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Executive summary

This document examines the current status of global container terminal services, as one important aspect in the globalization of port logistics, and the consequent challenges facing port owners and operators in developing countries.

Ports primarily derive their income from cargo handling. Global production processes and transhipment operations create port traffic which is growing three times faster than world trade. This means ports are an attractive investment for a reliable and steady stream of income. The recent consolidation of international terminal operators reflects such a situation and developing countries have an opportunity to take part in this rapidly growing and very profitable sector.

Ports in developing countries can partner with international terminal operators - many of which are themselves from developing countries - to strengthen their competitive positions and benefit from the sharing of knowledge and expertise in the areas of: management and operational techniques; infrastructure planning; international finance; the adoption of tried and tested computer software systems; fine tuned port equipment tested in other locations and backwards linkages into host economies that stimulate local imports and exports volumes.

To attract and benefit from such foreign investments, policy makers and practitioners in developing countries should look at to creating an enabling environment conducive to partnerships with established terminal operators and, by the same token, to improve their national transport networks for the benefit of their trade.

I. Introduction

1. Growth in world trade has fuelled the growth in derived goods and services such as transport and logistics. The international transportation of merchandise goods remains dominated by the maritime sector for its ability to offer the most economical mode of transportation over large distances. Ships can carry far greater capacity than any other means of transport plus they utilizes nature's free highway, the sea; unlike road and rail this does not require infrastructure investments along the entire journey but only the end nodes, the seaport.

2. Estimates show that in 2006, goods loaded at ports worldwide reached 7.41 billion tons, up 4.3 per cent from the previous year. A geographical breakdown of total goods loaded by continent can be seen in table 1.

Table 1. World seaborne trade in selected years by type of cargo and country groups

	Goods loaded							
	Total		Crude		Products		Dry cargo	
Country group	Millions of tons	% share	Millions of tons	% share	Millions of tons	% share	Millions of tons	% share
World	7 415.5	100.0	1 990.8	26.9	683	9.2	4 741.7	63.9
Developed countries	2 683.1	36.2	100	5.0	187.3	27.4	2 395.8	50.5
Economies in transition	202.6	2.7	108.4	5.4	43.3	6.3	50.9	1.1
Developing countries	4 529.6	61.1	1 782.4	89.5	452.4	66.2	2 294.8	48.4
Africa	791.7	10.7	477.4	24.6	53.1	7.8	261.2	5.5
America	1 052.5	14.2	284	14.3	102.1	14.9	666.4	14.1
Asia	2 678.8	36.1	1 016.7	51.1	297.1	43.5	1 365.0	28.8
Oceania	6.6	0.1	4.3	0.2	0.1	-	2.2	-

Source: Compiled by the UNCTAD secretariat on the basis of data supplied by reporting countries, the port industry and other specialized sources.

3. Gross domestic product (GDP) increased in 2006 on average by 4 per cent. In developed countries, GDP grew by 3 per cent, 6.9 per cent in developing countries and 7.5 per cent in the economies in transition. Along with the growth in world trade, membership to the World Trade Organization (WTO) has also enlarged, in 2007; Tonga and Viet Nam joined to bring its membership to 151 countries.

4. The total containerized goods handled by ports increased to an estimated 440m TEU1 in 2006, an increase of 13.4 per cent over the previous year.[2] Thus, whilst trade is growing marginally faster than GDP, port throughput is growing at a rate of more than three times trade. Port services, i.e. cargo handling, has grown faster than world trade because of practices such at the hub and spoke system of port connectivity. For instance, in 2006 there were estimated to be around 129 million full TEU shipped worldwide.[3] This should mean that ports handled twice that number, once to load and once to discharge, yet in reality ports handled three and a half times that figure. This is due to global supply chains and the more complex dimensions of international trade which now mean it is possible to design more sophisticated travel arrangements involving transhipment and multimodal transport.

[1] Twenty-foot Equivalent Unit.
[2] UNCTAD (2007) *Review of Maritime Transport.*
[3] Drewry Shipping Consultants.

Today 17.6 per cent of liner shipping port calls are direct, whereas 82.4 per cent require at least one transhipment port and 17.2 per cent two or more.[4]

5. Containerization arose as a means to tackle the issue of port congestion in the 1950s. However, it was not till 1966 that the first purpose built container ship plied the North Atlantic route between the North America and Europe. Despite this early introduction to containerization the major port operators today are not dominated by North American or European owners but by mainly owners based in developing countries and territories in Asia. This was no doubt achieved with the concentration of exports volumes at a few Asian hub ports such as Hong Kong, China, and Singapore, whereas those ports receiving the imports were more geographically spread on the continents of North America and Europe.

6. Asian ports are now dominating the industry in terms of increased efficiency and highest productivity. Malaysia's Westport reported handling some 452 container moves per hour, a world record, whilst discharging CMA-CGM's MV Puccini in 2006. To improve crane efficiency some ports such as Jebel Ali Port (United Arab Emirates) have introduced tandem lift gantry cranes capable of handling two FEU[5] or, four TEU simultaneously. At Shenzhen, China, cranes capable of lifting three FEU or six TEU are in operation. In an effort to improve container handling efficiency further a leading crane manufacture has began research into a concept crane capable of discharging four FEU simultaneously, or eight TEU.

7. This switch in the geographical positioning of the world's largest and busiest ports from North America and Europe to Asia is not just related to container handling. In 2004 Rotterdam ceded the title of world's busiest port to Singapore. In 2005 Shanghai seized the title from Singapore with a reported total cargo throughput of 537 million tons. In 2008/9 Shanghai is expected to take the title from Singapore of world's busiest container port. Singapore's total throughput in 2006 reached 448.5 million tons, including the handling of 24.7 million TEU. Guangzhou also in China, achieved a 16.4 per cent increase with total cargo throughput up from 250.9 million to 300 million tons in 2006. In Europe, Rotterdam achieved a marginal increase in cargo traffic to 378.2 million tons from 370.2 the previous year, Antwerp increased to 167.4 million from 160.1 million tons and Hamburg to 134.8 million from 125.7 million tons.

8. In 2006 the largest containership ever built was launched, the Emma Maersk, with a reported capacity of 12,508 TEU capacity she requires a depth of 16 metres.[6] She was closely followed by five, out of seven planned, sister ships. The growth of containerized trade in 2006 grew by 11 per cent whilst container fleet capacity grew by 13.5 per cent to reach an increase of almost 1.4 million TEU.

9. Limitations of the future expansion of container ships are primarily to do with vessel draft. The Malacca Straight, the world's busiest waterway located between Malaysia and Indonesia has a maximum depth of 21 metres. Few ports in the world have a comparable depth and only slightly more above 18 metres making this a limiting factor on ship design. The cost of dredging ports to accommodate larger vessels has also been a financial drain especially for ports located along fluvial waters.

10. In order to cater for larger vessels port investment will have to focus upon greater alongside berth depth, longer quay lengths, more quayside cranes, transport vehicles from quayside to container yard, reach stackers, straddle carriers plus the

[4] UNCTAD (2007) *Transport Newsletter,* no. 36, second quarter.
[5] Forty-foot Equivalent Unit.
[6] www.ci-online.co.uk.

information technology to link these capital intensive resources together to maintain their optimal usage.

11. Container terminal operations are just one element of port logistics services which can be improved with private-sector involvement, other activities such as pilotage, towage, storage, mooring, crane repositioning and maintenance, waste removal etc. have in various places been handed over to private operators. Whilst there are global providers of crane repositioning and maintenance services other services such as a global port waste removal providers are either non-existent or in their infancy. More developed services are the providers of software solutions to modern container terminals, the two market leaders are Navis and COSMOS. However, to-date most of the globalisation of port logistics has occurred in container terminal operations. For this reason this paper mainly focuses upon the globalization of container terminal operations.

II. Globalization of port logistics

12. Governments in many countries traditionally regarded ports as national strategic assets which should remain under public control. However, faced with the high cost of port modernization programmes governments began to seek alternative forms of finance other than through State budgets. Port liberalization thus began in many countries around the world during the 1980s and 1990s with the introduction of private participation in services through the granting of concessions to private terminal operators. In 1993, 42 per cent of world container throughput passed through State owned terminals but by 2006 this figure was down to 19 per cent. The share of State throughput varies by region, in Northern Europe 6 per cent, in South East Asia, 42 per cent, Eastern Europe 24 per cent and Africa 68 per cent.[7] While the overall volumes for State-owned terminals from 1996 to 2006 have remained constant the private sector has been growing rapidly.[8] Today the majority of the top 100 container ports have some form of private participation. For example, the Port of Tanjung Pelepas in Malaysia is 30 per cent owned by the shipping line Maersk Sealand whereas the adjacent Port of Singapore remains one of the few ports still owned by its national government, albeit in a form of corporatization.

13. The plethora of port concessions worldwide has created many individual terminal operating companies. Over time these companies have seen the benefit of joining together through common management or ownership companies. This has occurred through a spate of mergers and acquisitions which have transformed some terminal operators into transnational corporations (TNC) with some controlling more than 60 terminals and others present in more than 27 countries. At the other end of the scale are individual port operators who, having matured in their own market, have sought out new opportunities abroad (e.g. the Irish Port of Dublin is partnering with Sabang Port in Indonesia).

14. The cost of purchasing terminals has risen in recent years, when DP World purchased CSX Terminal in 2005 the price/earnings (p/e) ratio was 14. When Admiral Acquisitions bought Associated British Ports the p/e ratio was 15 and when Deutsche bank bought a share in Peel ports the p/e ratio was 16. DP World's purchase of P&O Ports the p/e ratio had risen to 19 times.[9] Hamburger Hafen und Logistik AG (HHLA) IPO[10] in late 2007 had a p/e ratio of 24. Presently the price/earnings ratio of Forth Ports in the UK, the last remaining UK port company

[7] Drewry (2007) *Global Container Terminal Operators*, Annual Report.
[8] Ibid.
[9] Drewry shipping consultants, www.drewry.co.uk.
[10] Initial public offering.

still listed on the stock exchange, was around 20 in the middle of 2007.[11] At the same time ICTSI[12] was at 25 and China Merchants Holdings International (CMHI) at 36. However, the largest ratio goes to Shanghai International Port (Group) Co which is reputed to be at 58 times prospective 2007 earnings.[13]

15. Ports primarily derive their income from the charges which they levy to handle goods (other activities include rental income, container storage, chandelling, container repair, etc.). Port traffic, and with it revenue, is thus expected to grow faster than world trade making ports attractive investment propositions. By having a global portfolio of terminals, companies hope to ride out the regional fluctuations in trade that occur.

16. In the last couple of years there has been a movement towards the purchase of ports by private equity funds resulting in the subsequent delisting of ports from the world's stock exchanges. The UK's Associated British Ports was bought by Admiral Acquisitions, a private equity firm, and delisted from the stock exchange. The UK's MDHC was bought by Peel Holdings a private company (now 49 per cent owned by Deutsche bank). Orient Overseas Container Line, the Hong Kong listed liner shipping company, sold its entire terminal operations (excluding Long Beach and Kaohsiung) to Ontario Teachers' Pension Plan Board (OTPPB) in 2006.[14]

17. Terminal operating companies are in some cases owned by subsidiaries of larger companies such as liner shipping companies (e.g. AMPT) or conglomerates (e.g. HPH) which makes acquiring them through hostile takeovers very capital intensive. Thus port companies wishing to expand are looking away from high profile mergers because of the cost. Instead global terminal operators are looking further down the port league table for partners. Ports in developing countries are thus likely to be seen by global terminal operators as a less capital intensive means of expansion.

18. Sovereign-wealth funds or State-run investment pools as they have been called are essentially organizations in which the government own a significant ownership share, have an estimated reserve of US$ 2–3 trillion and are playing an increasing role in cross-border investment.[15] For example, Borse Dubai (Dubai government) and Qatar Investment Authority have been bidding for stock exchanges e.g. OMX (Nordic) LSE and NASDAQ.[16] In Transport, DP World (77 per cent owned by the Dubai government following an IPO in late 2007[17]) successfully bought P&O Ports in 2006. In 2006 PSA corporation, owned by the Singapore government, bought a 20 per cent share in its rival Hutchinson Port Holdings for around US$ 4bn.

19. Table 2 shows the share of world container throughput of leading market players in global terminal operations. HPH maintained it lead through the period from 2004 to 2006, although the gap between its rivals has narrowed. Whereas in 2004 HPH had a 4 per cent lead over its closest rival, PSA International, this has narrowed to 1 per cent. PSA International growth can also be compared to that of DP World and APM Terminals, with which it shared a 9 per cent market in 2004, but which it has now surpassed from their present 10 per cent share. Although the global terminal operators have a present in many ports in many countries the ownership is rarely whole, more commonly there is a local partner with a significant share. An analysis of Cosco Pacific shows that of its interests in 23 terminals on

[11] UNCTAD (2007) *Review of Maritime Transport.*
[12] International Container Services Incorporated.
[13] Reuters (2007) *Hamburg port stock quoted near top of IPO range*, 26 October.
[14] UNCTAD (2007) *Review of Maritime Transport.*
[15] Economist (2007) *The new Rothschilds*, 27 September.
[16] Economist (2007) *Ringing the exchanges*, 21 September.
[17] Lloyd's List (2007) *US investors scoop up DP World shares in $5bn IPO*, page 1, 22 November.

average it has a 28 per cent stake in each. The penultimate column to table 2 takes into consideration market share by equity state, looking at this HPH slips to third position and PSA takes the lead. The last column, the Herfindahl Hirschmann Index (HHI), shows that the port industry remains highly fragmented and further consolidation likely.

Table 2. Global terminal operators' market percentage share of world container throughput

(Percentages)

Global terminal operators	2004	2005	2006	Equity Share 2006	HHI [c]
HPH	13	13	13	6.99	48.84
PSA International	9	11	12	9.34	87.20
APM Terminals	9	10	10	7.35	54.03
DP World [a]	9	9	10	5.93	35.21
Cosco Pacific	6	7	7	-	-
Eurogate	3	3	3	-	-
SSA Marine	3	3	3	-	-
Sub total	53	56	57		29.61
World throughput [b]	356.6	387.7	440.0	**HHI**	225

Source: Adapted by the UNCTAD secretariat from information obtained by Dynamar B.V and Drewry Shipping Consultants.

[a] DP World includes CSX World Terminals and P&O Ports for all three years.

[b] In millions of TEU.

[c] The "Herfindahl Hirschmann Index" (HHI) is computed by summing the square market shares of the companies. An HHI of 1000 or more is usually considered "concentrated" and 1800 or more to be highly concentrated. The HHI of the top four industry leaders is commonly used to see market concentration.

20. Today, 75 per cent of port container handling is done by private operators. In Africa, however, private participation in container port handling is estimated at only 20 per cent. The presence of international terminal operators in Africa is very limited. AMPT has a presence in mainly in West Africa (Angola, Cameroun, Côte d'Ivoire and Nigeria), DP World has present in Djibouti and Mozambique, HPH has a presence in the United Republic of Tanzania while all three of these international terminal operators have a presence in Egypt. When private sector investment and management is the driving force behind port modernizations such as in Djibouti, Cameroon, Nigeria and Côte d'Ivoire ports have generally managed to achieve significant improvements in their productivity. Thus the average crane productivity from 2002 to 2006 has more than doubled in Djibouti and Douala (Cameroon) with crane moves up from 15 to 35 moves per hour (MPH). In Apapa, Nigeria moves tripled from 6 to 18 MPH and in the ports of Abidjan, Côte d'Ivoire the number of moves were up from 15 to 40 MPH. However, in Jebel Ali Port (United Arab Emirates) in perhaps the largest single transfer of containers at any one time the port made 8,571 moves in 41 hours, achieving a crane efficiency rate of over 60 MPH.

21. The lack of connectivity to global transport networks – direct or via transhipment ports – remains an important barrier to trade in many developing countries. Many African countries are among the worst connected to international shipping transport networks. Their estimated international freight costs as a

percentage of the value of imports is therefore also particularly high.[18] On the other hand, many Asian countries are the best or among the best connected worldwide.[19] China is leading the index, followed by Hong Kong China, Singapore, Malaysia, the Republic of Korea, Sri Lanka and India.[20] Similarly, in Asia the estimated international freight costs as a percentage of the import value have steadily declined from over 9 per cent in 1990 to just below 6 per cent in 2005.[21] Africa on the other hand for the same period has seen its freight cost increase from 9.4 per cent to 10.

III. Opportunities and challenges for developing countries

22. The port sector in a vital node point in the international transport chain, since not only does it act as a gateway for goods to arrive and depart it is also a facilitator of trade. Well-run and efficient ports can attract transhipment traffic which is not per se reliant upon domestic demand or supply. Transhipment traffic is the movement of goods from one vessel to another via a port Attracting transhipment traffic is largely down to geographic advantages, being close to an international shipping lane or close to a centre of production/consumption is paramount.. Transhipment can be done at any location en route from origin to destination of either the finished goods or raw materials. Whereas the origin and destination ports are largely determined by proximity to areas of production or consumption, transhipment is not tied to either place. Transhipment traffic has the advantage of improving the efficiency and capacity of ports through handling larger cargo volumes which can also help to subsidies imports or exports.

23. At the heart of competition for transhipment traffic are two important issues. The first is the cost of transhipment, there is a “race to the bottom” where low costs are rewarded with higher business. The pressure is upon ports to reduce their charges as much as possible whilst providing the best possible service. The second issue is port congestion or quality of service. High congestion is penalised by the removal or transfer of transhipment traffic to the competitor. Ports thus have to balance the needs of its import/export clients who provide for greater employment opportunities and much needed import/export trade for the national benefit, against the needs of its transhipment clients.

24. The negative side to transhipment traffic is that it is fickle; transhipment can move rapidly from port to port making it difficult for ports to plan future investments when traffic and thus revenue is not certain. Care should thus be taken that the fortunes of ports do not become solely reliant upon its transhipment customers. This can be a significant challenge to developing countries but can be overcome through negotiation with customers and incorporated into long term of medium contracts. A win-win situation can be negotiated so that port owners can meet future investment needs while customers can achieve fixed costs and guaranteed availability of services. Port investment does require a leap of faith which to some extent can be mitigated by better understanding the port customer’s needs through regular dialogue.

25. Ports now have to be more global orientated than previously. Where once competition was seen to be a local issue over hinterland ports such as Colombo in Sri Lanka have found that they are competing with the port of Salalah in Oman, Port Klang and Port of Tanjung Pelepas (PTP) in Malaysia. In 2000, Maersk Sealand moved its transhipment traffic, about 2 million TEU, from Singapore to

[18] UNCTAD (2007) *Review of Maritime Transport.*
[19] UNCTAD (2007) *Liner Shipping Connectivity Index.*
[20] UNCTAD (2005) *Transport Newsletter,* no. 27, first quarter.
[21] UNCTAD (2007) *Review of Maritime Transport.*

nearby PTP. The port of Singapore lost more than 10 per cent of its total TEU throughput in this single act. In 2002 Evergreen Marine Corporation, then the world's second largest shipping company after Maersk Sealand also moved its transhipment traffic, around 1 million TEU, to PTP. The reasons cited for both moves was costs saving, up to 30 per cent, and more favourable terms such as a dedicated berthing facilities. More recently in 2006, the port of San Antonio in Chile lost out to neighbouring Valparaiso when a number of clients, including MSC and NYK, moved their liner business. Container throughput for San Antonio for 2006 was down by around 12 per cent on the previous year. Conversely, container throughput for Valparaiso increased by 65 per cent in the first quarter of 2007 compared with the same period in 2006. Thus ports located close to shipping lanes can win traffic from other ports elsewhere along the lane through negotiation and flexibility on price and conditions. The end result is lower transport costs which should translate into cheaper consumer goods. Ports along the shipping lanes benefit from handling increased volumes and can improve upon port efficiency.

26. The globalization of port logistics has brought with it many opportunities and benefits to developing countries such as the sharing of knowledge and expertise in the areas of: management and operational techniques; infrastructure planning; international finance; the adoption of tried and tested computer software systems; fine tuned port equipment tested in other locations and backwards linkages into host economies that stimulate local imports and exports volumes.

27. Ports are increasingly attracting the interest of investors, so for developing countries the main issue is no longer about how to finance new infrastructure projects but about which partner to choose. Some countries such as Viet Nam have decided to use multiple international terminal operators. Presently five of the top seven global terminal operators listed in table 1 and CMHI are involved in port projects in Viet Nam, mostly located around the southern city of Ho Chi Minh. Of these, most have multiple Phases of development of which the initial phase will not be operational until well into 2008. To accompany its port development projects, Viet Nam has also chosen to situate next to these free trade zones (FTZ). FTZ allow for value added services such as repackaging, engineering and design, knowledge processing, light manufacturing and processing, warehousing and logistics.[22]

28. In the new era of globalization of port logistics, port owners and terminal operators may find it harder to compete for new business and invest in port infrastructure because of close proximity to ports belonging to a TNC which may benefit from the advantages mentioned earlier. To win new business single port or terminal operators struggle to find a niche in a business that is dominated by the ubiquitous box (i.e. TEU) where standardization is the key to success and niches difficult to find and unrewarding.

29. Container port operations are driven by technology investments. Container terminal operations work flows have become so demanding that they require sophisticated software programs to plan for complex shipping arrangements whilst taking into consideration local issues, such as working shift patterns of various port employees, customs, as well as external factors such as tidal movements.

30. The challenges facing developing countries in the port sector are essentially about whether to remain a government owned and controlled company or to allow private participation, perhaps through a global partner. Some port owners have joined forces with large international terminal operators to manage their ports and thus have achieved high levels of performance and sophistication especially in port and container terminal management and development.

[22] UNESCAP (2005) *Free Trade Zone and Port Hinterland Development*, ST/ESCAP/2377.

31. An important challenge for any government privatising it ports is that it must replace its previous role as a self-regulated provider of services with that of a new role as an independent regulator of activities delivered by private operators. Care must be taken not to create shadow management of former activities or to over regulate. Government regulation of port tariffs with minimum throughput volumes, designed to protect the customer, have resulted in cases where the port operator turned away traffic because additional work did not create costs reductions which could be retained as revenue. A lack of incentives to perform more than the minimal contractual requirements will result in minimal traffic.

IV. Conclusions and the way forward

32. The fast expanding global containerized trade, and its specific requirements in terms of efficient handling of growing volumes of boxes, and increasingly larger ships at port terminals, has brought the emergence of global container terminal operators. These international terminal operators have developed knowledge and expertise, financial strength, and also leverage power to negotiate with shipping lines, which are not accessible to most ports in many developing countries. This very profitable activity can nevertheless also benefited developing countries interested in seizing opportunities and facing associated challenges.

33. Nowadays, container port operations have become so complex that they require sophisticated workflows supported by software programs. International terminal operators have the required highly specialized managerial and technological knowledge but they may also bring substantial initial and continuous financial investment to build, operate and maintain more efficient ports. This includes longer berths and deeper drafts to attend larger vessels and larger volumes of traffic, which will in turn allow achieving economies of scale and proper return on investment.

34. Offering a terminal concession to a global terminal operator, or even an established single port operator, is one possibility open to governments. Alternatively, port or terminal operators may wish to consider vertical integration into a supply chain incorporating national transport systems. Uniting transport operators such as truck or rail operators together with terminal operators to provide a dedicated service along specific inland routes to dry ports is a possible way forward.

35. In partnering with major global operators, ports in developing countries may benefit from the sharing of knowledge and expertise in the areas of: management and operational techniques; infrastructure planning; international finance; the adoption of tried and tested computer software systems; fine tuned port equipment tested in other locations and backwards linkages into host economies that stimulate local imports and exports volumes.

36. Some existing locations in developing countries may have geographical or commercial advantages. Such is the case of ports located close to important international trade lanes, and are therefore natural candidates to handle greater volumes of transhipment traffic. Still risks exist and transhipment operations are particularly subject to rapid moves by shipping lines that may provoke a significant loss of traffic to other ports elsewhere along the international trade lane.

37. For port operators to enter partnerships with established terminal operators an appropriate enabling environment needs to be in place which combines attractive conditions for potential foreign investors and provides the necessary safeguards to protect security, the environment and national land transport systems of the host nation. A win-win situation can be negotiated so that port owners can meet future

investment needs while customers can achieve fixed costs and guaranteed availability of services.