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# Emerging Challenges in Africa's Port Sector

The Congestion Pandemic and Efficiency

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# Emerging Challenges in Africa's Port Sector

## *The Congestion Pandemic and Port Efficiency*

Maritime transport today handles about 90 percent of world trade, or about 12.63 billion tons of cargo.<sup>1</sup> Increases in trade value and volume during the period 1995 to 2003—45 and 50 percent, respectively—are a consequence of trade reforms and globalization.<sup>2</sup> While the economic benefits associated with increased trade are easily demonstrated, the fruits of trade liberalization have challenged the ability of many countries to accommodate rising trade flows. The surge in cargo growth has created a congestion “pandemic” and ports with a longstanding reputation for efficiency—carriers recently imposed congestion surcharges in the ports of Rotterdam and Antwerp—are straining to handle ever-increasing cargo volumes.

What has this meant for Africa? First, Africa's container growth has exceeded growth of the world's top 100 container ports (Figure 1).<sup>3</sup> Cargo volumes increased about 44 percent from 2000 to 2003, compared to about 32 percent for the world's top 100 container ports during the same period. In fact, though growth in the top 100 ports can be attributed in part to advances in free trade, growth in many is due more to changes in carrier deployment practices (e.g., transshipment). For Africa, only Port Said and Port Damietta, both at the northern end of the Suez Canal, are handling substantial transshipment activity.<sup>4</sup>

Second, most countries in the top 100 rankings underwent economic transformations well before African countries did. The greater volume of activity in Africa is in part due to pent-up demand released after trade regimes were liberalized. So the container growth rates in the near term will

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<sup>1</sup> UNCTAD Secretariat, *Review of Maritime Transport, 2004*, New York and Geneva, 2004, Table 4, p. 8.

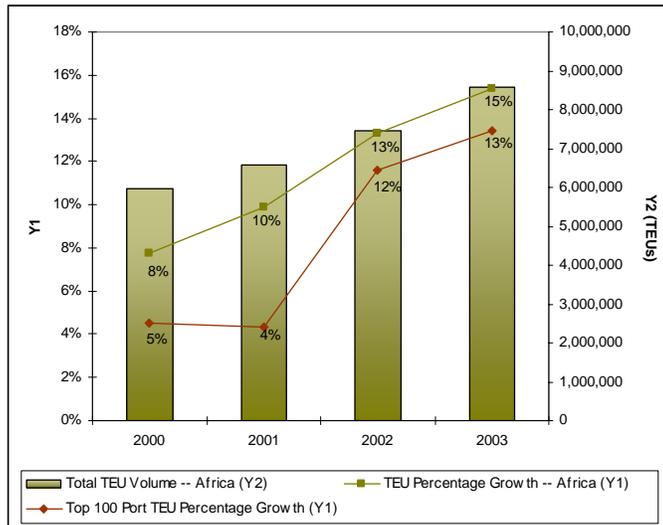
<sup>2</sup> WTO, *International Trade Statistics 2004*, Table A1, p. 165.

<sup>3</sup> The world's top 100 container ports include four from Africa: Damietta (68), Port Said (81), Durban (51), Abidjan (94). See *Cargo Systems*, “The World's Top 100 Container Ports,” August 2005.

<sup>4</sup> Not all African ports (e.g., Lagos) are included in the total volumes for Africa. The major data sources for calculating total volumes were *Containerization International Yearbook, 2003 and 2005*; *Cargo Systems*' supplement “The World's Top 100 Container Ports;” and direct queries of port authorities in Africa.

eventually slow, but will likely fall within the range of the top 100 port growth rates and total container trade growth rates worldwide (9-13 percent).<sup>5</sup>

Figure 1  
*Africa's Growth in Container Trades*



SOURCE: Compiled by Nathan Associates Inc. from Cargo Systems, "Top 100 Container Ports" and Containerization International Yearbook for 2003 and 2005; calls and e-mail queries to various port authorities.

Finally, Africa is now facing the kind of congestion that India, the United States, and much of Europe has faced. In Ghana, for example, the port of Tema suffers from low berth productivity because of a lack of gantry cranes. Increasing container volumes have forced carriers to wait several hours for berths and, in turn, impose congestion surcharges on shippers. In Durban, cargo-handling demand has exceeded the terminal's handling capacity, causing berth congestion and forcing carriers to also impose penalty surcharges. In accordance with normal practice of modernized ports, congestion is usually addressed by improving operations inside terminals—Mombassa, Dar-es-Salaam, and Tema have followed this course. But as the experience of the Jawaharlal Nehru Port in India and the U.S. West Coast ports shows, where ports do not anticipate the effects of volume surges, they can expect congestion outside the gates as well. The

<sup>5</sup> Some African ports are also likely to grow in transshipment as carriers rationalize their deployment practices to take advantage of economies of scale offered by larger vessels. If Durban improves efficiency and expands capacity, it is likely to have increased transshipment volumes. Port Louis, Mauritius, lost transshipment activity because of capacity constraints, but this could change if the port improves terminal capacity. Similarly, Mombassa and Dar-es-Salaam, both aiming to become major transit hubs, could experience meaningful growth in transshipment with improved facilities. On Africa's west coast, Abidjan has attempted to establish itself as a transshipment hub, though it saw no growth in transshipment activity in the last year. This is likely because of slow handling rather than the sociopolitical situation there, as the port still enjoyed an 11 percent increase in domestic cargo volume in 2004. Lagos, which just concessioned its container terminal, and Tema, which is now constructing a highly mechanized container terminal, will likely attempt to establish themselves as transshipment hubs. Tema might have greater potential because shippers find it difficult to do business in Nigeria.

limited truck inventory in many African countries, the failure to control truck movements outside the port gates, inefficient intermodal exchanges, and the resulting extraordinary dwell times for containers will raise the risk of many other African ports being caught up in this congestion problem. Meanwhile, African ports continue to be challenged to comply with recommended or imposed security protocols.

Achieving optimal efficiency will also require inducing competition. While most privatizations of the 1980s and 1990s avoided transferring port operations to private monopolies, they did not avoid oligopolistic settings and attendant risks of anticompetitive behavior. In Africa, governments are even preserving government monopolies (Durban) or creating private ones (Tema), and the concession strategies pursued by government-owned intermodal operators (e.g., Spoornet) could enable operators to manipulate rail pricing to their (anticompetitive) advantage. And for the most part, the regulatory framework and tools to monitor port and intermodal operators' anticompetitive behavior are not in place. In fact, only South Africa has started establishing an economic regulator to address port anticompetitive behavior.<sup>6</sup>

The surge in cargo volumes and the emerging competitive environments are of serious concern to shippers worldwide. Doors to new markets opened through trade reform will close unless countries understand the emerging events that will challenge transport efficiency, formulate concession strategies that induce competition, and establish a regulatory framework that addresses port anticompetitive behavior.

In this paper, we explain the impact of emerging trends and their implications for African port efficiency: (1) the possible expansion of the Panama Canal; (2) changing carrier deployment practices and transshipment; (3) security; (4) port competition; and (5) regulation.

## **PANAMA CANAL EXPANSION PROGRAM**

Having recently completed its \$1 billion capacity expansion program, the Panama Canal can now satisfy demand expected over the next few years, but can no longer expand given the canal's current design. Achieving additional capacity will require constructing a set of larger locks and providing a deeper navigation channel. The two photographs in Figure 2 illustrate the capacity constraints of the existing locks. In one photo, the vessel in the lock chamber, considered "large" in 1915, has plenty of room to maneuver. In the other, today's Panamax vessel has to squeeze into the lock chamber, with only about six inches of clearance between the side of the ship and the chamber's wall. With this constraint on vessel size, substantially increasing trade volumes, and the economies of scale accruing to larger vessels, the Panama Canal Authority (ACP) is already planning for another expansion program, with construction possibly beginning in 2007, depending on the outcome of a legally mandated referendum for the Canal's expansion in the coming months.

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<sup>6</sup>Certainly, Africa is not alone; the European Union continues to struggle with the framework and mechanics of port competition regulation, and the United States has never addressed it. Colombia, Peru, and Australia are perhaps the most advanced in tackling regulation for port anticompetitive behavior.

Figure 2  
*Evolution of the Panama Canal's Obsolescence*



*Photos courtesy of the Panama Canal Authority.*

The ACP conducted a number of market studies to develop global commodity forecasts and assess the shipping industry's likely response to Canal expansion. The assessment of the container trades concluded that carriers would deploy larger vessels to take advantage of economies of scale that an expanded Canal would enable.

Five years ago, the debate about container industry reaction centered on a cursory, though thoughtful, analysis of carriers' economic incentives for investing in larger capacity vessels. Some argued that if the Canal expanded its locks sufficiently, then vessels of 12,500 TEU capacity ("Post-III" Panamax vessel) would accrue economy-of-scale savings from lower per slot operating costs and deploy true 'round the world services. Such deployment was constrained by the current lock size and channel draft. Others argued that many other factors needed to be considered. For instance, industry concentration will force regulators to encourage competition (from smaller carriers) in the form of port-to-port (direct call) service, thereby lowering costs through competition rather than economy-of-scale savings from larger capacity vessels. Those estimating slot costs should also consider the costs of increasing port capacity and access, thus favoring port-to-port shipments in Panamax I and post-Panamax I vessels on traditional trade routes. And carriers' fears of over-capacity that will carry into the mid-term may discourage them from taking on the financial risk implied by post-Panamax II and III vessels.

The emergence of a new generation of container ships will certainly change industry dynamics. Most agree that if the Panama Canal could accommodate transits of larger vessels then ship sizes would increase. Precisely how the industry is likely to react in terms of vessel size, deployments, service patterns, and transshipment patterns has only recently been understood. The assumed maximum capacity for carriers transiting the expanded Canal constitutes the third generation container carrier ("Post III carrier"), roughly three times the capacity of the current Panamax ship (4,500 TEU capacity). Post II carriers fall within the range of 7,500–10,000 TEU capacity.

The carrier industry, however, did not need Panama to complete studies before changing its deployment practices because growing trade volumes justified investment in larger vessels. In fact, in the last two years, eighty-five 8,000-TEU ships have been ordered or are under

construction. Three service strings consisting of 8,000-TEU vessels are now serving Long Beach. And COSCO shipping line is now deploying eight 9,500-TEU ships.

What does expansion of the Canal portend for shipping on the African trade lanes? Though the new Post II and Post III carriers will never call the African trade lanes in the near-to-mid term, the Canal's expansion will unleash a flurry of transshipment activity because it will allow true 'round the world service, a service previously not possible because of the Canal's chokepoint effect on vessel size. With such service, and the deployment of larger and more expensive vessels, carriers will reduce the number of port calls for these larger vessels, relying on a greater number of feeder vessels for transshipment and more "double" transshipments.<sup>7</sup>

## **CARRIER DEPLOYMENT PRACTICES AND TRANSSHIPMENT**

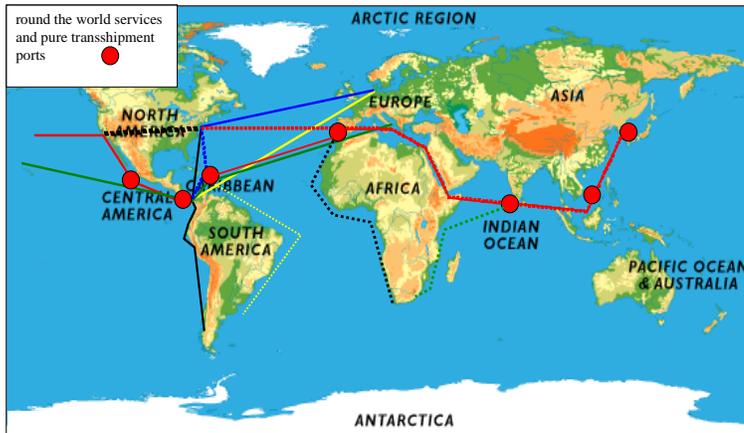
An expanded Canal is likely to be in place by 2012–2015, assuming referendum approval in Panama. As suggested earlier, the economics associated with such expansion will encourage the deployment of larger vessels and a change in service patterns. Deployment practices, in fact, have already changed to take advantage of larger vessels. The introduction of Post III vessels has had a cascading effect on vessel supply. This means that vessels on current Panamax-dependent trades will be redeployed on other trades, supplanting vessels that currently serve these trades. Thus, the typical vessel calling ports such as Tema, Abidjan, Durban, Port Luis (Mauritius), and possibly Lagos, will shift to larger capacity vessels as long as there are prospects for continued trade growth. But as vessels become larger, carriers will attempt to reduce the number of calls of these vessels. Ports having "smaller" domestic volumes will then be served by these feeder vessels. Let's see how this works for Africa.

Reducing the number of port calls for larger ships means that these ships will have to rely on the development of pure transshipment ports (PTPs). The majority of a PTP's activity is transshipment handling, though significantly smaller volumes of domestic cargoes are also handled. The most efficient route for the large ships is near the equator (denoted by the red line in Figure 3). To maximize the opportunities for capturing cargoes, PTPs should be located along the intersections of north-south and east-west trade flows. And, in fact, this system of PTPs has emerged in recent years, with the development of Manzanillo International Terminal (Panama), Freeport (Bahamas), Algeciras (Spain), Gioia Tauro (Italy), Singapore, Honk Kong, Port Klang (Malaysia), among others, as PTPs. Today's new port developments in Tangiers and Yan Shan Island (near Shanghai) are intended to serve in PTP roles.

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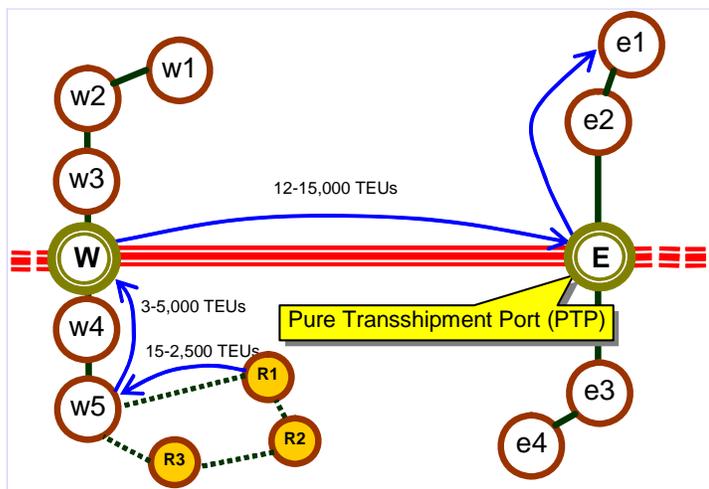
<sup>7</sup> In simple terms, transshipment is the temporary delivery of a container to one port by a "mother" (larger) ship, where it is then picked up by a feeder (smaller) vessel for delivery. Double transshipment refers to another feeder service vessel involved in an additional carriage of the container to its final destination port.

Figure 3  
*Development of Pure Transshipment Ports to Serve Post II and III Ships*



The cascading effect will lead vessels supplanted by Post II and III ships to play a new role as regional feeders loading and discharging cargoes from the PTPs. Because these vessels are larger than what is now deployed on many regional routes, the rationalization process begun by carriers on 'round the world service routes will be followed by a similar rationalization process in regional trades. This process, reflected in Figure 4, means regional feeders will minimize their calls, with subsequent transshipments carried out by smaller subregional feeder vessels.

Figure 4  
*Emerging Transshipment Feeding System*



SOURCE: Ashar, Asaf, "Revolution Now!" Containerization International, January 2002, pp. 56-60.

Figure 5 shows how this pattern fits into the context of Africa's West Coast. Though this is intended to be illustrative, this scenario is indeed becoming reality. For example, many in the industry expect that transshipment cargoes will be diverted from Algeiras (Spain) to a new, highly mechanized container terminal being built in Tangiers because of cheaper labor costs. Thus, transshipment cargoes will dominate activity in Tangiers, transforming it into a PTP.

Figure 5  
*Evolving Transshipment Patterns for West Coast Africa*



PTP = Pure Transshipment Port RH = Regional Hub Port = Port

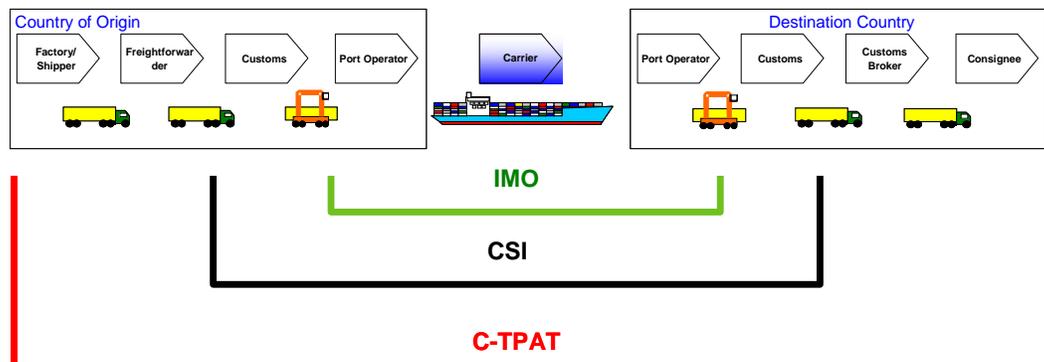
This means that Tangiers will likely provide regional feeding services to West Coast Africa, with regional hubs established at terminals offering fast turnaround times for vessels. Regional hubs are usually established in ports with substantial cargo volumes, making Abidjan, with 640,000+ TEUs, a likely candidate. But a new highly mechanized terminal, offering substantially more efficiency and berth productivity, will open in Tema (Ghana) before the end of the year. Though Tema has lower volumes (about 350,000 TEUs), this is enough to attract main regional feeding services, thus assigning Tema regional hub status. This means that in the mid-term, as cargo volumes continue to grow, Panamax size vessels will begin calling to Accra. Of course, with the concession recently awarded for the container operation in Lagos, competition will emerge for regional hub designation, but at this point, Tema will be the first to offer a terminal with the efficiency required for regional hub services. A similar scenario is likely to emerge for East Coast Africa, with competition for regional hub status emerging from Mombassa, Port Luis in Mauritius (if expanded), Maputo (if channel access is improved), and Durban.

## POST 9/11 SECURITY

The 9/11 attack led to protocols for addressing security concerns along the transport logistics chain. The protocols are embodied in the International Maritime Organization's Safety of Life at Sea (SOLAS) Convention (including the International Ship and Port Facility Security Code), Container Security Initiative, and the Customs-Trade Partnership Against Terrorism (C-TPAT). Figure 6 delineates the jurisdictional authority of these protocols by area of transport logistics activity.

Figure 6

*Transport Logistics Chain Coverage by Existing Security Protocols*



## International Maritime Organization International Ship and Port Facility Security Code

The IMO's package of security measures in Part A addresses mandatory measures for member countries; Part B lists "voluntary" measures. The United States interprets the voluntary measures as mandatory for U.S.-bound vessels. So what does all this mean for ports? Ports are required to carry out facility security assessments, develop port security plans

in accord with each security alert level, designate a port security officer, ensure that security personnel receive adequate training, and ensure that ports are sufficiently equipped and staffed to address three security alert levels. As of May 2005, the U. S. Coast Guard had identified ports in five countries as not complying with ISPS requirements, four of which are in Africa. These include

- Democratic Republic of Congo,
- Guinea-Bissau,
- Liberia, and
- Mauritania.

The U.S. Coast Guard requires vessels that visited these countries during five previous ports of call before arriving at the United States to satisfy other security-related requirements (e.g., posting of guards at each access point to the vessel). The U.S. Coast Guard will board arriving vessels to ensure that these requirements are satisfied; if they are not, the vessel is denied entry.

## **Container Security Initiative**

Given the risk that containers pose once they reach a destination port, it is preferable to ensure their contents and integrity as far upstream the logistics chain as possible. Thus, the Container Security Initiative moves container inspection to origin ports (C-TPAT moves ensuring container integrity all the way to the origin shipper).

The CSI is built around four elements: (1) establishing criteria to identify high-risk containers, (2) prescreening containers before they arrive in the United States, (3) using technologies to prescreen containers, and (4) developing “smart and secure” containers. The United States sought members for the CSI “club,” and focused initially on the world’s largest transshipment hubs. Membership offers certain strategic advantages in that it reduces the risk of delay in U.S. destination ports. Today, 37 ports participate in the CSI program, one of which is Durban. As Tangiers becomes established as a major transshipment hub, it will likely seek CSI participation as well; its main transshipment rival, Spain’s Algeciras, is a CSI participant.

One objective of CSI is to enable the inspection and securing of containers before they arrive in the United States. This explains the focus on transshipment ports and other ports having substantial cargo volumes that imply direct calls from these ports to U.S. destinations. Hence, the vast majority of shipments from Africa transit through transshipment hubs before arriving at a U.S. port. Regional hubs in Africa, where carriers have an opportunity to consolidate shipments and thereby generate sufficient volumes to justify direct calls to the United States, may encourage CSI participation of African regional hubs in the future.

Deployment of container detection technology is a prerequisite for ports seeking CSI status, and in certain instances U.S. Customs has financed X-ray systems for some countries. Some of these systems, which cost \$1–2 million, can inspect 20 containers per hour. Other potential requirements include identification cards and biometric devices to validate personnel identification.

Related to CSI is the Maritime Transportation Security Act. Under this act, vessels coming from ports that in the view of the United States fail to provide adequate security can be denied entry to U.S. ports. Inadequately secured ports will be blacklisted until security is improved.

## **Customs-Trade Partnership Against Terrorism**

Under C-TPAT, shippers are responsible for ensuring a secured logistics chain. All shippers who want expedited cargo processing in the United States are required to assess their own supply chain security using guidelines developed by U.S. Customs and the trade community, submit a supply chain security profile questionnaire to U.S. Customs, develop a program for enhancing security throughout the supply chain, and seek the cooperation of other companies in the chain. Shippers that go through this process are less likely to be targeted for U.S. Customs inspections, and hence reduce the risk of delay from inspections.

While shippers (U.S. importers) are responsible for security, shippers place pressure on their product sources (foreign exporters) to comply with C-TPAT requirements. For example, if a U.S. importer outsources the warehousing function of its supply chain, then it is the warehouse owner or operator who must secure the warehouse to avoid losing the storage contract with the U.S. importer. Hence, the requirements for the U.S. importers are also requirements for trading partners (e.g., exporters in Kenya). Exporters of products to U.S. importers need to ensure container security (e.g. seals, inspection, storage); physical security of warehouses, factories, and industrial plants (e.g., fencing, lighting, video surveillance); and site access (e.g., ID verification, pre-employment verifications/background checks), among other items.

While securing a logistics chain is an extreme challenge for U.S. importers, it is also a challenge for foreign exporters to U.S. markets, particularly smaller exporters. Failure to comply with U.S. shipper requirements means that U.S. shippers will seek other product sources. So if a foreign exporter, say in Botswana, wants to remain competitive in U.S. markets, it needs to cooperate with the U.S. importer in securing the logistics chain. But under today's system, this is no easy feat, and we explain why next.

## **Security and Efficiency: Can They be Achieved Simultaneously?**

The trade community's biggest concern about new security measures is that they will hamper the seamless flow shippers seek in the supply chain. In fact, while there may be some exceptions, security requirements have not caused the feared congestion or delays. One difficulty, however, is that shippers have been left to devise their own solutions, and vendors have offered technologies that address only one aspect of security (e.g., smart seals and GPS for truck tracking, container X-ray). A solution that takes a holistic approach to securing the transport logistics chain while enhancing transport system efficiency remains elusive. Let's first see where inefficiency lies in a representative case, and see how our solution might fix the problem.

### ***Ghana's Transport Inefficiency***

Transport efficiency in Ghana, as in many countries, is hampered by institutional, behavioral, and structural problems. For example, a recent shipment of goods from Tema to Burkina Faso entailed 7 stops for Customs and 22 stops for security inspections along the route to the border—

and this did not include border processing inspections. On the institutional front, Customs, as a chief collector of revenue, is intent on inspecting an inordinately high proportion (about 80 percent) of containers, even though a “red-light/green-light” system is in place. Additionally, Customs fears that trucks claiming Burkina Faso as their destination will deviate from their itineraries in favor of destinations inside Ghana to smuggle goods. Customs is also concerned about illegal weapons smuggling to countries suffering conflicts.

The behavioral dimension involves the national police and opportunities for informal payments. Shippers (or truck operators) use cash for informal payments and suffer associated delays. And, as in most developing countries, trucks congregate along city streets on the approaches to the port gate. Drivers even set up hammocks under the truck chassis and camp out several days while waiting for their cargo to arrive.

The structural dimension involves road conditions and port gate congestion. Ghana has become a transit corridor for Burkina Faso and other countries (Ivory Coast) affected by regional conflicts. Burkina Faso relied on Abidjan as its port of entry until regional conflicts forced the country’s shippers to use Tema and Takarodi (Ghana) as gateway ports. The influx of freight movements has caused damage to roads not designed for heavy flows, and many trucks are in violation of axle-load restrictions.

### ***The Security Gap***

A review of security protocols reveals a coverage gap in the C-TPAT, CSI, and the IMO’s ISPS protocols, particularly as applied to trucks. C-TPAT and ISPS cover containers but do not seem to have application to truck movements (and possibly truck drivers), for example, between the shipper’s gate and the port gate.<sup>8</sup> So the challenge in Ghana, and in many of Africa’s countries, is to devise a system that secures cargo, trucks, and drivers without creating inefficiency in the freight transport system.

### ***Secured Transport Logistics Chain: A Holistic Solution***

The solution has its roots in business thinking. Just-in-time logistics, for example, seeks a seamless flow of cargo to reduce (idle) inventory and transaction costs. The transport industry thinks the same way about its equipment. Idle transport equipment indicates an imbalance between supply and demand—the equipment incurs cost, but is not generating revenue.

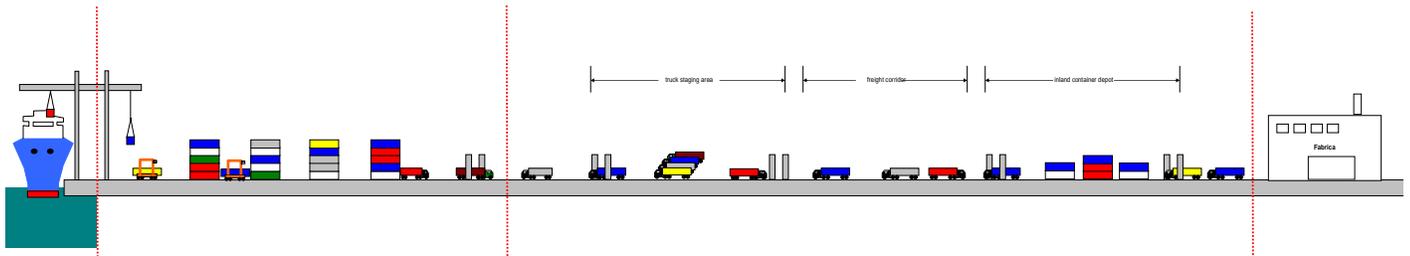
Computerized process-control systems in port terminals are intended to optimize the staging of equipment with the loading/discharge, storage, and gate operation in the terminal so that the operator can manage the terminal like a factory production line. These process-control systems seek to minimize the time at the cargo exchange nodes in the terminal. Equipment deployment is staged to reduce the idle time of equipment and cargo; this reduces the amount of equipment required in the terminal and increases terminal capacity without facility expansion.

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<sup>8</sup> The Carrier Initiative Program of U.S. Customs and Border Protection, which covers air, maritime, and land carriers, focuses only on trucks crossing U.S. borders.

Applying the same logic along the logistics chain can achieve similar results by extending the port gate in proximity to the factory or warehouse where the cargo originates or is destined. Trucks moving the cargo between the port and the importer's or exporter's premises are staged much like the cargo-handling equipment in the terminal. The major infrastructure components (Figure 7) include inland container depots (sometimes referred to as dry ports) and truck staging areas. Technology components include container smart seals, GPS devices for tracking trucks, and tracking monitoring stations, all which are relatively low cost. Let's trace an export shipment to see how this works:

Figure 7  
*Infrastructure Components of the Secured Transport Logistics Chain (STLC)*



SOURCE: STLC concept developed by Nathan Associates Inc.

1. Driver departs factory with sealed container and enters inland container depot (ICD).
2. Dispatcher logs truck in, attaches GPS device to truck and smart seal to container.
3. Depending on ship's schedule for arrival, truck is immediately dispatched from inland container depot for transport to the truck staging area (TSA) near the sea port.
  - ICD dispatcher monitors truck movement to port.
  - If truck driver is too early for dispatch, truck is assigned a slot until dispatcher release.
  - Driver, container, and truck are "captive" in the ICD, but driver has access to bed/shower facilities, cafeteria, communications center, clinic and pharmacy, and electronic bulletin board consisting of shipper requests for trucks.
  - Truck may also be refueled, undergo minor repairs, be fitted with new tires, etc.
4. Truck arrives at TSA, which can be as far as 30 miles from port gate, and is logged in by dispatcher.
  - Dispatcher compares actual travel time with "expected time" for the route.
  - If time differential is "extraordinary," dispatcher queries driver and compares responses to GPS tracking movements.
  - If driver's explanation is acceptable, truck is assigned slot in the TSA; if not, the driver is interviewed and the truck and/or container is inspected.
  - Driver and truck have access to same services offered in the ICD.
5. Truck is dispatched to the port gate after being cleared for arrival by port dispatcher; transit time also subject to review by dispatcher.

6. Truck arrives at port gate and is logged in by port dispatcher, drops off container; GPS device is collected and truck is released.

The same process can be applied to import containers, except that Customs inspection can occur at the TSA or ICD. Because of GPS tracking, Customs will know if the driver deviated from the route and can identify where the truck was delayed. So Customs' concerns are mitigated, negating Customs' perceived need to inspect containers several times along the route.

Exhibit 1 lists services the TSA and ICD can offer; benefits include the following:

- Less urban congestion
- Less pollution
- Lower freight costs
- Less traffic congestion in freight corridors
- Lower road maintenance costs
- Better security for trucks, cargo, and drivers
- Lower AIDS risk.

Shippers are likely to demand that drivers "enter" the STLC and use the TSA and ICD because doing so will reduce the risk of shipment hijacking and pilferage and will help shippers comply with C-TPAT objectives (and cut time lost to inspections). The systems also offers truckers easy access to a range of services and helps them avoid the ticketing by municipal authorities that would occur they parked outside the TSAs.

Exhibit 1  
*STLC Services*

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<p><b>CARGO SERVICES</b></p> <ul style="list-style-type: none"> <li>• Check in/dispatch</li> <li>• GPS monitoring/control</li> <li>• Container storage</li> <li>• Smart seals</li> <li>• Consolidation/deconsolidation</li> <li>• Warehousing</li> <li>• Customs clearance</li> </ul> <p><b>TRUCK SERVICES</b></p> <ul style="list-style-type: none"> <li>• Repair</li> <li>• Environmental permits</li> <li>• Sales of tires, fuel, spares</li> <li>• Parking</li> <li>• GPS monitoring/control</li> </ul>	<p><b>TRUCK DRIVER SERVICES</b></p> <ul style="list-style-type: none"> <li>• Electronic bulletin boards for freight bookings</li> <li>• Cafeteria</li> <li>• Foodstore/pharmacy</li> <li>• Hotel</li> <li>• Communications center (internet/phone)</li> <li>• Dispatch</li> </ul> <p><b>OTHER</b></p> <ul style="list-style-type: none"> <li>• Banking</li> <li>• Offices for logistics—freight forwarding, ship's agents, etc.</li> </ul>
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Benefits also accrue to truck owners, who will have better control of drivers and greater probability of obtaining backhaul business via offerings on the electronic bulletin boards at the TSA and ICD. Additionally, keeping trucks on designated freight corridors will reduce damage to secondary feeder roads and the need to improve freight corridors to accommodate truck flows. Finally, the system reduces urban congestion by directing trucks to the TSA and reduces highway

congestion because movements along the corridor are controlled. So overall, in an environment of enhanced security, the efficiency of the transport system is improved.

Figure 8 shows how the STLC may be applied to Ghana. ICDs are established at major crossroads of trucking activity, while TSAs are located near ports. TSAs need not be located very close to the ports; because truck movements are controlled by port and TSA dispatchers, the TSA can be several miles away, where land tends to be less expensive than near ports.

Figure 8  
*STLC in Ghana: Linking Ports, TSAs, and ICDs*



As described, the STLC offers many opportunities for revenue generation, so the prospects for private sector investment are very good. Benefits for investors include the following:

- Captive cargoes, trucks, and drivers—400 trucks call Tema each day
- Various revenue generation activities
- Truckers and shippers are encouraged to enter the STLC to comply with C-TPAT, avoid fines for violating city parking regulations, and to avoid inspection delays
- Lower market risk

The holistic approach of the STLC demonstrates that enhancing security can result in efficiency gains. And it appears that revenue potential, at least in Ghana, is sufficient to encourage private investment in ICDs and TSAs. While the STLC concept offers great potential for addressing

security and efficiency concerns, other factors will affect port efficiency. Now let's enter Adam Smith's realm of competition.

## PORT COMPETITION

In the past decade, reformers have generally avoided monopolistic settings when privatizing ports. The resulting competitive environments have made many ports more efficient and lowered their costs, to the benefit of both consumers and port users. Colombia, Argentina, and the United Kingdom are good examples of government efforts to avoid private sector monopolies. Countries also have a number of options for expanding competition. Depending on market conditions, they can introduce new berths or terminals, divide the existing port into terminals, divide the operation within the terminal, or use short-term (contestable) contract mechanisms granting rights to operate a facility. The resulting level of competition defines the degree to which operators are to be regulated in light of antitrust concerns.

Given the experience of the past decade and lessons derived from it, why are several countries in Africa designing privatization transactions that minimize competition? Durban, for example, has enough cargo volume to support several terminal operators, and thus introduce healthy competition. Yet before deciding to maintain its public monopoly at Durban, South Africa had considered a maximum of only two transactions for Durban's container business on the basis of economy-of-scale advantages accruing to the operator (who would have a greater share of the market pie).

Tema, with a record of strong growth, and with the proper terminal sizing and configuration, could leverage two operators given the volumes handled there. One rule of thumb is that operators generate about \$200 per TEU. With Tema's current volume of about 350,000 TEUs, annual revenue is about \$70 million, more than enough to cover the cost of two terminals at perhaps \$240 million. Yet the port authority is conducting one-on-one negotiations with a global operator in lieu of open bidding.

Having fewer competitors in ports gives rise to the same antitrust concerns as horizontal mergers and acquisitions. Larger allocations of the business in port privatization transactions or in a proposed merger or acquisition are both based on the same argument for economies of scale (e.g., the proposed terminal operator merger in Buenos Aires in 2000). A substantial horizontal merger involves some loss of direct competition and is thus at least anticompetitive absent all efficiencies. But antitrust regulators challenge only a few horizontal mergers, and even fewer in "unconcentrated" markets. In the United States, for instance, merger guidelines recognize that most mergers "are either competitively beneficial or neutral."<sup>9</sup>

Regulators presume that where the loss of direct competition is slight, the transaction is likely motivated by efficiencies that outweigh that loss, and is thus on balance "beneficial or neutral." Therefore, only when a merger creates substantial concern about competition does the issue of

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<sup>9</sup> U.S. Department of Justice and Federal Trade Commission Horizontal Merger Guidelines, Section 4.01 (1992, revised 1997).

efficiencies become explicit. Such concern doesn't arise unless the industry is already concentrated, suggesting that economies of scale are likely to be significant in the industry and that market shares are "sticky." It would thus not be surprising if the merged entity could achieve fairly quickly economies of scale that the merging parties could not achieve individually. From the perspective of consumer welfare, however, one doubts that the efficiencies arising from scale will be both large enough and sufficiently passed through that consumers benefit: that the merged firms will share their benefits with port users is unknown.

Whether governments maximize competition or consider economy-of-scale advantages in structuring privatization strategies, they must still be concerned with the competitive behavior of terminal operators. Port reform typically results in an oligopoly: a handful of operators compete in a defined market. As the environment evolves and matures after privatization, competitive forces can be expected to affect competitive behavior. But, given the oligopolies, firms may engage in anticompetitive behavior as each vies for market dominance or market share. Indeed, the risk of anticompetitive behavior has led many countries to regulate port tariffs, at least in an interim period after privatization (e.g., Colombia after port sector reform in 1991). Countries are recognizing that the behavior of terminal operators must be monitored, that complaints of alleged anticompetitive behavior must be reviewed, and that the impact of proposed mergers and acquisitions must be assessed.

Of course, where cargo volumes are relatively low inducing competition is difficult. To support gantry crane service, for example, volume should be 120,000-150,000 TEUs. Many ports in Africa (e.g., Maputo) would not generate revenues sufficient to cover this cost. Where cargo volumes are low, operators are usually engaged through short-term leases to allow some notion of "contestability" in bidding for the leases. But if governments need to rely on substantial private investment for facility improvement this is not possible. Under these circumstances, long-term operating agreements<sup>10</sup> are appropriate, but price-setting from an economic regulator is necessary.<sup>11</sup> Maputo has a monopoly operator without a regulatory framework to monitor for anticompetitive behavior.

Countries have two basic options when structuring a privatization strategy: (1) take an approach that leverages as much competition as the market will allow, or (2) take an economies-of-scale approach, but then set permissible prices for the operator. (There exist a variety of options for inducing competition without regulatory price setting.) The selection should be made on the basis of potential business volume as well as engineering and/or physical constraints on configuring

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<sup>10</sup> Operating agreements, concession agreements, and leases are essentially equivalent contractual mechanisms. In some countries, these may be distinguished by specific-use or investment requirements. Generally, however, these forms may still result in substantial investment requirements.

<sup>11</sup> An alternative approach is for the government to structure bids so that interested parties bid on the *lowest* price charged for berth and terminal handling and storage. The agreement would allow for cost adjustments in accord with consumer price indices. Many governments are tempted to ignore this approach as it results in fewer revenues for concession payments. While lower port costs would have a much greater economic impact, it is hard for governments to ignore the larger annual cash flows of the "highest-bid" approach.

facilities in a way that does not hamper operational efficiency. Figure 9, based on our identification of competition-inducing strategies for the World Bank's *Port Reform Toolkit*, defines the range of operational environments and the extent of competition that may exist for each. It then identifies the range of solutions for ensuring competitive pressures. Only in rare circumstances is it necessary to set prices for port operators.

## Tema

While Tema has chosen a course that does not introduce port competition, it has an opportunity to change this in the next five years. The scale and scope of investment for the terminal under construction will discourage competition from entering the arena. But current growth patterns suggest that the terminal will need to be expanded within five years. So Tema could bring in another operator, but its current arrangements with the new terminal operator imply a conflict of interest. Let's see why this may happen.

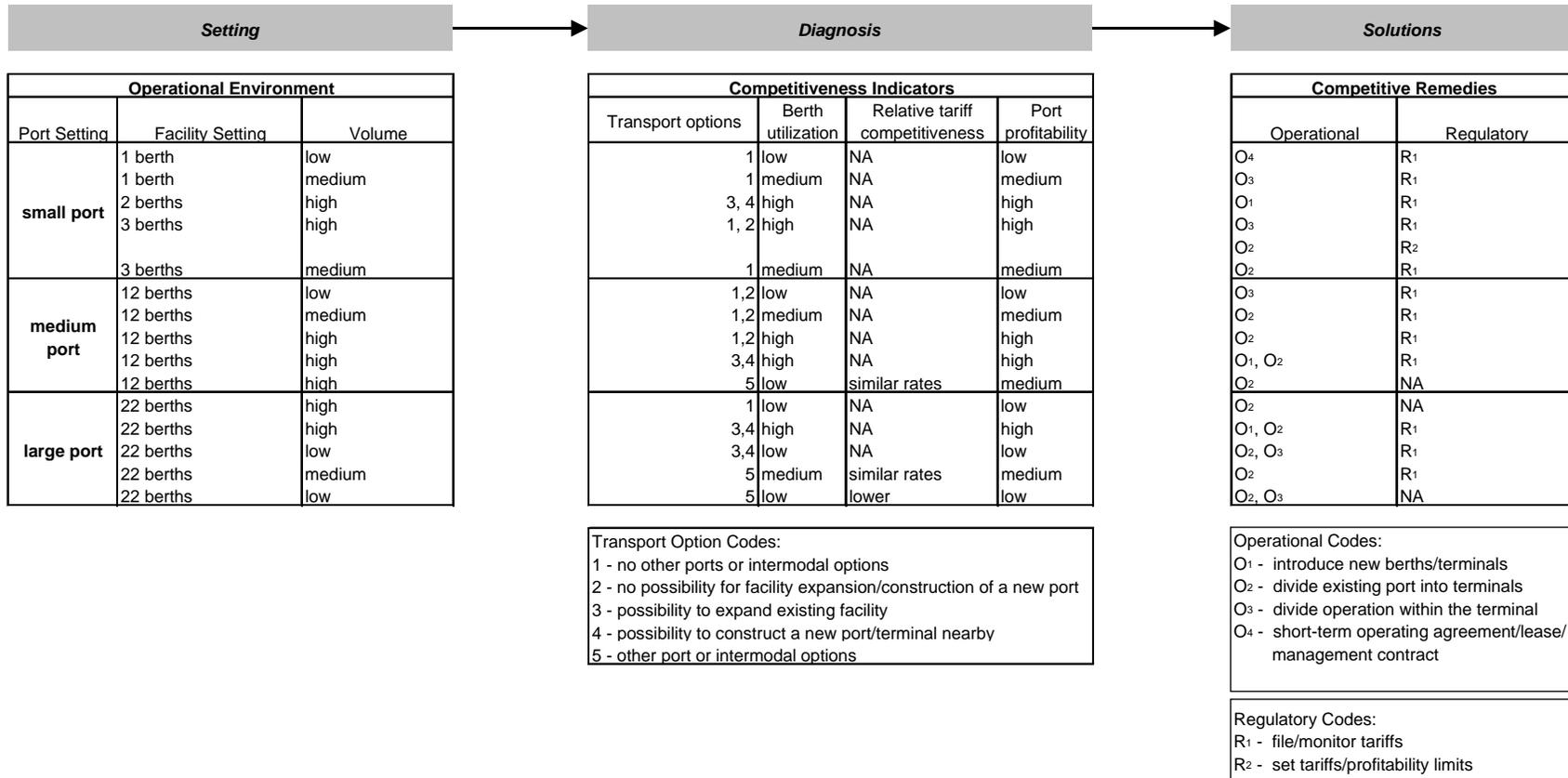
The port authority has a 30 percent equity arrangement with the new operator. As volume grows, for future concessions the authority could

1. Obtain an equity position with the new concessionaire;
2. Allow a new terminal operator to enter the arena without the authority taking an equity interest; or
3. Award a terminal expansion concession to the incumbent in which the authority shares equity to preserve the favorable (monopoly) position.

Under the first option, it may appear that the port is inducing competition even with its equity position. Tema's port authority, however, will be able to confer preferential treatment on the operation where the margins are higher (to preserve or enhance the authority's equity value). Preferential treatment can consist of vessels calling the authority's "preferred" operator being assigned priority pilotage or tug assist services (over which the authority has monopoly control) or of maintaining sufficient alongside berth draft only at the preferred operator's berth. Such treatment, of course, is even more likely under the second option, while the third option continues the *status quo* monopoly. The equity position held discourages the port authority from sharing the market with a new terminal operator unless it also leverages a higher equity position, in which case the authority will likely grant the new operator preferential treatment.

Other issues arise with stevedoring services for breakbulk cargoes. Tema's port authority administers a cargo allocation practice based on an agreed-upon business sharing arrangement that the authority has brokered with the private stevedores. The authority, however, is also a stevedoring company, to which 25 percent of cargo is allocated. The balance of the cargo is allocated among 8–9 private companies. The authority intends to "liberalize" stevedoring by allowing companies to compete for contracts with the ships' agents. The port authority, however, will retain its 25 percent share, and the companies will compete for the remaining 75 percent. The authority claims that its continued involvement will ensure that the port remains open in case of a strike by the private companies. But what if port authority workers join the strike or striking workers outside the authority's control (e.g., truck drivers) shut the port down by striking?

Figure 9  
Remedies for Enhancing Competition in Port Operations



SOURCE: Kent, Paul E., et al, Port Reform Toolkit, Port Regulation Module, World Bank, Washington, D.C., March 2001.

## Durban

The development of intermodal linkages in South Africa, particularly via the TransAfrica Rail Link (of which Spoornet has a major ownership stake), has enabled the port of Durban to extend its reach into the hinterlands of a number of countries previously served by Dar es Salaam and Mombasa. Durban has competitive advantages for some of these cargoes, but Spoornet, South Africa's rail operator and concession holder for the Maputo freight corridor serving Hauteng, can change Durban's cost and efficiency-induced advantages through a pricing strategy that diverts cargoes to routes offering higher margins. For example, if Spoornet's profitability is higher per unit cargo via Maputo to Hauteng, then it can raise its prices on the Durban-Hauteng route to divert cargo to its higher margin operation. In addition, given the Spoornet precedence, and the corporate independence of the National Port Authority (NPA) in South Africa, NPA could build a new terminal in Maputo and effect its own pricing distortions.

The range of possible outcomes discussed above suggests the need for a regulatory framework. We delve into the regulatory issues in the next section.

## PORT REGULATION

Most countries have avoided transferring port services to private monopolies, but the privatization approach in Africa seems to run counter to worldwide experience. Even countries in Asia, some of which had created private monopolies after their first privatizations (e.g., Port Klang in Malaysia and Jakarta, Indonesia), have since recognized the benefits of competition and opened up their markets to other terminal operators.

While Africa as a whole has certainly needed to address the state of its port infrastructure, only a few countries have begun to address efficiency gains and cost controls by regulating competition. And, despite the range of options for inducing competition, oligopolistic behavior is still a risk because only a few operators could compete given volume and investment requirements.

Port privatizations, particularly of the 1980s, that had seemed radical have become the norm. Regardless of concentration tests, port sectors are by nature concentrated and should be of regulatory concern (see Figure 10).<sup>12</sup> Yet, governments, which are supposed to protect the public interest, are not prepared to address emerging concerns about anticompetitive behavior. Figure 10 "measures" the extent of market concentration for some of the world's most successful port privatizations, yet the risk of anticompetitive behavior persists.

In spite of the two waves of port privatization of the 1980s and 1990s, experience with regulation that ensures fair competition is rare. Only Peru, Australia, Colombia, and perhaps Mexico, have well-established economic regulators to address pricing regulation. Authorities in many countries,

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<sup>12</sup>Concentration ratios measure the percentage of total sales in an industry by a prescribed number of the largest firms. In port terms, this could mean the percentage of containers handled by the largest terminal operator (in terms of containers handled) or the largest group of operators for the same market. For example, an n-terminal operator concentration ratio (CR<sub>n</sub>) measures the percentage of the total containers in the port industry handled by the n largest terminal operators in that industry. Some countries, like the United States use the Herfindahl-Hirschman Index (HHI) instead of the CR test. The HHI is also intended to measure market concentration by calculating a concentration "score"; the score is calculated by taking the square of the market share of each firm competing in the market and totaling the result for all of the firms competing in that market.

Figure 10

*Market Concentration and the Risk of Anticompetitive Behavior*

Port/Operator	TEUs	Market Concentration		Considered Dominant/Concentrated in**			
		Market Share	HHI*	Germany	United Kingdom	Australia	United States
<b>Malaysia -- Port Klang</b>							
Klang Container Terminal Bhd	946,788	68.2%	4,649	yes	yes		yes
Klang Port Management Sdn Bhd	422,698	30.4%	927		yes		
Klang Multi Terminal Sdn Bhd (Westport)	19,150	1.4%	2				
Total HHI			5,577				yes
<b>Argentina -- Buenos Aires</b>							
Terminales Río de la Plata (Terminals 1&2)	320,492	38.0%	1,448	yes	yes		yes
Buenos Aires Container Terminal Services (Terminal 5)	175,830	20.9%	436				
Exolgan (South Dock)	346,031	41.1%	1,687	yes	yes		
Total HHI			3,571				yes
<b>Colombia -- Atlantic Coast</b>							
Barranquilla Society	45,235	15.2%	231				yes
Santa Marta Society	42,705	14.4%	206				
Cartagena Society	152,272	51.2%	2,620	yes	yes		
CONTECAR	25,028	8.4%	71				
El Bosque	32,240	10.8%	117				
Total HHI			3,175				yes
<b>United Kingdom</b>							
Associate British Ports	1,709,107	33.6%	1,127	yes	yes		yes
Felixstowe (Hutchinson Whampoa)	2,042,423	40.1%	1,610	yes	yes		
Tilbury	394,772	7.8%	60				
Thamesport	350,000	6.9%	47				
Teesport	280,209	5.5%	30				
Rest of UK	313,737	6.2%	38				
Total HHI			2,845				yes
Source: For Colombian statistics, Office of the Port Superintendent -- 1997 statistics; for the other ports, <i>Containerization International Yearbook</i> , 1998, statistics for 1996.							
*Note: The HHI is computed from the sum of the squares of the market shares. For ease of calculation, in the UK case, the HHIs for the top four ports only are calculated. This practice reflects the norm for calculating industry HHIs, as for many industries it is not possible to determine market shares for small competitors. Regulators rationalize this by the fact that the HHIs for smaller competitors have an insignificant impact on the total HHI.							
**Germany assumes market dominance exists when a single firm's share exceeds 33 percent. For the United Kingdom, the single firm threshold is 25 percent. Australia applies a CR4 (e.g. the top four firms) test has 75% or more of the market. The United States uses the HHI, which is based on the market share for each industry							

Source: Kent, Paul E. "Monitoring for Port Antitrust Behavior: An Operational Model and Future Challenges," Annual Conference Proceedings: International Association of Maritime Economists, November 2002, Panama.

even those of the European Union, seem unprepared to manage port anticompetitive behavior, despite their authority to do so. Costa Rica, with its “Essential Services” Regulator, exemplifies the difficulty that utility-oriented regulators have in adapting utility pricing theory to port operations: the regulator’s refusal to allow the port to raise prices to cover the cost of expansion has resulted in congestion.

Instances of limited market volumes, where price setting may be appropriate, present perhaps the most difficult regulatory challenge. Regulators must determine an appropriate price for a service, yet doing so requires knowledge of the terminal operators’ cost structure. If an operator has monopoly control over anything, it is the information it provides to the regulator. Even with audit powers, regulators have difficulty fully understanding the cost structure of an operator’s business—hence our emphasis on inducing competition where practical. Where this is not practical, regulators must apply a host of “higher economics” skills to either estimate cost structure and/or to determine appropriate standards (e.g., factor productivity analysis) to ensure acceptable terminal operator performance.

Globalization and related market dynamics have shaken up industries in a number of sectors. Global trade in the maritime sector has generated new service patterns and induced changes in industry structure that have led to even higher market concentrations. Carriers have become larger as a result of mergers and acquisitions (in the former) and global terminal operators have emerged because of investment opportunities driven by port privatization. Today, the world’s top seven terminal operators handle about 50 percent of the world’s port container volume, yet the emerging global dominance of terminal operators has gone relatively unnoticed. The trend of global dominance can even be local in character. In Colombia, for example, the Port Society of Cartagena (one of three terminal operators in Cartagena) purchased one of its competitors, allowing the Port Society to now control about 80 percent of the market. This did not even raise the eyebrows of the port regulator, who does not does not impose reviews of mergers and acquisitions.

In several ports of Africa increasing cargo volumes could support inter-terminal competition. In addition to competition monitoring and price-setting authority, the regulator will need to be able to impose reviews of mergers and acquisitions. Otherwise, as with Colombia’s Port Society, a return to (near) monopoly is likely.

## **CONCLUSIONS**

Thanks to economic and trade reforms, Africa is enjoying strong growth in cargo volumes, at a rate higher than the global rate. As growth continues, Africa’s ports will be affected by changing carrier practices driven in part by the likely expansion of the Panama Canal and the introduction of substantially larger container vessels on mainline routes. As carrier service is rationalized, the number of calls by larger vessels will probably decrease, resulting in a very few ports serving as pure transshipment hubs along the equator and others serving as regional hubs. Some regional hubs will be in Africa, with other African ports served by feeder services from the hubs.

For reasons that extend well beyond the port gates, the efficiency necessary to keep costs down for port users will be challenged by added volumes from regional hubs and continued strong

growth in smaller ports. Hinterland transport systems are not sufficiently developed to accommodate these volumes, institutional practices and informal payment schemes hinder seamless flows of cargo, while shippers need to adjust to post-9/11 security protocols. Establishing secured transport logistics chains via a linked network of inland container depots and truck staging areas could enhance both transport security and efficiency.

African ports have had some success in leveraging private investment through privatization programs. But the tendency to end up with monopoly port operators, either through negotiated sole-source awards or competition for a single concession for an entire container operation, is troublesome. South Africa, home to Africa's largest port in terms of container volume, has decided to preserve its government monopoly in port operations. In other ports, cargo volumes are not sufficient to support more than one operator. In any of these situations, a competition and economic regulation framework is needed to ensure efficient performance, yet no country in Africa has the ability to monitor competitive behavior, set pricing, and review proposed mergers and acquisitions. And Spornet's interest in rail concessions outside South Africa raises concerns about competition that country regulators, even if established, might not have the authority to address.

This report has shown that efficiency concerns extend beyond the port's gates and that options for improving port efficiency reside not only in infrastructure investment, but also in non-structural measures. To improve its global competitiveness, African countries need to attend to privatization strategy, regulatory frameworks that safeguard competition and monitor pricing behavior, and an institutional design that facilitates security and encourages transport efficiency.

## WHAT CAN USAID DO TO ASSIST?

As countries contemplate strategies for improving transport sector efficiency, USAID can focus assistance in the four dimensions of the African context:

1. ***Support efforts to improve transport logistics chain efficiency.*** Events outside the port's gates can have an effect on the operations inside the port. Governments will need to be concerned with the entire transport logistics chain, including ports and freight corridors, to minimize transport costs. Governments can improve transport logistics by first identifying the chain's chokepoints and then applying a terminal operator's "factory line" approach to the transport logistics chain: optimizing equipment with cargo and always striving to reduce idle time of each. USAID can assist countries by applying logistics chain diagnostics and helping them identify institutional, regulatory, and structural impediments to logistics chain efficiency. In so doing, countries will know where changes should be made and where limited resources should be allocated.
2. ***Assist with efforts to promote competition in the transport sector.*** Promote the use of privatization strategies that induce competition. There is no assurance that the benefits from transactions designed to maximize economies of scale savings will ever be shared by operators with port users. It is necessary to achieve an appropriate balance of economies of scale savings and the number of transactions offered to promote competition. Further, competition is more effective for assuring high efficiency at the lowest possible cost than

regulation, thus enhancing trade competitiveness. Countries have many options to consider for inducing competition, but this requires a look at current cargo volumes and growth prospects as well as terminal capacity. Capacity building in market review, strategy design, and terminal planning considerations can be a very effective approach for formulating effective privatization programs.

3. ***Strengthen regulation to deter anticompetitive behavior in the sector.*** Privatization will result in either oligopolies or monopolies. And in instances where governments choose not to take the privatization route, then port services will remain government monopolies. In the oligopolistic case, governments will need to monitor competitive behavior; in the monopoly case, governments will need to set prices. USAID can assist governments in establishing the port regulatory function as a functional entity within an already existing regulatory body or as an independent one and in developing guidelines covering competition monitoring and price setting.
4. ***Enhance port security.*** Not all of Africa's ports need to be concerned with all of the security protocols. CSI is generally applicable to transshipment ports or to ports with volumes sufficient to merit a call to U.S. ports without calling a transshipment port. But countries for the most part will still need to be IMO compliant, and shippers trading with countries are still faced with C-TPAT compliance requirements.

Compliance with international security protocols can be facilitated by establishing secured transport logistics chains (STLCs) along a country's major freight corridors. The objective of STLC is to reduce the security risk to trucks, cargoes, and drivers. The combination of inland container depots, truck staging areas, and technologies for monitoring truck and container movements can secure the transport logistics chain while simultaneously improving efficiency, and they negate the need for en-route inspections. USAID can promote this concept as part of its ongoing corridor programs and assist countries in defining STLC requirements, including locations and technologies.