605 (1.0)
2000	8,842,628 (100.0)	7,424,871 (84.0)	483,342 (5.5)	236,396 (2.7)	615,327 (7.0)	82,692 (1.0)

Note: Figures in parentheses are portion of each port out of the national total. Coastal container cargo (domestic trade) excluded.
Source: Korea Container Terminal Authority.

Five specialized container terminals handle the cargo containers in Pusan with the total annual capacity of 4.15 million TEUs as of January 2001. Since the cargoes demanded in Pusan surpassed the total capacity of all the five specialized terminals, conventional piers had to handle 2.4 million TEUs to supplement the gap between supply and demand of container port facilities. The characteristics of the five container terminals in Pusan and the other in Kwangyang Port are shown in table 11.

Table 11. Characteristics of Specialized Container Terminals in Pusan and Kwangyang

	The Port of Pusan					Kwang Yang
	Jasungdae	Shinsundae	Gamman	Uam	Kamchon	
Construct. Period	'74-'96	85-97	91-97	95-99	88-97	87-97
Start of Operation	Sep, 1978	June, 1991	April, 1998	Sep., 1996	Nov., 1997	July, 1998
Operator	HMM	PECT	4+ companies	WTC	HJ	4+ companies
Quay length	1447 m	1200 m	1400 m	500 m	600 m	1400 m
Water depth	12.5 m	14-15 m	15 m	11 m	13 m	15 m
Annual Capacity	1 million TEU	1.28 million TEU	1.2 million TEU	300 K TEU	370 K TEU	960 K TEU
Berthing Capacity	50000 DWT*4; 10000 DWT*1	50000DWT *4	50000 DWT*4	20000 DWT*1 5000 DWT*2	50000 DWT*2	50000 DWT*4
Con. Cranes	11	11	12	4	4	8

Note: HJ (Hanjin), HMM (Hyundai Merchant Marine), Sebang, Korea Express. Capacity as of January, 2001.
Source: Korea Container Terminal Authority.

The table shows that three terminals in Pusan can handle about one million TEUs, respectively, with each terminal accommodating four 50,000 DWT ships. The other two terminals can handle three to four hundred TEUs per terminal. The Jasungdae terminal was developed in two phases as the first specialized container terminal in Korea. It used to be run as a state-run company before being privatized in September, 1999. The Port of Pusan lacks container yard area within the terminal and therefore, most of containers have to be transferred to the 37 Off-Dock Container Yards dispersed in the city. This causes increased traffic congestion in the city.

2. Container Port Development Plan in Korea

To secure port facility capacity in Korea, MOMAF strives to: 1) develop Pusan and Kwang Yang port as hub port so called Two-Port System; 2) establish feeder service system in each regional block; 3) establish the connection with the inland transportation system; 4) induce private capital for timely development of several ports; 5) and develop and introduce duty-free zone in the hinterland with a view to activating the port (Y. Kim 2000).

As for the two port systems, Pusan plans to develop a new container port (Kaduck New Container Port) in two phases by 2011, with a view to providing 24 berths and having the annual capacity of 4.6 million TEUs. Kwangyang has also developed its second phase plan from 1995 to 2001 (construction completed, but not in operation yet as of July 3, 2001) in addition to its present terminal, totaling eight berths. The new development by the second phase provides four berths for 50,000 DWT ship class and another four berths for 20,000 DWT ship class, resulting in the annual capacity of 1.44 million TEUs. To expedite construction of container port facilities and to manage all the container terminals in Korea, Korean government established Korea Container Terminal Authority (KCTA) in 1991. Before 1991, port income from container terminals as well as general cargo and bulk terminals was transferred directly to the National Treasury, which is controlled, by the Ministry of Economy and Finance. The Budget Authority assigned all the port budget that is necessary for the development and operations of the ports. But it took very long time to acquire port budget, since it needs strong and patient discuss with the budget authority, ministerial discussion and also consent from parliament. Furthermore it was very difficult for securing sufficient investment budget for the development of the ports, since priority to the port investment was not high compared with other infrastructure. KCTA was given the right to borrow existing container terminals form port authority for nothing, therefore, taking over the management of Jasungdae, and Shinsundae terminals as well as semi-exclusive container terminal in the port of Incheon

(terminal 4). KCTA was given the right to issue bond to finance the investment money, guaranteed by government. Consequently, it could finance huge amount of fund from international financial institutions. In addition, the KCTA can lease the terminals to private sector for rent since it doesn't operate terminals, but only manages them. Finally, KCTA was empowered to construct new container terminals (H. Kim 2000). KCTA, thus far, developed 20 berths both in Pusan and Kwangyang including, Gamman Terminal, Uam terminal and Kwangyang Port terminals. KCTA is expected to play the leading role in future container development as in table 12.

Table 12. Container Development Plan in Korea

(Unit: No. of berths)

	Pusan				Kwangyang				Total			
Financial source	G.	K	P	total	G.	K	P	Total	G.	K	P.	Total
Till '01	7	12	-	19	-	8	-	8	7	20	-	27
2002-11	12	8	10	30	-	25	-	25	12	33	10	55
Total	19	20	10	49	-	33	-	33	19	53	10	82

Source: KCTA.
G. Stands for government; K for KCTA; P for private sectors.

Korean government is ambitious in developing the two ports as the regional hub. Pusan is one of the cheapest ports in East Asia in handling cargoes. KMI research (KMI 1999) shows comparative index of handling charges among competing ports. Shanghai is very slightly cheaper than Pusan, but Pusan is much cheaper than any other ports in the region. Pusan has particularly comparative advantage in transshipment cargoes as shown by KCTA study (KCTA 2000) in terms of cost and facilities, and recent years' sharp increasing in these cargoes has made Pusan emerge as powerful transshipment port. Table 13 presents a very sharp increase in transshipment cargoes in 2000. Year-on-year growth rate of the transshipment cargo was 47.8% nationwide in 2000. Pusan handled 7.54 million TEUs, out of which Pusan handled 2.39 million TEUs for transshipment cargoes, taking 32% of the total container cargo. Pusan's surpassing Kaohsiung in world ranking of container ports to the third can be attributed much to the increase of transshipment cargo. Encouraged by this increase in recent years, Korea government has amended its original container cargo demand for the ports more aggressively (see Table 14). As the government increased the predicted container cargoes, it also had to increase berth productivity from 250.000 TEU per berth to 300,000 TEU per berth not to incur too much budget on building new capacities in proportion to the increased demand for the facilities.

Table 13. Recent Years' Container Throughput in Korea

(Unit: 10,000 TEUs)

		1998	1999(a)	2000(b)	Growth (b/a)
National Total	Total cargo	673	767	912	18.9%
	T/S	(127)	(166)	(245)	47.8%
Pusan	Total	595	644	754	17.1%
	T/S	(127)	(163)	(239)	46.4%
Kwangyang	Total	11	48	68	40.6%
	T/S	(0)	(3)	(6)	128.4%
Others	Total	67	75	90	20%
	T/S	(0)	(0)	(0)	0%

Source: Kim, H. (2001).

Table 14. Amended Prediction Container Cargo in Korea

(Unit: thousand TEU)

1999 (actual)		2001	2006	2011	Growth (%)
Original prediction	7,670	9,854	13,955	19,224	7.9%
	(1,661)	(1,740)	(2,663)	(4,076)	(7.8%)
Amended prediction	7,670	11,031	19,266	29,668	11.9%
	(1,661)	(3,219)	(8,005)	(13,176)	(18.8%)

Note: Parenthesis indicates transshipment cargoes.
Source: MOMAF.

3. Port Privatization and Other Strategy in Korea

Container cargoes were transported dominantly by roadway (84.5%); then railway (12.9%) and coastal shipping handled only 2.3% in 1999. This heavy reliance on roadway caused congestion, pollution and other types of environmental stress and to resolve this problem, the government explores to increase the proportion by coastal shipping for the transport to and from the hinterland. In addition, the government has striven to induce private investment in port construction and also operation not only from domestic sectors, but also from foreign investors. From the second phase port of Kwangyang onward, the government actively encourages to attract foreign investment as well as the new port development in Pusan, where already a consortium of private companies, is formed in constructing ten berths (see Table 12). Along the same line, the government has also attempting to privatize their ports either to private companies for operational purpose or to local municipalities for the whole delegation of port development and management such as Pusan and Incheon. However, the delegation to the municipalities has

been protracted due to different views between central agencies and the local governments and financial clearance issues of accumulated debts. In this regard, Kim(H. Kim 2000) well describes the port privatization process in Korea as in the following:

As for the container port privatization in Korea, Shinsundae Container Terminal was the fist to be privatized in Korea in 1991. The terminal was the 2nd exclusive container terminal in Korea and leased to PECT (Pusan East Container Terminal Co.), which is a consortium composed of existing 10 stevedoring companies and a public corporation. Then BCTOC in Jasungdae Terminal was privatized in 1999, when Hyundai Merchant Marine Co. Ltd. purchased it for 20 years. Meanwhile, in 1994, 4 berths of Gamman Container Terminal in the port of Pusan, and another 4 berths in the port of Kwangyang were to be leased to 4 private companies. However, construction work of these terminals was delayed, and furthermore the difficulty with negotiating dock laborers made the opening the opening of the terminals in 1998 (H. Kim 2000). H. Kim (2000) argues that the most conspicuous obstacle to private sector's participation is the attitude of docker's union. They resist to the decasualization policy suggested by government. To cope with this situation, government now pans to reform current docker's employment system fundamentally.

Finally, the government introduces Free Trade Zone (FTZ) in three port areas: Pusan, Incheon and Kwangyang in 2001 planning to implement it in 2002. The main purpose of FTZ is to stimulate port activities in a wider ranges as is the case with other Asian competing ports in the direction of meeting customers' demand for more efficient supply chain management. Since this approach has been just adopted after a certain feasibility study, there seem still remaining issues as to whether this system will work effectively as planned or be in conflict with existing system. The basic direction of introducing the FTZ must be on the right path in view of other countries' development plan and success stories. Therefore, while implementing the new FTZ system with trial-and-errors, Korean ports are likely to adapt themselves to new environmental challenges as the success history of Korean development, in general, has shown us up to date.

V. Discussions and Conclusion

Ports have been facing numerous challenges arising from various factors including changes in international trade pattern, shipping companies' evolving strategy and networking of different transportation modes. Contemporary ports are particularly concerned with handling longer distance cargoes for global

carriers, intermodal demand for the ports, port financing for expansion and environmental issues. These require ports to provide more efficient, faster and clean services for the customers.

To respond to these challenges, we have seen some ports have taken ambitious steps toward large-scale long-term development plans like Shanghai, Hong Kong, Singapore and Yantian and Tanjung Pelepas. Some others seem relatively stagnant as is the case with perhaps Japanese ports. Intermingled with hub-and spoke phenomena, port may have two ways in their future destiny: expansion into being hub strategy or shrinking into residing as spoke in the network. This destiny will be expedited by the speed of upsizing of vessels. Container history appears to have told us that our prediction on ship size has been underestimated or put differently, perhaps pessimism on the size factor has been shown as coward's position. In this regard, some lines are already in the vanguard of ordering next step of mega carriers. As one of forerunners in this frontier, China Shipping's move to 9,000 TEU ships (top single engine size today) is a significant change of pace (Clarkson Research Study 2001).

As the lines demand deeper-water depth in ports, some ports are in line with the same angle of the lines in terms of developing their approach channels and berth side depth as well as turning basin. As mentioned, Germany plans to develop a new deep-water port up to 18.5 meter to accommodate over 10,000 TEU vessels in Wilhelmshaven. Big lines like Maersk-Sealand are always concerned with putting their brand new biggest vessels in service and any existing ports not ready for their new demand are more likely to be rejected by the lines when renewing their contracts. There are numerous examples belonging to this category of renewals over the history of port contract with lines. In this regard, Asian ports seem less aggressive in preparing the future path for the mega-carriers in their plan. For instance, though Korea plans to develop 55 berths by year 2011, all of them have the water depth of less or equal to 15 meters in the plan. Shanghai seems to be in similar situation. One noteworthy thing in this respect is that Yokohama already developed 16 meter draft to accommodate 12,000 TEU vessels, attracting much attention from Maersk-Sealand group. In case Maersk-Sealand sets their chart again in the north-tier competition ports in the future, this itself will have enormous impact on market sharing among the rivals. Furthermore, it may have domino effect onto other global alliances since the author of this paper has always felt that Maersk-Sealand has acted as the opinion leader in port selection business and would do so in the future. If so, the present happy news among competing ports in the north-tier range may be reversed, retaliated by Japanese ports. As we have seen, all three countries in the range - China, Korea and Taiwan - are full steaming to comprehensively develop their container ports in a large scale. Their direction appears to arrive in the same

destiny such as combining site expansion, deepening water depth, locating logistics center and Free Trade Zone within the port boundary, rationalizing inland transportation, and inviting foreign investors and specialized port operators. As expected, if China became the member of WTO by the end of last year, the port competition would reach the highest level that we have never seen yet. In addition, when contemporary Post-Panamax vessels are taken over by the mega-carriers -12,000 - 15,000 TEU- within less than then years, today's 9 - 10 port calling by major lines is more likely to be reduced to 3 - 4 calls at the maximum in East Asia. Therefore, the most important thing to the ports in the region may well formulate effective long-term port development and responsively adapt their plans to changing environment due to lingering uncertainties in ship size and other technology development. Once could explore the same path that shipping lines when faced with enormous rivalry requiring heavy investment - that is alliance among rival ports. It is a new approach, and some countries seem to have already selected this strategy like Wilhelmshaven between Bremen and Hamburg and another between Malmo in Sweden and Copenhagen in Denmark. (Sim 2001). No attempt has been made so far among the rival ports in East Asia except the fact that some ports such as PSA and Hong Kong based group (Hutchison) are investing in foreign ports as the international operators, but not as the alliances. High time, thus, may have arrived that the rival ports can explore this port alliance strategy to fight against lines' alliances strategy.

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