

the inland port-location problem in some developing countries and mountainous areas such as La Mosquitia Region, Honduras.

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The Role of Ports in Double-Stack Train Service

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Double-stack train service is one of the latest technological innovations in the highly competitive business of intermodal shipping of containerized cargo. The double-stack train can carry twice the number of containers as a flatbed rail car, which sharply reduces shipping costs per container. Although steamship companies have taken the lead role in initiating double-stack service from the inland cities to ports, ports can market their facilities and rail connections to attract stack-train service. An overview is given of existing stack-train services, and discusses the impacts of stack trains on port competition and ways that several ports have attracted stack-train service are discussed.

In the past two years, double-stack technology has virtually exploded on the U.S. intermodal transportation industry. At this time, there are over 60 weekly departures of double-stack trains to and from 12 major port cities in the United States. These services, as they were promoted in December of 1985, are given in Table 1.

What is double-stack service? The term double-stack refers to the practice of stacking standard marine containers in two-high configuration on specially designed railroad flatcars. These flatcars have been designed to lower the overall profile and reduce the total weight of the container or flatcar unit. In practical terms, the double-stack car carries four 40-ft ISO containers, as opposed to the two 40-ft containers that are carried on conventional railroad flatcars. The result has been a savings in the cost of moving containers long distances by rail. These savings have been estimated by various railroads providing stack train service to be between 20 percent and 40 percent, depending on the route and rail carrier involved.

Ironically, it was not the railroads that developed and implemented the double-stack service, but the ocean carriers. Since the early 1960s, ocean carriers of all flags have been engaged in a highly competitive battle for high-value cargoes on trade routes between the United States and its trading partners in Europe and the Pacific rim. Faced with competition from lower wage-rate Third World and state-owned carriers, the more progressive U.S. flag carriers relied on technology to improve their productivity and to maintain or increase their market share. Accordingly, carriers such as Sea-Land and American President Lines (APL) introduced container ships, automated container yards, and, finally, low slot-cost vessels as means of improving productivity. Concurrent with their technological development, U.S. flag ocean carriers accelerated their marketing efforts and began to offer through-intermodal service to selected shippers or consignees.

Before the Shipping Act of 1984, the legality of intermodal service was in question and the carriers offered it intermittently and usually as single entities rather than as conferences. In the 1982-1983 recession years, several ocean carriers contracted for inland rail service as part of a through-single-rate service. During that period, international freight rates dropped precipitously, and some ocean carriers found their rail costs were exceeding their revenues on some intermodal shipments. This experience focused the ocean carriers on the inland mode as an area for cost control, and as a possible source of advantage over competition. Meanwhile, the Shipping Act of 1984 was passed, which authorized conferences to offer intermodal service under a single-through-rate and allowed other practices that facilitated intermodal movement. These events culminated in decisions by some ocean carriers to design, test, and purchase double-stack equipment and to enter into agreements with rail carriers to pull the equipment.

TABLE 1 ONE-WAY DOUBLE-STACK TRAIN SERVICE, DECEMBER 1985

| Originating Port | Originating Railroad | Ultimate Destination | Frequency Per Week |
|-------------------------------|----------------------|----------------------|--------------------|
| Baltimore | CSX | Chicago | 1 |
| Chicago | CSX | Baltimore | 1 |
| Chicago ^a | C & NW | Los Angeles | 3 |
| Chicago ^a | JC | Los Angeles | 1 |
| Chicago ^a | CSX | Long Beach | 1 |
| Chicago ^a | C & NW | New York | 1 |
| Chicago ^a | CSX | New York | 1 |
| Chicago | C & NW | Oakland | 2 |
| Chicago | C & NW | Portland/Seattle | 2 |
| Chicago | BN | Seattle | 6 |
| Chicago ^a | C & NW | Tacoma | 1 |
| Chicago ^a | BN | Tacoma | 1 |
| Houston ^a | SP | Los Angeles | 1 |
| Houston ^a | SP | Savannah | 1 |
| Los Angeles ^a | UP | Chicago | 3 |
| Los Angeles ^a | SP | Chicago | 1 |
| Los Angeles ^a | SP | Houston | 1 |
| Los Angeles ^a | UP | New York | 1 |
| Los Angeles ^a | SP | New Orleans/Atlanta | 1 |
| Long Beach ^a | SP | Chicago | 1 |
| Long Beach ^a | SP | New York | 4 |
| Long Beach ^a | SP | Houston | 3 |
| New Orleans ^a | | Savannah | 1 |
| New Orleans ^a | SP | Los Angeles | 1 |
| New York ^a | CSX | Chicago | 1 |
| New York ^a | Conrail | Los Angeles | 1 |
| New York ^a | D & O | Long Beach | 1 |
| New York ^a | Conrail | Portland/Seattle | 2 |
| New York ^a | Conrail | Tacoma | 1 |
| New York ^a | D & O | Tacoma | 1 |
| Oakland | UP | Chicago | 2 |
| Portland/Seattle ^a | UP | Chicago | 2 |
| Portland/Seattle ^a | UP | New York | 2 |
| Savannah ^a | SCL | Houston | 1 |
| Savannah ^a | SCL | New Orleans | 1 |
| Seattle ^a | BN | Chicago | 6 |
| Tacoma ^a | BN | Chicago | 1 |
| Tacoma ^a | UP | Chicago | 1 |
| Tacoma ^a | UP | New York | 1 |
| Tacoma ^a | BN | New York | 1 |

^aMore than one destination for train providing service.

Double-stack service is now offered in the United States by three U.S. flag ocean carriers, two foreign flag carriers, and two railroads. The current capacity of each of these entities is given in Table 2. Two leaders in the service, Sea-Land and APL, together, account for approximately two-thirds of the available capacity. An additional 20 percent of the available capacity is offered by the Burlington Northern (BN), with assistance from the Port of Seattle. In total, these carriers and agents offer 4,640 40-ft equivalent units (FEUs) per week in a one-way direction.

There are currently 12 ports that are served by double-stack service. Chicago is included in this group because it is a seaport with service through the St. Lawrence Seaway. When the capacity of the existing double-stack trains is multiplied by the number of ports they serve, the aggregate capacity is 10,230 FEUs per week. However, because some trains will transship only a portion of their containers at an intermediate point (for instance, Chicago on a Seattle-New York City run), the aggregate national capacity is somewhere between the 4,640 FEUs given in Table 2, and the 10,230 FEUs possible if an empty train were available at each point.

TABLE 2 APPROXIMATE WEEKLY ONE-WAY CAPACITY BY CARRIER OR AGENT, DECEMBER 1965

| Carrier | Capacity in 40-ft Equivalent Units | Percentage |
|---------------|------------------------------------|------------|
| APL | 1,400 | 30.17 |
| NYK | 150 | 3.23 |
| Sea Land | 1,550 | 33.41 |
| U.S. Lines | 400 | 8.62 |
| Maersk | 200 | 4.31 |
| CSX/Baltimore | 40 | 0.86 |
| BN/Seattle | 900 | 19.40 |
| Total | 4,640 | 100.00 |

Based on the capacity of trains serving the ports indicated, Chicago has approximately 32 percent of the total capacity. Seattle has 12 percent, and New York has 11 percent. Long Beach and Los Angeles together have over 17 percent. The capacity theoretically available at each port is given in Table 3.

The impact of double-stack services on these ports is mixed. The double-stack service was initially designed to serve the Pacific rim import trade by providing mini- and macro-landbridge service to U.S. Midwest and East Coast markets. This continues to be the primary focus on double-stack service. Full containerloads of import commodities move east, and empty units (domestic commodities) move west.

TABLE 3 APPROXIMATE WEEKLY ONE-WAY DOUBLE-STOCK CAPACITY BY PORT

| Rank | Port | Capacity in 40-ft Equivalent Units | Percentage |
|----------------|-------------|------------------------------------|------------|
| 10 | Baltimore | 40 | 0.39 |
| 1 ^a | Chicago | 3,240 | 31.67 |
| 7 | Houston | 400 | 3.91 |
| 5 | Los Angeles | 950 | 9.29 |
| 6 | Long Beach | 800 | 7.82 |
| 4 | New Orleans | 1,000 | 9.78 |
| 2 | New York | 1,150 | 11.24 |
| 7 | Oakland | 400 | 3.91 |
| 7 | Portland | 400 | 3.91 |
| 9 | Savannah | 200 | 1.96 |
| 3 | Seattle | 1,300 | 12.70 |
| 8 | Tacoma | 350 | 3.42 |
| | Total | 10,230 | 100.00 |

^aSeveral trains serve Chicago en route to East or West Coast origin or destination; therefore, total port capacity exceeds train capacity given in Table 2.

Considering current cargo flows and the ports presently served by stack trains, West Coast ports of Long Beach, Los Angeles, Oakland, and Seattle have attracted more stack-train service than ports on the other coasts. Cargoes moving in double-stack service come across their docks and provide longshore jobs. However, for the ports of Chicago, Houston, New Orleans, and New York, it can be argued that the double-stack service is actually diverting cargo that formerly moved over their docks. For instance, some Pacific rim cargo that now moves from Los Angeles to Houston, formerly

moved to Houston by an all-water route through the Panama Canal. Although double-stack service does serve industries in these latter port cities with cost-effective, fast transportation and does provide transportation jobs, it has not, to date, been successful in attracting cargo over their docks.

Not all East Coast ports are being used as mini-landbridge destinations. Double-stack trains serving Baltimore and Savannah are actually carrying cargo that moves across their docks.

The role of ports in initiating double-stack service has been mixed. Only Baltimore and Seattle have played an active role in attracting double-stack service. The remaining services were initiated by ocean carriers. Seattle initially considered buying its own double-stack cars. In the end, BN initiated the service, with the Port of Seattle serving as agent for smaller ocean carriers. By serving as an agent, the port can ensure high-volume rates for smaller carriers.

Baltimore, in response to an aggressive marketing thrust by Virginia Port Authority and the Norfolk Southern, took the initiative with the Chessie System (CSX) to introduce double-stack service into Baltimore. The Maryland Port Administration reached an agreement with the Chessie to absorb local drayage for shippers and ocean carriers from the container yard to the port in return for a reduction in the Chessie's rate to Chicago. In addition, the Chessie agreed to place a double-stack service into Baltimore. However, the service is limited: it does not involve a unit train, and because of clearance problems, accommodates only standard ISO marine containers.

The long-range impact of double-stack service on U.S. ports and intermodal service is summarized as follows:

- Continued competitive pressure will be placed on all-water, round-the-world ocean-carrier services and will continue to give West Coast ports a time advantage on Pacific rim import cargoes destined for the U.S. East Coast;
- Regional surface transportation hubs in key Midwest and East Coast ports and cities will be created;
- Domestic cargoes in the backhaul leg will be attracted;
- Port congestion will occur because of the volume of containers that will be deposited at one time by unit trains;
- Ports will be forced to focus on the direct rail or port interface, resulting ultimately in the elimination of intraport drayage.

In conclusion, double-stack trains will continue to exist. For many ports, the service was not anticipated and in some cases was not welcome. Nonetheless, the ultimate winners will be those ports that can adjust and use the service to the advantage of their ports and communities. The transportation industry in general will benefit from double-stack because lower transportation costs will stimulate the movement of price-elastic goods and commodities.

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