Development of Asian Container Shipping Under Change of Maritime Environment

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Abstract

The sustained growth of Asian economic development has brought significant changes in the structure of container shipping services network in the intercontinental trades to and from Asia and intra-Asia as well. This paper aims to examine the development of Asian container shipping network in response to change of global and regional maritime environment. Firstly, we examine the factors that are driving to evolution of the Asian container shipping services network. Secondly, we analyse the development of Asian container shipping services network. Beside the high growth of Asian economic development, increasing vessel size, performing alliance among liner shipping, emergency of new ports, port administrator policy, terminal operators, and liberalisation also play important role in restructuring container shipping network. Frequent changes in the pattern of mainline and feeder services in Asian container shipping network on transpacific and Asia-Europe trade suggest that the system is still evolving; that the economic forces driving change have not as yet been fully accommodated. Rapidly changing trade patterns, especially in East and South East Asia, add to this instability. Hence we would expect to see further modifications to the pattern of mainline and feeder services, as well as changes in the absolute and relative status of regional ports, over the next decade.

1 Introduction

Asia has become progressively more interdependent, since the more industrialized countries of the region succeeded in moving into the production of higher value-added export items and diversified their market. In 2001, transpacific container volumes were 10.6 million TEU in both directions, an increase 16% over the previous year. Asia-Europe container volumes were 6.9 million TEU (Containerisation International, July, 2002). The sustained growth of Asian economic development has brought significant changes in the structure of container shipping services network in the intercontinental trades to and from Asia and intra-Asia as well. The structure of container shipping networks changes over time. Understanding these

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changes is very important for analysing the competitive position and growth prospect of container ports. The network structure of container shipping is commonplace knowledge and numerous studies deal with the issue of the evolution of liner shipping service patterns. De Langen, et al (2002) said four reasons explain the complexity of the structure of liner shipping network, (1) annual transport volumes increase substantially, (2) rising of number of container port, (3) increasing size of vessel, (4) the liner shipping company increase.

This paper aims to examine the development of Asian container shipping network in response to change of global and regional maritime environment. Firstly, we examine the factors that are driving to evolution of the Asian container shipping services network. Secondly, we analyse the development of Asian container shipping services network.

2 Changes in maritime environment

2.1 Developments in Asian Trade

It is impossible to understand properly the changes that have occurred within the container shipping and ports over the last decade without understanding the context in which these changes have taken place. Over the last decades, the Asian economies have increasingly relied on international trade as the primary engine of economic growth and development. Keeping pace with economic development, the Asian container trade has been growing rapidly and the development of shipping network and port facilities have been priority issues. In understanding the evolution of container shipping systems in Asia it is useful to think in terms of four phases in the Asian economic development (Meyrick):

- The Japan phase, during which Japan dominated the Asian industrial scene.
- The Tigers phase, during which rapid industrialization in Korea and Taiwan complemented that of Japan, and Hong Kong and Singapore began to emerge as major centres of commercial and industrial activity within the region.
- The ASEAN phase, during which Thailand and Malaysia took over as the fastest growing States in Asia.
- The current phase, during which the massive Chinese economy signalled its arrival as a major international force with economic growth in excess of 10 percent.

Table 1 shows the growth in container handled within each of the major Asian economies during 1985-2002. Within this massive overall growth, there are several major structural changes. As the four successive waves of Asian economic development have occurred, the centre of gravity container of container shipping operation has changed. Figure 1 indicates comparison of growth in the world and East Asian trade from 1990 to 2002. World container trade has more than tripled for the last 12 years from 85.6 million TEU in 1990 to 266.3 million TEU in 2002. Figure 1 also shows growth of East Asian container trade that indicates significant changes from 31.6 million TEU in 1990 to 129.9 million TEU in 2002. Share of East Asian container trade tends to increase from 36.9 percent in 1990 to 48.8 percent in 2002. This means that share of East Asian container trade almost half of world container trade. The substantial growth in container trade due to further economic development, in particular in China, and in ASEAN countries.

Table 1: Container Movement in East Asia (000TEU) 1985-2002

	1985	1990	1995	2002
Japan	5,517	7,851	10,740	13,501
Taiwan Prov. of China	3,075	5,430	7,848	11,605
Hong Kong	2,289	5,100	12,549	-
Singapore	1,699	5,223	11,800	16,986
South Korea	1,246	2,348	4,502	11,542
Philippines	638	1,383	1,707	3,270
PRC	446	1,143	4,678	55,717
Indonesia	229	922	2,197	7,539
Malaysia	389	882	2,086	7,541
Thailand	400	1,078	1,962	3,800

Note: Container movement in PRC 2002 including Hong Kong. Source: Containerisation International Yearbook, various years

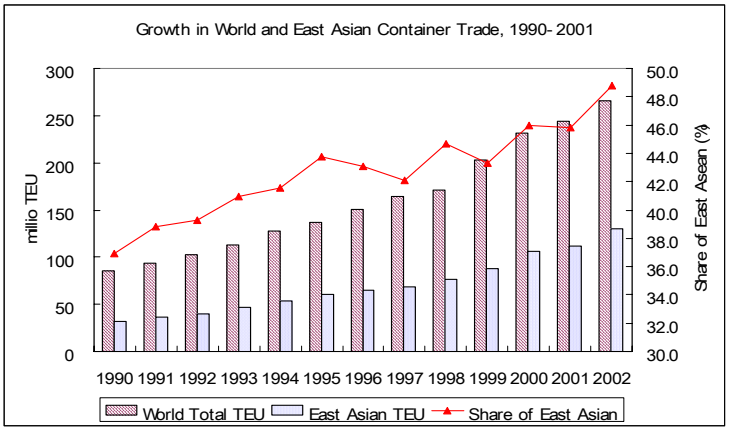

Figure 1: Growth in World and East Asian Container Trade, 1990-2002

Source: Compiled from Containerisation International Yearbook, various years

2.2 Concentration in Liner Shipping

Global container shipping companies are under intense pressure to compete in providing shippers with service that include fast transit time, high frequency and low cost. This has given rise to two trends: deployment of increasingly large ships, alliances and merger/acquisitions of carriers.

2.2.1 Increases in Vessel Size

Since 1995, the container shipping industry has entered a new phase where the emphasis has once again shifted technological advancement and associated importance of reaping economics of scale in ship size. Currently 4,000-6,000 TEU vessels already dominated major Asian deep-sea trades as shown in Figure 2. In 2002, ships in excess of 6,500 TEU have come into operation on Asian routes and some carriers are considering constructing and deploying even larger ships. The most significant point is that all of these new large vessels will be deployed to and from Asia. This will place enormous demands on Asian ports.

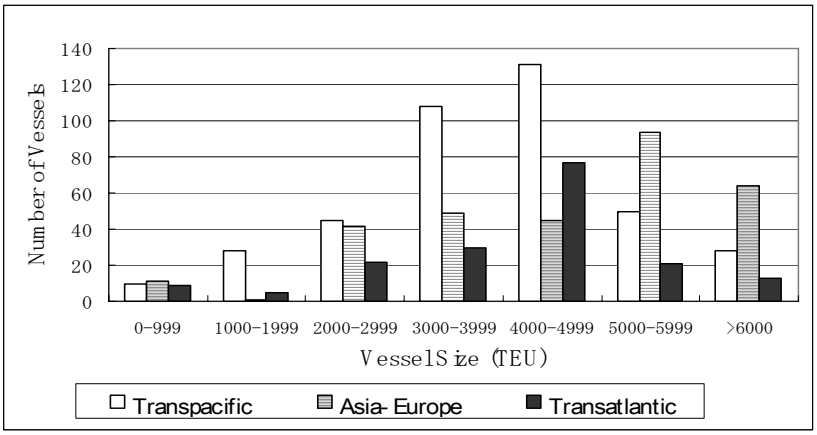

Figure 2: Number of vessel by ship size on main trade route 2002

Source: Compiled from International Transportation Handbook 2003 (in Japanese)

The scale of the revolution of vessel size is illustrated by the fact that at the start of 1992, only 5.9% of container slots were in ships of over 3500 TEU, as of April 2002, 32.8% of existing slot capacity now rests in ships of over 3500 TEU (see Figure 3). In consequence, not only has there been a significant shift towards larger ships in the past years, it is inevitable that it will continue into the future. The implication of such increase in ship size will be an even greater focus on the hub and spoke system, in which the biggest ships will call at only a limited number of very efficient ports on the main routes, with other ports being linked by extended feeder networks. Through this approach, carriers will maximize the utilization of vessel capacity and reduce/port transit time.

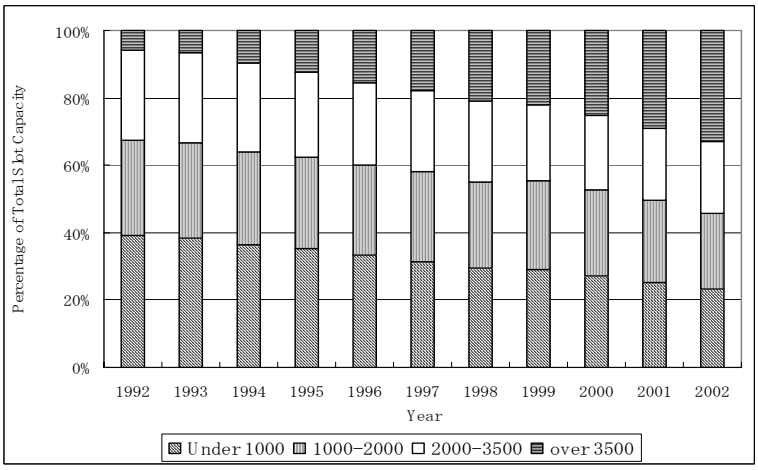

Figure 3: World container slot capacity by ship size 1992-2002

Source: Compiled from Containerisation International Yearbook, various years

2.2.2 Alliance

The current alliances began on August of 1995, which four alliances had been announced (Brooks, 2000a), (1) The Global alliance, comprised APL, MOL, OOCL and Nedlloyd, (2) The Grand alliance made up of Hapag-Llyod, Neptune Orient Line (NOL), Nippon Yusen Kaisha (NYK), and P&O, (3) Maersk and Sea-Land, and (4) The alliance of Hanjin, DSR-Senator and Cho Yang line. The pattern of mergers and alliances changed dramatically between 1995 and 2001 as shown in Table 2. The resulting of new global grouping dominated the Top 20 and accounted for 28% on offer in 1998. Of the Top 20, 13 were involved in one of the large-scale alliance (Brooks, 2000b). The market power represented by the alliances suggest that the new alliances will have exceptional ability to rationalize existing shipping services and links, and to integrate mainline and feeder networks as well as to extend the scale of feeder networks.

Alliance	1995 members	1997 (December)	2001 (October)
Global alliance (New World Alliance)	APL MOL OOCL Nedlloyd	APL (NOL) Hyundai MOL	APL (NOL) Hyundai MOL
Grand Alliance	Hapag-Llyod NOL NYK P&O	Hapag Llyod MISC NYK P&O Nedllyod	Hapag Llyod MISC NYK P&O Nedllyod OOCL
Maersk/Sea-land	Maersk Sealand	Maersk Sea-Land	
Tricon/Hanjin (United Alliance)	Cho Yang DSR-Senator Hanjin	Cho Yang DSR-Senator Hanjin	
Cosco/K-Line/ Yang Ming		Cosco K-Line Yang Ming	CKYH Alliance: Hanjin/DSR Senator UASC K-Line Yang Ming COSCO

Table 2: Changing Alliances

Source: Brooks (2000b) and Junior, et al (2003)

2.3 Emergency of New Ports

The massive Chinese economy had impact on the need of constructing new ports, notably in the Pearl River Delta – including Yantian, Chiwan, Zhuhai, and Jiuzhou – and with other port developed by Hong Kong's Hutchison Delta group, including port of Zhu Chi and the port of Shan in central Guangdong Province (Containerisation International, May 1995).

In South-East Asia, the emergency of Tanjung Pelepas Port in Malaysia has changed the liner shipping network structure in the region. On August 18, 2000, Maersk Sealand announced that they were going to move their transshipment operations from Singapore to the Port of Tanjung Pelepas (PTP) in Johor, Malaysia (Asia Times on line, September 2, 2000). All Maersk Sealand's mainline services that used to call at Singapore, except the West Australia and New Zealand services, will in the future call at PTP.

2.4 Port Administrator Policy

Port administrator policy also gives significant influences on the development of container shipping network. Attempting to reduce container congestion in port and anticipating the bigger vessel size, some of ports in East and South-East Asia have developed the ports by increasing capacity and deepen the draft of berth. As example, in 2001, Tanjung Priok port changed its berth depth from 11.0 m to 14.0 m. This change has become post-panamax vessel of Asia-Europe services can enter the port. Another port administrator policy is terminal concession. Shipping lines not only formulate demands with regard to port charges but they are more widely interested in the use of dedicated terminals. As container volumes enable better utilization of such terminals and as the benefits of integration through corporate responsibility for planning, investment and operations management increase, so the interest of lines in dedicated terminals has increased. Shipping companies see the terminals as part of their international networks of transport and logistics services. Recent developments in Port of Tanjung Pelepas indicated the phenomenon. Under the agreement, Maersk Sealand purchased 30% of the equity in PTP for an estimated $192 million, and PTP allowed Maersk Sealand to operate theirs own terminal (Jayansankaran, et al, 2001).

2.5 Terminal Operators

The restructuring of container shipping network is also effected by the companies providing container handling and terminal management services. The global expansion of container trades created an opportunity for the growth of specialized container-terminal operating companies. The companies have the resources to support substantial investments, have wide experience in container handling and logistics and have considerable expertise in technologies, particularly information technologies. The major terminal operators are:

- P&O Ports, one of the core businesses of the P&O Group, with responsibility for 27 container terminals in 18 countries;
- Hutchison Port Holdings (HPH), one of the five core businesses of Hutchison Whampoa of Hong Kong, which operates in 29 ports; and
- Port of Singapore Authority, which set up an International Division in 1996 to take its expertise to other ports. It has 17 projects in 11 countries.

2.6 Liberalization of Maritime Transport

The maritime transport sector is already relatively liberalized compared to other service sectors. Even so, further liberalization in the international shipping market is receiving increased attention. There has long been general international acceptance of shipping conferences as a means of ensuring a stable liner shipping environment. However, the exemption of conferences from antitrust legislation has been questioned by supporters of competition-based market mechanisms.

For the ESCAP region, maritime transport services are included in the General Agreement on Trade in Services (GATS) within the multilateral framework of the World Trade Organization (WTO). During the Uruguay Round, international maritime transport was recognized to be already highly liberalized, and maritime auxiliary services and access to and use of port services were therefore included in the maritime schedule for discussion.

3 Development of Asian Container Shipping Network

In 1968 Japanese shipping lines began a US west Coast service to establish container shipping operation. In the early 1970s, Japan, Hong Kong, Singapore were hub ports of Asian shipping networks in structuring the Europe/Far East and the transpacific mainline services. Due to the significant growth of economic activities in the Republic of Korea and Taiwan Province of China, an increasing number of lines began providing shipping services to these locations, initially in conjunction with services to Japan and later with additional dedicated services. Somewhat later, Kaohsiung and Busan were developed as regional hubs. Significant volumes of regional cargoes also began to emerge on short-sea routes linking these new centers to Japanese main hubs (Robinson, 1996).

Table 3 shows comparison of direct calls on Transpacific and Asia-Europe service in the major Asian port from 1986 - 2002. In 1986, most of the Transpacific and Asia-Europe services terminated in Japan, Hong Kong, Taiwan, Korea and Singapore. Due to rapid economic development in South-East Asia, an increasingly complex network of feeder services emerged to link the regional ports to the key hub ports of Hong Kong, Singapore and Kaohsiung. Shipping lines began to experiment with additional calls at South-East Asian ports including Port Klang, Malaysia and Bangkok, Thailand which have one call respectively. In this year, Indonesian, Vietnam and Philippines ports were connected by feeder services.

	Calls					Calls			
Port	1986	1991	1996	2002	Port	1986	1991	1996	2002
Japan					*South Korea*				
Yokohama	23	27	21	28	Busan	24	28	28	37
Kobe	36	36	27	28	Kwangyang	0	0	0	7
Tokyo	24	21	25	21	*Total*	24	28	28	44
Nagoya	23	29	25	22					
Osaka	11	12	15	9	*Singapore*				
Hakata	6	8	9	9	Singapore	14	27	39	34
Shimizu	10	12	9	4					
Total	132	144	130	119	*Thailand*				
					Laem Chabang	0	0	3	2
China					Bangkok	1	0	0	0
Hong Kong	33	40	54	70	*Total*	1	0	3	2
Yantian	0	0	6	38					
Xiamen	0	0	0	18	*Malaysia*				
Shanghai	1	0	12	36	Port Klang	1	2	10	21
Ningbo	0	0	1	15	Tanjung Pelepas	0	0	0	9
Chiwan	0	0	1	10	*Total*	1	2	10	30
Qingdao	0	0	7	10					
Dalian	0	0	0	3	*Indonesia*				
Xingang	0	0	5	5	Tanjung Priok	0	1	0	2
Shekou	0	0	1	4					
Total	34	40	87	208	*Philippines*	0	0	0	0
Taiwan Province of China					*Vietnam*	0	0	0	0
Kaohsiung	21	31	35	36					
Keelung	17	20	10	7					
Total	38	51	45	43					

Table 3: Comparison of direct ports calls on Transpacific and Asia-Europe trade

Source: Compiled from International transportation Handbook, various years (in Japanese)

In 1991, with the rapid growth of Chinese container trades, Chinese ports were included into new feeder shipping networks, adding further complexity to the Asian shipping system. In particular, intense networks were developed between Pearl River delta ports and Hong Kong port. Busan and Japanese ports increased feeder links with Shanghai as well as the central and the northern regions of China. Chinese cargoes bound for Japan, the Republic of Korea and Hong Kong, China mixed with feeder cargoes destined for trans-shipment at these locations. A number of shipping services between Southeast Asian ports and Chinese ports were also developed.

In 1996, there have been two conflicting forces at work in shaping the inter-continental container shipping networks. On the one hand, economies of scale are encouraging the use of larger vessels, which places increased emphasis on minimizing time spent in port and concentrating mainline vessel calls on the limited number of key hub ports with massive volumes of cargo exchanges and very high productivity. On the other hand, increasing container volumes at secondary ports, combined with the ability of global shipping alliances to offer multiple string services on key routes have encouraged the proliferation of direct calls at these ports. As a result, increasing numbers of the ports in South-East Asia and China in all three regional locations, i.e., southern, central and northern China, are served by direct calls, while at the same time feeder services to and from major hubs including the ports of Hong Kong, Singapore and Busan still continue.

In 2002, a shift in economic activity has taken place within Asia, with Japan, South Korea and Taiwan gradually losing out to the ASEAN grouping and then more recently to China. This has also been reflected in international trade. In the region, trade is dominated by the giant Chinese economy, which has just received the added bonus of official entry to the World Trade Organization. With the rapid growth in Chinese container trade, improved handling facilities at mainland China ports and congestion in Hong Kong, direct calls at mainline ports increase slightly, collecting cargoes previously transshipped through Hong Kong or Japanese ports. These finding tend to confirm that many of the additional services sought to widen the distribution network by adding more port calls.

The emergence of Tanjung Pelepas Port has changed container shipping network in the ASEAN region. The Maersk Sealand movement was also followed by Evergreen that moved their cargo from Singapore to PTP. Evergreen also dropped Singapore from its round the world westbound service and moving all South-east Asian cargo to Thailand’s Laem Chabang terminal. Table 3 also shows the restructuring of container shipping network in this region, direct calls at Singapore Port reduce from 39 in 1996 to 34 in 2002. The container shipping network in is also shown in Figure 4. The figure indicates Japan, Hong Kong and Singapore Port play as the key hubs of the region. Most of transpacific services connect to Japanese port as the first call, while Asia-Europe services use Singapore port. In South East Asia, Singapore is considered the central location of the transport network of this area.

Frequent changes in the pattern of mainline and feeder services suggest that the system is still evolving; that the economic forces driving change have not as yet been fully accommodated. Rapidly changing trade patters, especially in East and South East Asia, add to this instability. Hence we would expect to see further modifications to the pattern of mainline and feeder services, as well as changes in the absolute and relative status of regional ports, over the next decade.

Beside the mainline services, the intra-Asian services play important rule in shaping container shipping network. More than 200 ocean carriers are known to be present in the intra-Asia, Asia/South Asia and Asia/Mid-East (Gulf) trading areas (Drewry Shipping

Consultant, 2003). The largest trade in the region is from North-East Asia to South East Asia with 3.68 million TEU in both directions. In this long distance intra-Asia service the presence of global carriers has significant share whether by alone services or making partnerships with others carriers and leading service deploy vessels 1000-2000 TEU. Competition from mainline operators in this service leads to two main strategies namely emulation and diversification. In short sea service, market is dominated by regional specialist such as Wan Hai, KMTC, Heung-A, Cheng Lie, Dongnama, and Pacific International Line.

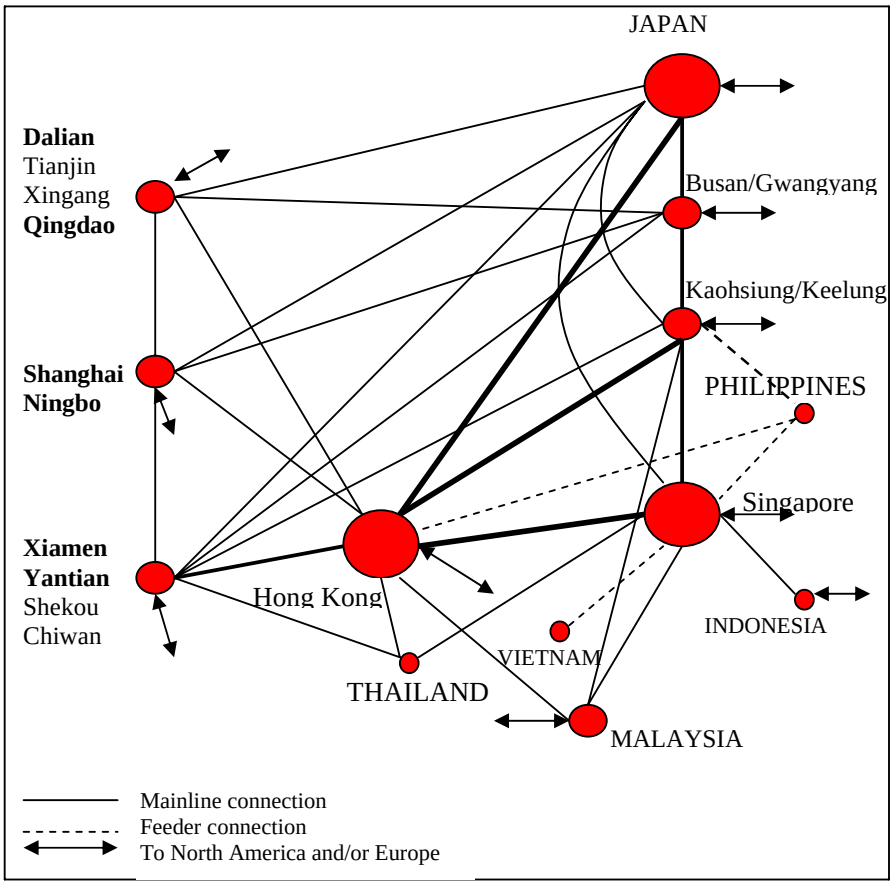

Figure 4: Asian Container Shipping Network 2002

Source: Compiled from International Transportation Handbook 2003 (in Japanese)

4 Conclusion

The sustained growth of Asian economic development has brought significant changes in the structure of container shipping services network in the intercontinental trades to and from Asia and intra-Asia as well. Increasing vessel size, performing alliance among liner

shipping, emergency of new ports, port administrator policy, terminal operators, and liberalisation also play important role in restructuring container shipping network.

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5 References

Asian Times online, (2000),"A New Era in Asian Shipping", http://www.atimes.com/se-asia/BI02Ae01.html

Brooks, M.R. (2000a). Sea Change in Liner Shipping: Regulation and Managerial Decision Making in a Global Industry. Oxford: Pergamon Press.

Brooks, M.R (2000b), "Restructuring in the Liner Shipping Industry: A Case Study in Evolution", http://www.mgmt.dal.ca/sba/cibs/a013-papers/DP-176.pdf

Containerisation International, May 1995

Containerisation International, July, 2002

Containerisation International Yearbook, various years

De Langen P.W & Van der Lugth L.M and Eenhuizen J.H.A (2002) "A stylised container port hierarchy: a theoretical and empirical exploration", IAME Panama 2002 Conference Proc., Panama, www.eclac.cl/transporte/perfil/iame_papers/proceedings/Langen_et_al.doc

Drewry Shipping Consultant (2003). Intra-Asia Container Trade-Dynamism Beyond Bounds. Drewry Shipping Consultant, London.

International Transportation Handbook, Ocean Commerce Ltd. (in Japanese), various years

Jayansankaran, S. and Saywell, T. (2001) " Heading for a collision" *Far Eastern Economics Review,* 164 (50), Hong Kong.

Junior, G.A.D.S. & Beresford A.K., and Pettit, S.J. (2003) "Liner Shipping Companies and Terminal Operators: Internationalisation or Globalisation?" *Maritime Economics & Logistics*, 5: 393-412.

Meyrick, S.J. "Development in Asia Maritime Trade," Institute on Global Conflict and Cooperation (IGCC). http://www-igcc.ucsd.edu/publications/policy_papers/pp33.html

Robinson, R (1998) "Asian hub/feeder nets: the dynamic of restructuring" *Maritime Policy and Management*, vol.25, No.1, 21-40.