

CONTAINER PORT DEVELOPMENT IN ASIA: CHANGES, CHALLENGES AND FUTURE TRENDS

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Abstract: Containerization plays a vital role in Asia's rapidly growing international trade. Mirroring global growth trends, container port developments throughout Asia have attracted investments, technological innovations, and advances in port management expertise. This study looks at the development of container ports in Asia and finds that: (1) the relative competitive positioning of a port may be altered in line with a confluence of dynamic environmental factors, (2) advances in information technology (IT) are becoming significant, and (3) the demand for container ports in Asia will further increase. The convergence of these trends will heighten competitive pressures on Asia's ports, requiring operators to be responsive to market changes by adopting logistic solutions and current IT technologies.

Keywords: Concentration in shipping industry, container ports development, information technology, and freight logistics.

1. INTRODUCTION

Along with the process of globalization, containerization continues to make a vital contribution to the region's rapidly growing international trade. With strong economic developments since the early 80's and a shift in the global center of manufacturing to Asia, and the liberalization of international trade policy, which has created a stable legal environment and an incentive for private sector participation in the development of marine ports within the region, container port development in Asia has expanded with vast development projects, technological innovations, and advances in port operation and management expertise. However, recent changes in shipping business strategies and practices—especially the deployment of super capacity vessels—have had numerous detrimental impacts on port development. In addition, the fast evolving development of information technology in shipping and port industries such as EDI and other forms of Internet-based activities, are adding yet another major challenge to many ports in Asia. This study looks at several aspects of the development of container ports in Asia, with an emphasis on Southeast Asia. In particular those changes affecting the competitive environment ports now find themselves in are explored, and the implications of these changes for the future development of port facilities are considered.

2. ECONOMIC DEVELOPMENT POLICY AND CONTAINER PORTS IN ASIA

2.1 Export-oriented Economies and Port Development Policies

There have been significant changes in the geographical location of manufacturing output in Asia through the late 70s, and especially in the mid 80s when the region began to encourage the investments of Foreign Multinational Corporation (MNCs), which are always interested in new export markets and lower cost production environments. Since then, efforts in attracting foreign investment have been and remain strategic policies for stimulating regional economic activities. While most of the world's manufacturing capabilities are still located in countries like the United State, Japan and Western Europe, Asian nations, especially Asian NIEs and later ASEAN countries, have been able to take advantage of this shifting location of industrial manufacturing jobs. These Asian nations have experienced spectacular manufacturing sector-driven growth during the last few decades (Table 1), and the region's economic developments relied on export-oriented activities in which Asia, especially Southeast Asia, offers a multitude of opportunities in sea-borne trade due to its island geography and a lack of land based transport alternatives.

Table 1. Share of Manufacturing in GDP (%)

Country	1970	1993	% Change	Country	1970	1993	% Change
United State	29	18	-37.93	Taiwan	35	39	11.40
United Kingdom	32	25	-21.88	Singapore	12	37	208.33
France	29	22	-24.14	Malaysia	9	25	183.11
Germany	40	27	-32.50	Indonesia	8	22	175.00
Australia	26	15	-42.31	Thailand	13	28	115.38
Japan	34	24	-29.41	Philippines	20	24	20.00
Hongkong	25	13	-48.00	China	n/a	38	n/a
Korea	14	29	107.14				

Source: OCED Reports, several issues

The framework of these new economic directions favors a market-oriented economic structure and aggressive measures in liberalizing international trade. In this environment the major strategic goals of government policies for port development in general, and for modern container terminals in particular, have been to:

- Attract foreign investments and promote trade through fast, reliable and inexpensive maritime transport,
- Create employment and taxable income from maritime-related industries within the local economy, and
- Reinforce basic infrastructure elements for local and regional economic development.

Port development was stimulated by strong economic growth since the 1980s and supported by a favorable investment environment provided by the governments. Additionally, in certain cases strong bilateral links provided favorable loan and aid conditions to fund substantial infrastructure developments. These international funds were typically provided on a bilateral basis, that is nation-to-nation and project-by-project, without a good deal of coordination (LE D.H., 1998). This essentially ad hoc approach to development funding has resulted in an over

investment in port facilities in some parts of the region. In the early 80s all regional primary ports (such as Singapore, Bangkok, Manila, Tanjung Priok, and Port Kelang) and number of smaller ports were significantly developed through a vast number of modernization programs designed to improve efficiency and to keep up with modern shipping technologies, in particular containerization. During this time port developments in Asia were considered as a part of national systems (Indonesia Ports, for example) and as elements in national and regional economic development strategies (as in Laem Chabang Port in Eastern Seaboard, Thailand, and many ports in the Philippines and Malaysia). Thus, port developments have been seen as a supplemental aspect of economic development strategies, rather than as a leading component (Chia, 1989). In the 1990s, however, an emphasis emerged in the development of principally market-oriented ports offering competitive services, particularly container terminals. These ports were developed by public or private interests, or by a combined public-private-partnership, as business centers providing cargo service for the transshipment of goods originating from neighboring economies. An interesting shift in the application or use of multilateral and bilateral funding has occurred with the development of these competitive ports: rather than being used to capitalize port facilities, these funds are now frequently used instead as a mechanism to guarantee the performance of private sector investments in port facilities. In essence these resources now serve to offset or mitigate the risk of private sector participation. As basically a subsidy of private port investments, this practice has stimulated an over development of port facilities. Consequently, this new wave of business-oriented port development has made these ports themselves, and many other ports in the region, vulnerable to market forces.

2.2 The Primacy of Asian Ports

Since the introduction of containerization, container development in the Asian-Pacific region has been dramatic with an annual growth rate of 10.8% as compared to 8.7% of world container port throughput growth rate during 1990s (ESCAP, 2000). In this context, port cargo throughput in each container port in the region has continuously increased due to (1) fast economic growth, (2) container penetration of general cargo trades, (3) the movement of empty container due to trade imbalances, and (4) the increase in trans-shipment due to a strong concentration of port activity at national primary ports and the hubbing transshipment role played by the ports of Singapore and Hongkong.

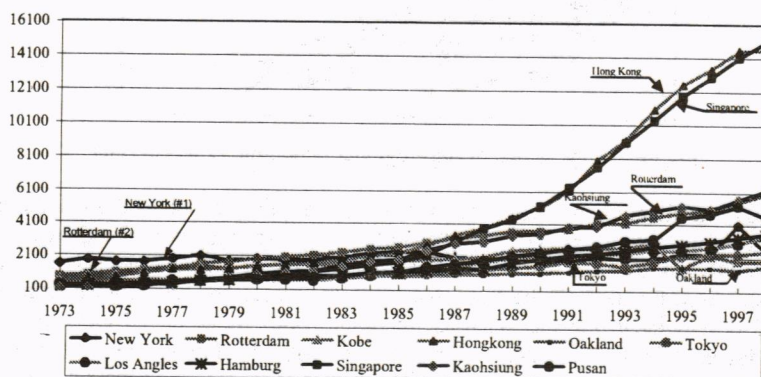


Figure 1. World Container Port Trends ('000 TEUs)

A strong hub and spoke system has become a fundamental characteristic of the port system in Asia, and particularly among ASEAN countries (although this central port system has been somewhat weakened in recent years due to strong economic growth and a maritime nationalism tendency arising in several ASEAN countries like Indonesia, Malaysia [e.g. make use of local port policy] and China).

Since the late 80s and throughout the 1990s, container ports in Asia have been gaining stature as the busiest container ports in the world. There has been a significant shift in terms of container volume throughput at Asian ports during this period as shown in Figure 1. In 1985, for example, container cargo volume handled at the regional hub ports of Hong Kong, Kaohsiung and Singapore was more or less 2 million TEUs (Twenty Equivalent Unit) while other national primary ports and local ports still struggled with the adaptation of modern shipping technologies, with 400 TEU handled by Manila, 244 TEUs by port of Kelang, and only 213 TEUs by Jakarta port. Since the early 1990s, however, with rapid economic growth in almost every country in the region, including Vietnam, Cambodia, and Laos, and accelerated further by the concentration of container shipping, container cargo volume has been growing rapidly at hub ports like Singapore and Hong Kong, with each of these major ports handled more than 16 million TEUs in 1999. These capacities are supplemented by a number of newly emerging ports which can offer an international standard of service that is capable of handling substantial container volumes, such as ports in northeast and southern China (Shanghai and Shenzhen ports) and Jakarta international container terminal (JICT), and many other ports in Malaysia like West Port of Kelang, and Laem Chabang of Thailand.

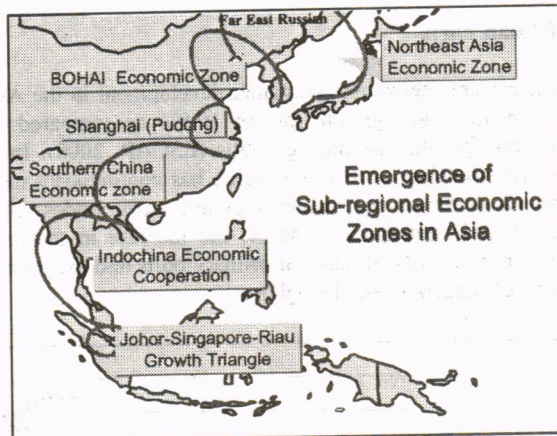


Figure 2: Emergence of Sub-regional Economic Zones in Asia

Compared to the situation in the mid-80s, the number of ports as well as the volume handled at each port is increasing rapidly. One of the most important factors to the growth of Asian ports in the 90s has been the emergence and strengthening of various sub-regional economic zones as shown in Figure 2. These fast growing economic regions have enjoyed a number of designated development priorities such as free-trade zones, value added logistics, etc., and series of favorable port investment initiatives, including the foreign ownership (solely or partially) and private financing initiative (PFI) schemes. This emerging market is one of the core reasons for the changes occurring in shipping patterns and the relative re-positioning of many ports in the region in recent years.

3. CHANGES IN CONTAINER SHIPPING AND PORT ENVIRONMENT

3.1 The Era of Mega-ships and Alliances

Along with this growth in port capacities and capabilities, global container lines are under intense pressure to compete by providing shippers with services that include fast transit times, high frequency, and low cost and damage free delivery. In this competitive environment, shipping lines are pursuing efficiency strategies to gain economies of scale through the development of mega-capacity-ships, the formation of alliances on a global basis, or through mergers and acquisitions among carrier. These strategies have the effect of rationalizing investment and administrative costs, along with the spreading of risks. All of this has led to a further concentration within the industry and the emergence of mega-ships operating along major Asian shipping routes. For, example, in 1999 after Maersk Line acquired the international shipping operations of Sea-land to form a company controlling 9.2 per cent of the world container shipping fleet. As a consequence of this consolidation, the 20 largest carriers now control around 56 per cent of the world's container fleet, and the top 5 liners own or operate more than 25 per cent (ESCAP, 1999). In terms of vessel size, capacities are now dominated by 4000-6000 plus TEU vessels in major Asian deep-sea trades, as opposed to the 2500-3500 TEUs ships used previously. It is predicted that capacity of vessels deploy on Asian trade lane will be further increased in the years to come. Volume efficiencies and the high daily operating costs of large vessels have forced liner companies to rationalize their port-of-call strategies.

3.2 Effecting Changes Within Regional Ports

The introduction of mega-ships has effectively altered port selection decisions, thereby changing the route that goods take to market. It doesn't make much difference whether the final market for goods is on the West or East coast of the US, the operation of these new and much larger capacity container ships has resulted in changing port preferences and trade flow patterns. The most significant impact on port operations caused by this increased vessel capacity is a reduction in the overall number of port calls and a corresponding increase in the demand for the transshipment of goods, resulting in a need for more relay ports and feeder services. As a consequence, the main-line and hub and spoke system of container cargo is becoming more concentrated, with the biggest ships calling at only a limited number of very efficient ports situated in ideal locations along main trunk routes, with other ports linked to these main ports by an extended feeder network.

In addition to the traditional hub and spoke system, global alliances among carriers have recently extended their service coverage areas and diversified their activities to non-traditional (e.g. feeder) service markets. For example, Maersk-Sealand (the world's largest shipping line) traditionally focused their service only on the trunk route between their main hub ports (e.g. Singapore for Asia, Los Angeles and Long Beach for United State West Coast and Rotterdam for Europe); now, however, they are providing multiple, overlapping service lines composed of a blend of services that call only at main hub ports (e.g. New State-of-the-Art Port of Tanjung Pelapas, Malaysia, instead of Singapore) and services that call directly at secondary (newly emerging) hub ports like Yantian, southern China, JICT at Jakarta, Indonesia, etc. Also, feeder services are available, like the super shuttle provided by Maersk-Sealand between Singapore and its new Asia hub port at Tanjung Pelapas, as one example.

These liners' new service strategies are causing a re-ordering of the established port hierarchies to form a transshipment-feeder structure as illustrated in Figure 3.

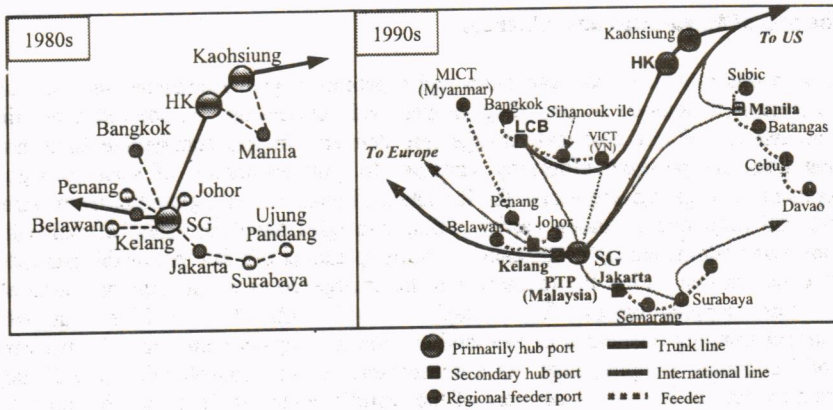


Figure 3: Changing Shipping Pattern (1980s vs. 1990s)

This has increased the importance of secondary ports such as Jakarta, Tanjung Priok (Indonesia), Port Klang (Malaysia), Laem Chabang (Thailand), Manila (Philippine), as well as Shanghai, Yantian (China), which have recorded a high growth in container throughput in recent years. These trends, however, also forced a number of regional ports into becoming local ports for feeder services.

The fact that these large ships began to by-pass many ports in the region, at just the time that new facilities at these by-passed ports became operational, have left many port operators in a vulnerable position given the heavy investments they had made in port facilities in order to stay in service and compete to attract liner shipping, (such as deepening channels to 14-17 meters, purchasing super panamax cranes with 17 to 24 reaches, and etc.). These changes are not only creating a substantial financial burden, especially, for developing countries where most funds come from international loans, but, more significantly, they have also heightened competitive pressures among Asian ports.

4. COMPETITIVE TRENDS FACING ASIAN PORTS

4.1. Port Privatization and International Port/Terminal Operators (IPOs)

One trend affecting port development and thus port competition in Asia is the emergence of large International Port/Terminal Operators, such as Hutchison Port Holding Group (HPH), P&O of Australia, PSA cooperation of Singapore, ITCSI of Philippine, and others. Started in the late 80s in response to the intensified battle for hub status occurring in the port sector all over the world, international container operators are seeking markets for extending the scope and scale of their port operation activities around the world. At the same time in Asia, governments have realized that privatization of ports and many related operations are key to improving port efficiency and achieving larger regional transport hub status. Thus during this time a number of state ports in the region undertook privatization programs. The most common form of privatization are Land-lord Port models, where the Port Authority retains

ultimate property rights over port properties and facilities and fulfills all regulatory functions, and commercial operations are undertaken by private operators, Build-Operate-Transfer (BOT) arrangements, and joint venture developments. As results, private sector investments in port infrastructure and involvement in port operation and management have grown significantly in the region since 1990. For example, Singapore has privatized its terminal port operations, Malaysia is moving fast in that direction in all strategic ports, including the Port of Klang, Port Penang, and the most recent state-of-the-art development at Port of Tanjung Pelapas (PTP). The two main container terminals in Manila are run by private firms (ICTS and Asian Terminal Inc. of P&O) under long-term lease agreements with the government, Taiwan and Korea are well on the way in all major seaports, like Kaohsiung, Keelung, Inchon and Kwangyang of Korea. In addition to Hong Kong, which has always been privately run, China has permitted foreign investment in Shanghai, its largest port, Shenzhen ports complex in southern china, and several smaller ones along the southeast coast.

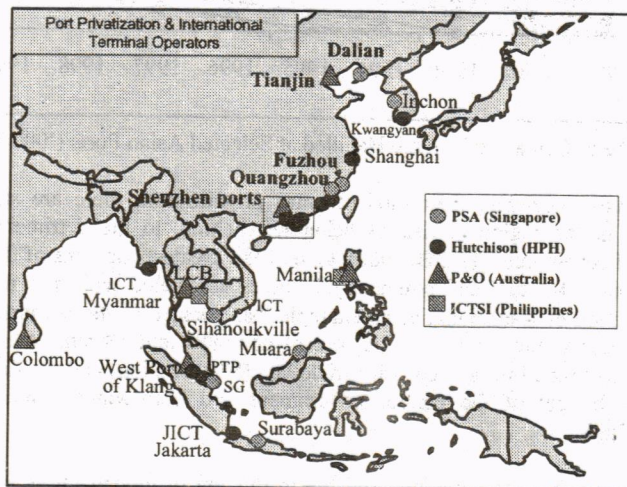


Figure 4. Port Privatization and International Terminal Operators in Asia

International port/terminal operators have been able to quickly take advantages of the privatization policies and these companies rapidly gained dominance in Asia container operations as shown in Figure 4. For example, the development of Yantian port in southern China involved 49% ownership by Hong Kong's Hutchison International Port Holdings Ltd, who also owned 51% of JICT, Jakarta, and similarly Surabaya, Indonesia sold 49% of its container terminal unit to the P&O Ports division of P&O Australia in its recent privatization efforts. These international port/terminal operators have brought to the port sector vast development funds for the most sophisticated terminal facilities, and their experience and expertise in port operation and management combines with their global business network and business perspective in making them significant participants in the port sector. With the involvement of IPOs, many container ports in Asia have achieved a higher level of technological innovation, and advances in port operation and management expertise can be noted as well. It can be demonstrated that where the private sector has participated in port activities (development, management and operation), there has been significant improvement in port performance as represented by the high growth rate in container volume handle at

each port. JICT, Jakarta, as one example, in the first five months of private operation saw productivity rise 28.5%, and ten service calls have been added to the terminal since then. Similarly, in the first year since the container terminal was privatized to Australia's P&O Ports, the Queen Elizabeth Quay at the Port of Colombo in Sri Lanka handled 300,602 TEUs in 2000, up 50% over 1999. Figure 5 illustrates container volume handled at selected ports which have undergone port privatization with the present of the International Port Operators.

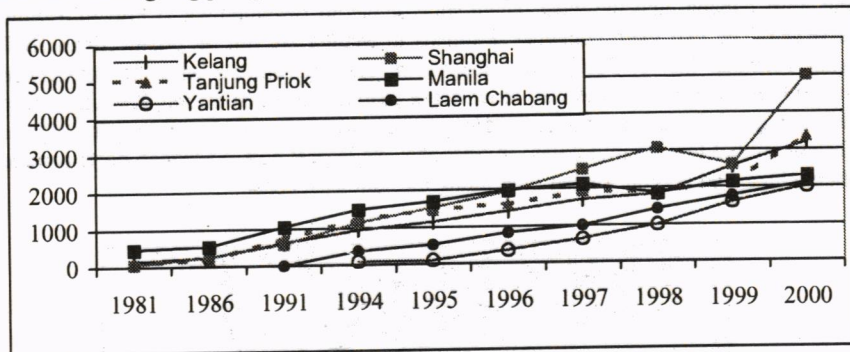


Figure 5. Container Volume Handled at Selected Asian Ports ('000 TEUs)

As ports in Asia accelerate their move toward privatization, there are still a number of national ports in the region at risk of being left behind, to the detriment of their trade, investment and development (ADB, 2000). One of the greatest concerns of the government is the social impact of actual and potential job losses associated with port privatization. The recent privatization of Kaohsiung, as an example, has resulted in the retirement of more than 4,000 dock laborers through the buying out of contracts and retirement entitlements. This compensation cost 9.62 billion New Taiwan dollars (\$283 million) and the funds came from a supplementary budget of the central government and borrowings from a transportation development fund.

Privatization in the port sector is unavoidable in this era of globalization, and this trend has become especially important for port developments in developing and emerging nations that are experiencing fast economic growth, and thus modern and large-scale port facilities are in demand. However governments of these nations usually face budgetary constraints and competing priorities, and they may no longer be able to rely on international development aid to the extent they have previously. Thus, countries that fail to keep up with the modern scale and technology of port development risk being left behind. Privatization offers a way to keep up with these development needs, and we have witnessed that countries that structure their port development programs to attract and accommodate private participation will likely outperform those that do not.

4.2 Port and Freight Logistics

Current pattern of complex logistics has transformed ports into strategic nodes wherein production and transport are integrated. The efficiency and comprehensive networking of this structure is driving trade competitiveness and, consequently, the competitive positioning of ports. Today port customers (including shipping lines and local and foreign shippers) are making their choices based on high-quality, door-to-door services. For port operators this means that the success of their port now depends on more than just its infrastructure and

geographic location—it depends on the logistical efficiency of the total transport and distribution system within which their port is only one node of the entire transport chain. Streamlining logistical services is therefore becoming more and more important. In addition, with the increased globalization of trade and the continuing economic development of Asian economies, an increase in the flow of long-haul freight movements and especially inland transport (intermodal) is elevating the strategic importance of efficient logistics to port operators and users, and to governments.

This quickly evolving environment has had a profound effect on port competition, as an advantage in some cases, but as a disadvantage in most of the cases. The demand for large-scale logistical services and facilities is growing due to the rationalization of corporately held supply chain and physical distribution channels. Logistics terminals are places that provide total supply chain management services for numerous industries and businesses, including booking space, stuffing and un-stuffing containers, issuing cargo receipts, collecting freight and other charges, customs brokerage, warehousing (sorting and packaging) and distribution, modal transfer (e.g. arranging for rail and trucking services), as well as shipping needs. Seaports are often an ideal location for such terminal activities due to their function as gateways to global trade. However, logistics terminals and transport infrastructure links take up a lot of land, a commodity that most of the ports are not able to provide. For example, a number of primary ports in the region, e.g., Bangkok, Manila, Tanjung Priok, Saigon in Ho Chi Minh City (Vietnam) and etc., remain physically embedded within urban areas. Pressure on land, bottlenecks at access points, and higher labor costs are major problems contributing to high shipping costs at these ports. Recently, the relocation of Maersk-Sealand from Singapore to the new state-of-the-art Port of Tanjung Pelapas, Malaysia, where they can control 30% of their acquisition (as result of Malaysia's privatization policy) and enjoy 30% lower port charges compared to Singapore. These advantages are a typical example for cases of this sort.

Challenges facing Indochina's ports are more severe. In recent years, with the economic growth of the region, we have seen an increased use of marine transport for both domestic and foreign goods, despite the relatively poor port handling facilities. The concept of containerization, however, has not been widely implemented, resulting in many small seaports lacking container handling and holding facilities. This leads to serious congestion problems at main container terminals due to excess demand (e.g. Sihanoukville in Cambodia, and Yangon in Myanmar where annual capacity of the port is only about 2 million tons while throughput handled reached 4.6 million tons of cargo in 1996). Also there is a critical shortage of deep-water ports in this region. Haiphong and Saigon ports of Vietnam and Sihanoukville and Phnom Penh (Cambodia) are experiencing continuing silting problems that permit access to only ships of less than 10,000dwt. Danang, likewise, can only handle ships of less than 5,000dwt. Saigon port at Ho Chi Minh City is being sited within the city, ships must take three hours to travel an 85km upriver channel, which can only handle ships up to 25,000dwt. Furthermore, insufficient ground slots for containers, the lack of inland container clearance depots (ICDs), and the non-existence of quality public warehousing facilities and modern inventory practices ((Mark, G. 2000) are posing serious logistical challenges for port operators and governments. Table 2 demonstrates condition of key logistics related infrastructures in Indochina as compared to those levels in other neighboring countries.

Table 2. Logistics Related Infrastructure Rating

	Singapore	Thailand	Vietnam	Myanmar	Laos	Cambodia
Airports	4.9	3.1	1.9	1.6	1.5	1.6
Ports	4.9	2.5	2	1.5		1.5
Transportation	4.6	1.6	1.9	1.6	1.5	1.8
Telecommunication	4.7	3.0	2.2	1.4	1.5	1.4
Technology	3.8	2.62	1.9	1.8	2.5	1.3
Human resources	4.1	2.7	2.7	2.3	1.7	1.4
Administration efficiency	4.5	2.3	1.4	1.6	1.3	1.1

Note: Measured on five-point scale

Source: The Straits Times (1997a)

In recent years the governments of Indochina have gradually come to recognize the importance of logistics. The number of logistics facilities being planned (e.g. ICD in Phnom Penh), and the willingness of governments to invite foreign logistics companies to join with local and state firms in major projects to improve warehousing and container handling facilities, are evidence of progress. Unfortunately, however, these developments have not been coordinated across the region and much work has yet to be done. In particular, inland transport (rail, road and waterways) links to the seaports need to be improved and more development in logistics infrastructure, including both soft- and hardware resources, are urgently needed in order for this region to be integrated into ASEAN and the world community.

4.3 EDI and Port Operation and Management

Recent advances in the development of port information technology (IT) represent another competitive challenge facing port operators and governments in Asia. IT systems are integrated terminal and port management information networks that provide connectivity to all port users, government agencies, banks, and overseas agents. This has led to better trackability within an entire transport chain, reducing costs (time required) per shipment and improving efficiency by providing detailed information related to a shipment. Using these systems, information about shipments is available in advance of their arrival, and invoices and detailed transaction records maintained on these computer systems can be made available to all concerned parties.

IT solutions have become vital to port competition as shippers and carriers are keen in demanding that such systems be implemented for their use. By tracking the shipment from its origin using EDI technology, the shipper remains more in control of its own destiny. For carriers, less time can be spent at terminals because the advance knowledge of a container's content and destination prior to its actual arrival. For example, in case of a 2000 TEUs vessel are unloaded by two gantry cranes, with EDI application carrier could save US\$ 35,000 or 19 hours time-spend at berth (Kia, M., 2000). For the last decade, therefore, the port community has made major investments in EDI (Electronic Data Interchange) to facilitate secure communications between ports, port users, and selected service providers including freight forwarders, transport companies, rail operators, crane operators, and container carriers at the terminal.

For terminal operators, the benefits of such IT system are quite significant. However, these systems are expensive and, for now, only the larger ports can afford the huge investment

required for EDI to be installed. Table 3 illustrates port EDI applications in selected countries.

Table 3. EDI and Electronic Commerce (EC) Application in Selected Countries

Country	Port Procedure Computerized	Port EDI	Customs Procedure Computerized	Customs EDI	All Parties Electronically Linked	Electronic Trade in Transport Services
Cambodia	No	No	No	No	No	No
Indonesia	Yes	Yes	Yes	Being Implemented	No	No
Japan	Yes	Yes	Yes	Yes	Yes	No
Korea	Yes	Yes	Yes	Yes	Yes	Yes
Laos	No	No	No	No	No	No
Philippines	Yes	Yes	Yes	Yes	No	No
Singapore	Yes	Yes	Yes	Yes	Yes	Yes
Sri Lanka	Yes	Yes	No	No	No	No
Thailand	Yes	Yes	Yes	Yes	Yes	Yes
Vietnam	No	No	No	No	No	No

Source: ESCAP Country Report, 2000

Moreover, in addition to the costs to install these systems, there are further challenges in making these systems operate properly. This is due to the lack of system synchronization and standardization among parties linked to a particular system. And lastly, these data-based applications also incur high maintenance costs.

Now, just as the use of EDI technology is starting to take-off at many ports in developing nations after tremendous efforts, the development of web-based information technology—the Internet—may soon make these data-based systems obsolete. Carriers and other logistic industry entities are beginning to find that there are advantages to web-based communications in sharing information and conducting transaction on a much wider basis, advantages that overcome the closed nature of EDI system in terms of the number of parties linked by one system. According to a new study from the research and consulting firm Datamonitor, EDI systems will coexist with the Internet in the short term, but web-based communications "will, for the most part, replace data-based EDI."

5. PORT DEVELOPMENT TRENDS

5.1 Continued Development in Port Sector

Current changes in the maritime transport environment have affected the viability and profitability in many ports in the region. However, with Asia's ongoing status as an export-center of globe trade, freight transport as well as the demand for logistics facilities will increase. Thus container port development in Asia will continue to grow, though the focus of development will be very different from country to country depending on their particular development needs. As shown in Table 4, while regional hub ports like Hongkong and Singapore will continue to expand and modernize their port facilities with the most sophisticated technologies in order to maintain their regional hub status, new competitors will

emerge with the new ports developed in China (e.g. Yantian, southern China ports) and in Southeast Asia (e.g. Tanjung Pelapas, Malaysia). However, the unprecedented race to build

Table 4. Future Plan in Selected Asian Ports

Port	Future Plan	Completion year
Singapore	Addition of 32 berths with the latest in state-of-the-art equipments	2000-2005
Hongkong	Most advanced terminal 9, addition of 2.6 mil TEUs capacity	2001
Kaohsiung	Increase capacity to 8 million TEUs	2001
Kwangyang	Newly developed terminal, 5.28 mil TEUs annual handling capacity	1987-2010
Shanghai	Construction of second deep-sea terminal, reaching 20 mil TEUs capacity	Phase I: 2010
Tanjung Pelapas	New development state-of-the-art port with current capacity of 3.8 mil. TEUs (phase I) and up to 4.5 mil. TEUs per annum in 2002	2002
Surabaya	640m berth, 500-hectare stacking yard, -16m depth	2002
Vietnam	US\$130 million upgrade of <i>Cai Lan</i> port; capacity of 3 mil. tons US\$426 mil. Port investment program: <i>Chan May</i> deep-water Int.commercial port: capacity of 80 mil. tons of cargo annually. <i>Dung Quat</i> : capacity of 26 million tons of cargo per year and others.	2002 Phase I: 2010

Source: *Several Issues on Port Development Plan, Country Report*

transshipment ports of the 1990s will most likely slowdown as carriers and alliances are now in a position to demand a specific set of services and capacities from the ports they chose to include as a part of their transshipment and hub-port networks. A key demand is that a port has an advantageous location. For example, a regional transshipment port should be positioned for minimal deviation from the trade lane it serves. It preferably be proximate to secondary ports along the route and to a large local market, and access is another important consideration. Also, liners typically require either deep water or channel drafts of 16 meters or more. However, having a natural deep-water location is such a unique privilege that most existing ports in the region are not likely to possess it.

Given these attributes, Singapore and Hongkong will most likely maintain their position as hub ports, even as changes in the current shipping environment work to increase the importance of several secondary ports in the region, such as Tanjung Pelapas, Yantian, Shanghai, Kelang, and other such ports. Most of these ports must deal with siltation problems that require frequent dredging to maintain the required channel depth, and consequently their costs are increased and that will affect their competitiveness in the long run.

It seems most likely, therefore, that a two-tier system of ports and shipping patterns will emerge in the region, with high-value/light-weight cargo needing the fastest transit time continuing to use Hongkong and Singapore, and lower valued containerized cargo requiring less stringent delivery times using other ports like JICT of Jakarta, Port of Kelang, and Yantian.

5.2 Impact of Development in Air and Rail Transport

Another important factor effecting port development decisions is the increase in air cargo transport and the development of border-crossing rail services. Regarding air transport, multinational companies are more and more involved in the development and production of

high-tech component in the region. This will boost the share of high value/low bulk shipments in international trade. Furthermore, a wider use of just-in-time logistics will increase the pressure for rapid and dependable delivery. These factors will give air transport a competitive edge over marine shipping. As Table 5 demonstrates, the share of air cargo of Hongkong merchandise trade in 2000 is still less than ocean shipping, however, its growth rate is increasing steadily.

Table 5. Hongkong Merchandise Trade by Modes in 2000

Mode	Share	Growth
Air	26.80%	35%
In which to:		
USA		28.30%
Taiwan		31.10%
Japan		32.30%
Singapore		11.90%
Mainland China		69.60%
Ocean	39.60%	12%
Land	28.60%	19.80%

Source: *Asian Shipping News*, 2000

Sea-borne trade has prospered in Asia due to the region's island geography and lack of land based transport alternatives. However, in recent years the rapid increase in intra-regional trade among member countries has intensifying the desire for an integrated rail cargo system within the region. One example is the quickly evolved popularity of the Thailand-Malaysia rail landbridge that opened in 1999. Since the opening of this system, its container volume was increased rapidly, reaching 240,000 TEU in 2000 and predicted to reach more than 300,000 TEUs in 2001. A double-track construction was begun early this year to double its capacity to meet increasing cross-border import and export volume between Thailand and Malaysia in the coming years. Similarly, another example is the new railway lines for southern China and Vietnam running between Kunming and Hanoi. This is the largest border crossing between the two countries, with current trade consisting of 440,000 tons of cargo. In total, freight volumes on the China-Vietnam Railway are showing an impressive rise with 20% increased in 2000. To conclude, the recent development in air cargo transport and cross-border rail cargo systems in the region will be further accelerated in the foreseeable future. Ports should look at the integration of sea-air and sea-rail transport as an opportunity to broaden service areas and diversify port activities. One example is the recently completed landbridge linking Port Klang with Bangkok, Thailand. Shippers stand to benefit from shorter transit times as the transit time via the rail-link is 60 hours compared to the 5-7 days required for transport by sea, and 3-4 days required for road transport. This resulted in the increased container volume at Port Kelang in 2000 to exceed 3 million TEUs. Follow this success, another project of this kind is planned to re-construct and build a 2,500 km landbridge between Port Klang and Cambodia's capital Phnom Penh.

6. CONCLUDING REMARKS

The manufacturing and export oriented economic growth that has occurred in Asia as a result of trade liberalization and the welcoming of foreign investments has spurred the rapid development of port facilities in Asia. Along with expanded facilities, technological innovations and advances in port operations and management expertise have contributed to a

remarkable increase in the volume of freight passing through the region's ports. As the region continues in its role as a center of global manufacturing, the part played by ports in ensuring economic development and as a significant component within the global trading system will continue to grow.

On the shipping line side of the industry, the emergence of mega-ships operating along major Asian routes has driven the concentration of freight movements to hub ports capable of accommodating these large capacity container ships. This concentration of movements at major ports has supported the transshipment of freight at smaller ports through feeder services. For the foreseeable future this trend toward the concentration of freight movements at existing hub ports will continue, and at the same time the continuing economic growth in ASEAN and China will necessitate that additional ports and capacities be developed at secondary locations. The significance of these secondary ports is evident in the interest shown by global shipping lines in expanding their direct services to these ports. The hierarchical structure of ports emerging in these trends suggests certain port development policies that would advance the complementary role that these emerging ports play in the overall capacity of the existing port system in Asia.

The globalization of trade has heightened demands for high quality, door-to-door freight transportation services. This comprehensive approach to freight movements is driving the development of sophisticated logistic systems, of which marine ports are a crucial component. Working within this overall system of transport has become essential to the economic success of port facilities. To accomplish this, the application of information technologies is essential, as is the provision of a full range of logistic services. In total, ports are now required to function as a logistical hub, bringing together sophisticated communications, business services, and physical distribution networks to provide a seamless means of handling ever-increasing volumes of cargo. Efficiencies must be achieved in time, capital, and the flow of information between parties involved in the process. To this end, port policy makers must commit to providing the best possible communication and transport links, and also encourage the inflow of private investment and management expertise to port developments.

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