

## GLOBAL SUPPLY CHAIN OVERVIEW (CONSUMER GOODS)

### SEAPORTS & MARINE TERMINALS



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Improving Competitiveness and Profitability Through Cost-Effective Supply Chain Solutions

## I. OVERVIEW

Seaports and Marine Terminals are an essential link in the intermodal transfer of ocean cargo. Ports and Terminals facilitate the interchange of consumer goods exports between Ocean Carriers and land-based transportation such as trucks and railroads.

Because of their essential functions and strategic locations, the viability and productiveness of Seaports can have a significant economic impact on the surrounding hinterland and national regions served. As such, many Seaports are owned and subsidized by public entities. Private Seaports, which are less prevalent, are often designed for single purpose cargo transfer (e.g., bulk products) for the benefit of a specific commercial enterprise or as a general cargo facility (e.g., in countries with limited national investment resources).

Marine Terminal Operators, which manage the loading and off-loading (stevedoring) operations of Ocean Carriers, Trucks and Railroads, may consist of Port personnel or organizations which have a contract/lease with the Port owners. Terminal Operators are often owned/controlled by Ocean Carrier Companies, serving both their own and competitors' vessels. Stevedoring and other terminal operations are often performed by Labor Union personnel (e.g., longshoremen) (e.g., by the ILWU (on the US West Coast) and ILA (on the US East Coast)).

Container Ports specialize in the high volume transfer of Ocean Containers utilizing special purpose cargo management and handling equipment. Some Ports can achieve vessel discharge rates of over 50 Containers per hour<sup>1</sup>.

In addition to the traditional activities of carrier loading and unloading, freight consolidation, storage, and customs bonding and clearance, some Ports & Terminals are now providing Value-Added Services including, product labeling, inspection, packaging, assembly and product exhibition in or near Port facilities, often in areas designated as Foreign Trade Zones.

## II. SERVICES

- Pilotage and navigation control through Port channels
- Resupply, refueling (bunkering), and vessel maintenance and repair
- Loading and discharge of cargo utilizing on-board or shore-based equipment (e.g., cranes)
- Cargo storage (e.g., indoors, on-ground, on-chassis, etc.)
- Freight consolidation/deconsolidation
- Value-added services (packaging, marking, labeling, inspection, processing, etc.)
- Customs examination and clearance
- Cargo transfer (e.g., to and from on-dock railroads, trucks, etc.)



### III. FACILITIES & EQUIPMENT

- Harbor Anchorage & Channels (often dredged/maintained by public entities (e.g., US Army Corp. of Engineers))
- Harbor Traffic Control Systems (e.g., Radar)
- Harbor Vessels (Tugboats, Towboats, Bunkering (Fuel), Water, Floating Cranes, etc.)
- Piers, Wharves and Docks
- Cargo Handling Equipment (Cranes, Conveyors, Trucks, Chassis, Forklifts, Loaders, etc.)
- Container Yard Storage (e.g., for Imports, Exports, Empties, Reefers, Chassis, etc.)
- Cargo Storage Equipment (e.g., Containers, Trailers, etc.)
- Warehouses (e.g., Container Freight Stations, Bonded, Long Term Storage, etc.)
- Value-Added Service Facilities (e.g., for packaging, processing, cross-docking, etc.)
- Port & Terminal Management Facilities (Offices, Control Rooms, etc.)
- Government and Regulatory Agency Facilities (e.g., Customs, Port Authority, etc.)
- Terminal Gatehouses (at Truck entrances)
- Inland Cargo Transfer Facilities (e.g., Yard Loaders, On-Dock Rails, etc.)
- Examination Equipment (e.g., Weigh Scales, X-Ray, Radiation Portal Monitors. etc.)



### IV. TECHNOLOGY

Many Ports & Terminals utilize state-of-the-art real-time Management Information Systems, including:

- *Vessel & Cargo Management Systems* (e.g., for Vessel Traffic Control, Berth Management, Vessel Load Plans, Cargo Loading/Discharge, Container Sequencing, etc.)
- *Container Management Systems* (Gate Processing, Weighing, Location Assignment/Tracking, Equipment Status & Positioning, etc.)
- *E-Commerce* (e.g., for Web-based Booking, Tracking, Truck Appointments, Billing, etc.)
- *EDI* (Electronic Data Interchange) (e.g., for Booking, Cargo Data, Freight Availability, Customs, etc.)





Automatic Identification technology such as RFID (Radio Frequency Identification), OCR (Optical Character Recognition), and Bar Coding coupled with modern Information Systems and GPS (Global Positioning Satellite) technologies is helping Terminals improve their productivity and security needs, including:

- *Global Tracking Networks* (for real-time Global Supply Chain visibility)<sup>2</sup>
- *Electronic Container Seals* (for real-time detection of broken seals on "Smart Box" Containers)<sup>3</sup>
- *Container Sensor Tags* (for real-time monitoring of internal container environments, such as temperature, humidity and shock)<sup>4</sup>
- *Truck Tags* (for automated Terminal Gatehouse check-in)<sup>5</sup>
- *Container Yard Management* (for automated Container identification, handling and location management)<sup>6</sup>

## V. RATES & FEES

- Fee structures vary by Country, Port and Terminal Operator
- Fees charged to the account of the Ocean Carrier/Charter can include:
  - Mooring
  - Pilotage
  - Tug/Tow Boat
  - Dockage/Berthing (e.g., based on ship size/capacity and numbers of days dockside)
  - Ancillary Services (e.g., water, waste disposal, security, etc.)
- Fees charged to the account of the Exporter/Importer/Agent can include:
  - Wharfage (i.e., cargo wharf usage fee (e.g., by Container))
  - Stevedoring (if not included in Carrier charges)
  - Wharf demurrage/storage (for cargo remaining in Terminals beyond "free time" allowed (e.g., 4 days))
  - Terminal Storage (e.g., for pre-arranged long term storage)
  - Loading/Unloading (e.g., for cargo transfer to/from trucks, rail cars, etc.)
  - Checking (e.g., for cargo verification and inspection)
  - Equipment Usage (e.g., cranes, loaders, reefer unit support, etc.)
  - Handling (e.g., for cargo movement)
  - Misc. User Fees (e.g., US Import Harbor Maintenance Fees (payable to US Customs))
- US Port tariffs must be published to comply with Federal Maritime Commission regulations
- A typical vessel dockage charge for a 4300 TEU\* Containership 292 meters in length is approx. \$ 6,300/day<sup>7</sup>
- A typical wharfage charge for a 40 ft Inbound Container is approx. \$ 320/Container<sup>8</sup>

\* Containership capacity is measured in TEU's (twenty foot equivalent units) equal to the storage capacity of one 20 ft long container (or ½ of a 40 ft long container).

## VI. STAKEHOLDER INTERFACES

Ports and Terminals interface with many of the Global Supply Chain Stakeholders, including:

- |                                  |                                 |
|----------------------------------|---------------------------------|
| • Ocean Carriers                 | • Foreign Consulates            |
| • Consolidators/NVOCC's          | • Railroad Companies            |
| • Labor Unions                   | • Trucking Companies            |
| • Shippers/Importers             | • 3rd Party Logistics Companies |
| • Government Regulators          | • Freight Forwarders            |
| • Customs & Security Authorities | • Customs Brokers               |
| • Community Interest Groups      | • Liner Conference Associations |

The diverse requirements and often competing interests of these stakeholders result in complex interface structures, including strategic partnerships, integrated information and communication

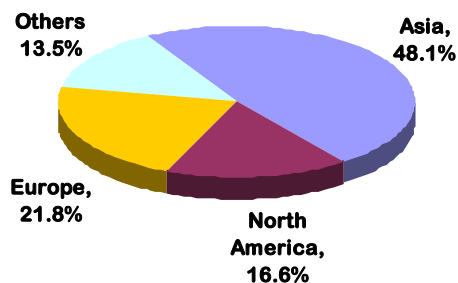
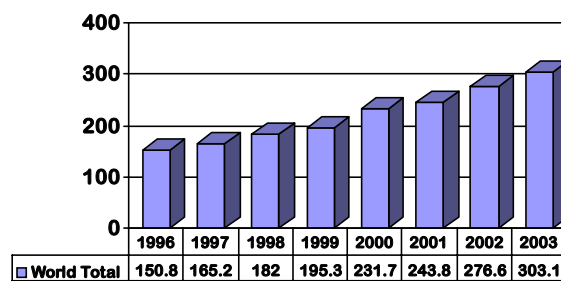
systems, stakeholder representation on policy, planning and management committees, and joint operational procedures.

## VII. KEY INDUSTRY DATA

### World Container Port Traffic (in million TEU's)

World Container Port throughput is estimated to be over 300 Million TEU's, with an annual growth rate of over 9 percent.

Source: UNCTAD<sup>9</sup>



### World Container Trade Distribution

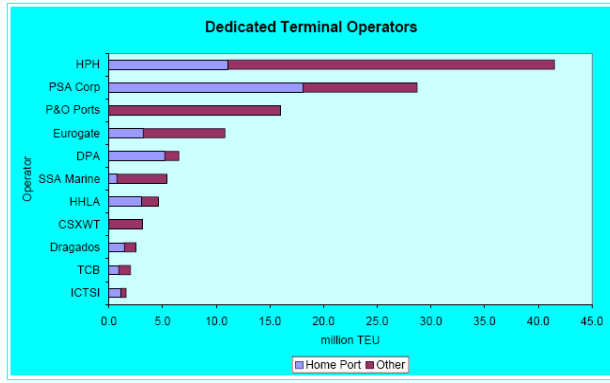
Nearly half of all world Container cargo exports and imports are attributed to Asian countries.

Source: UNESCAP<sup>10</sup>

### World's Top Container Ports (Based on TEU throughput) (in million TEU's)

Source: UNCTAD<sup>11</sup>

| Rank | Port                   | TEU's (2004) | Rank | Port                      | TEU's (2004) |
|------|------------------------|--------------|------|---------------------------|--------------|
| 1    | Hong Kong              | 21.93        | 11   | Antwerp, Belgium          | 6.06         |
| 2    | Singapore              | 20.60        | 12   | Long Beach, CA USA        | 5.78         |
| 3    | Shanghai, China        | 14.57        | 13   | Port Kelang, Malaysia     | 5.24         |
| 4    | Shenzhen, China        | 13.65        | 14   | Qingdao, China            | 5.14         |
| 5    | Busan, South Korea     | 11.43        | 15   | New York/New Jersey, USA  | 4.40         |
| 6    | Kaoshiung, Taiwan      | 9.71         | 16   | Tanjung Pelepas, Malaysia | 4.02         |
| 7    | Rotterdam, Netherlands | 8.30         | 17   | Ningbo, China             | 4.00         |
| 8    | Los Angeles, CA USA    | 7.32         | 18   | Tianjin, China            | 3.81         |
| 9    | Hamburg, Germany       | 7.03         | 19   | Laem Chabanh, Thailand    | 3.62         |
| 10   | Dudai, U.A.E.          | 6.43         | 20   | Tokyo, Japan              | 3.58         |
|      |                        |              |      | Total (Top 20)            | 166.62       |



### Top Global Terminal Operators

(Based on TEU throughput)

Global Terminal Operator Companies own and operate Terminals in many regions of the world

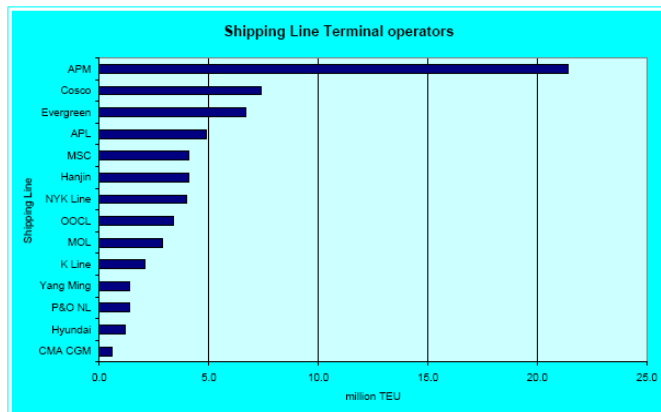
Source: UNESCAP<sup>12</sup>

### Top Shipping Line Terminal Operators

(Based on TEU throughput)

Many Ocean Carrier Companies own Marine Terminals to assure better control over their operations.

Source: UNESCAP<sup>13</sup>



| Best Seaports                      |
|------------------------------------|
| Port of Singapore (Asia)           |
| Port of Long Beach (North America) |
| Port of Rotterdam (Europe)         |
| Dubai Ports (Middle East)          |
|                                    |
| Best Container Terminals           |
| PSA, Singapore (Asia)              |
| Ceres Paragon, Amsterdam (Europe)  |
|                                    |
| Best Global Terminal Operator      |
| PSA International                  |

### Top Service Quality

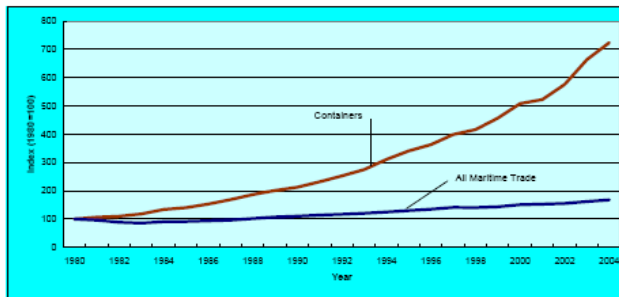
(2005 Asian Freight & Supply Chain Awards)

(Based on magazine readership survey of the following criteria:

- Seaports: infrastructure, cost, shipper-friendly fee regime, new infrastructure investments, ancillary service facilitation
- Container Terminals: product range, dock crane handling rates, new infrastructure investment, truck turnaround, IT systems
- Global Container Terminals: consistency of quality across terminals, product ranges, new infrastructure investment, IT systems)

Source: Cargonews Asia<sup>14</sup>

## VIII. INDUSTRY TRENDS & CHALLENGES



### Container Trade Growth

The use of Container Ports is expected to increase as more importers take advantage of the benefits of Containerization, including:

- intermodal interchangeability
- lower handling requirements
- improved security

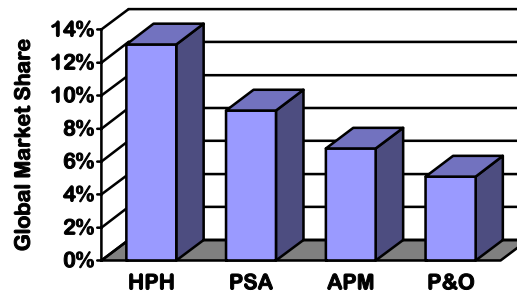
Source: UNESCAP<sup>15</sup>

### Global Terminal Industry Concentration

Expansions and mergers have resulted in the top four Global Terminal Operators managing over 1/3 of the Global Terminal throughput.

Further concentration will result with the planned purchase of P&O by PSA, the combination of which would surpass HPH as world's largest Terminal Operator<sup>10</sup>

Source: Society of Maritime Industries & Drewery<sup>17</sup>



### Increased Volume Concentration

In order to achieve economies of scale, Ocean Carriers are deploying larger capacity vessels (e.g., 10,000+ TEU post-Panamax vessels<sup>18</sup>) and at the same time rationalizing their direct Port calls by loadcentering at fewer "Hub" and "Trans-shipment" Ports

- To accommodate these increased volumes and minimize vessel dwell times at Port (which can cost over \$60,000/day<sup>19</sup>), Ports & Terminals are upgrading their infrastructures, including:
  - Dredging (for larger vessel drafts)
  - Larger, more efficient Dock Cranes
  - Improved intermodal rail facilities, such as on-dock rails and double-stack trains
  - Expanding on-dock and in-land Container Storage & Transfer Facilities, which are often serviced by dedicated freight corridors (e.g., 20-mile Los Angeles Alameda Corridor)

### Value-Added Logistics Centers

In order to attract cargo and foreign investment and to satisfy Importer's global Just-In-Time supply requirements, Ports and Terminals are establishing Value-Added Logistics Centers (e.g., Distriparks<sup>20</sup>). These Centers, often located in tax-advantaged Foreign Trade Zones, not only process products imported/exported from the host country but also process products being trans-shipped to other destinations as well. Services include: inventory management, order processing, packaging, documentation, assembly, shipping, invoicing, and returns handling.

### Current Challenges

- *Congestion*  
Increased cargo volumes, limited infrastructure, and inefficient inland transportation interfaces are contributing to increased congestion delays at major gateway ports (e.g., in Los Angeles/Long Beach, South Africa, India, Australia, etc.<sup>21</sup>). Measures taken to improve throughput have included better scheduling processes, higher manning levels, increased automation, extended operating hours, and improved Truck interfaces. Absent significant process and infrastructure reforms, congestion at these Ports is expected to continue.
- *Throughput Capacity*  
The projected growth of world Terminal throughput capacity of 5% per year is not expected to keep pace with the projected world container throughput growth of 9%. Without additional confirmed expansion plans, world Terminal capacity is expected to be exceeded by the year 2010.<sup>22</sup>
- *Labor Relations*  
Balancing the rights and negotiating power of labor union personnel with Company needs to control costs and improve productivity, remains a challenge for Ports and Terminals world-wide. Waterfront Labor actions which affect cargo flow not only impact Port/Terminal reputation and economic return, but can also affect the economy of the national region served as well. The 10-day US West Coast Labor Dispute/Shutdown in the year 2002 was estimated to cost the US economy over \$1 billion/day.<sup>23</sup>
- *Security*  
Faced with increased international concern over terrorist attack, Ports and Terminals are required to implement a number of regional and international security requirements, including:
  - US voluntary and mandatory initiatives (e.g., C-TPAT, the Container Security Initiative, the "24-Hour" rule and the Maritime Transportation Security Act (MTSA)).
  - Various international treaties and agreements, such as the IMO ISPS (International Ship and Port Facility Security Code), which includes requirements for Security Plans, Drills, Assessments, and Certification.<sup>24</sup>Failure to implement and maintain these initiatives can not only increase the risk to population safety, but can also result in vessel delay, detention or denial of entry or criminal and civil penalties.

## **IX. PORT & TERMINAL SELECTION CONSIDERATIONS**

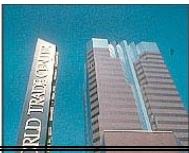
- Port Location (Proximity, Competing Ports)
- Climatic Conditions (Ice, Fog, Tides)
- Channel/Berth Capacity (Depth, Dock Lengths, etc.)
- Carriers Serviced (Ocean Liners, In-land transportation)
- Vessel Repair & Supply Facilities (dry-dock, stores, fuel)
- Congestion & Delays (Vessel, In-land Transportation, road traffic, trains, etc.)
- Land-bridge Service (interior, coastal, transcontinental)
- Trans-loading Services (to/from Feeder Vessels)
- Customer Service (Responsiveness, Inquiries, Consultation, Quotation, Booking, Cargo Tracking/Tracing, Expediting, Arrival Notice, Claims/Complaint Handling, Billing Accuracy)
- Rates (Tariffs, Negotiable, Ancillary, User Fees)
- Information Systems (Cargo & Yard Management, E-Commerce, Web, EDI, Scheduling, Booking, Payment, Documentation)
- Hours of Operation
- Cargo Expertise
- Financial Stability
- Flexibility (e.g., to Changes)
- Equipment (Condition, Reliability, Availability, Automation)
- Cargo Handling Capacity/Capability (High Volume, Specialized, Hazardous)
- Labor Relations
- Productivity (Throughput, Loading/Discharge Rates)
- Dwell Time (Vessels, Trucks, Trains)
- Containers & Chassis (Availability, Leasing, Management, Interchange)
- Demurrage/Free Storage Period
- Customs Clearance Procedures
- Storage Capacity (Container Yard, Warehouse, In-land Facilities, etc.)
- On-Dock Rail/Road Access
- On-Dock Transfer Facilities
- In-land Drayage (Availability, Cost, Reliability)
- In-land Transportation Access (Freight Corridors, Highways, Waterways, Transcontinental Rails)
- Additional Logistics & Value-Added Services (Consolidation/Deconsolidation, Inspection, Packaging, Labeling, Warehousing, Inventory Management, Customs Brokerage, Documentation Assistance, Drayage, Product Processing, Cross-Docking, Invoicing, etc.)
- Foreign Trade Zones
- Loss Prevention (Security, Protection, Liability Limits, Claims)
- Government & Regulatory Compliance Assistance (Security, Environmental, Customs)
- Stakeholder Integration (Intermediaries, Banks, Railroads, Trucking Companies, Government)

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