In a Tight Spot: American Ports in Global Supply Chains

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"Barriers to Supply Chain Modernization and Factor Productivity Enhancements"

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A Maritime Future at Stake

I can begin by making a bold statement. The United States is no longer a commercial maritime power. Most of our commercial maritime capabilities have been outsourced and offshored. By the size of its market, the United States remains the world's leading trade power, which creates some paradoxes between the capabilities of the American economy to generate wealth and the ability to support its commercial interests on the world's maritime trade lanes.

I will discuss here how this scenario unfolds for American ports, particularly container ports, which are the anchor of our national logistics system. Six core barriers contributing to national and global supply chain inefficiencies can be proposed.

Barrier 1. A matter of volume

Since the 1990s, the volume of containers handled by American ports has continuously grown. Between 2010 and 2024, 19.8 million Twenty-Foot Equivalent Units (TEUs) have been added to the cargo handled by ports, which has reached 60.4 million TEUs (Figure 1). This absolute growth is the equivalent of the cargo generated annually by three Canadas or two Mexicos. Each year, American ports need to handle an additional 1.6 million TEU of cargo at a growth rate of around 2.3%.

This growth is derived from the dynamism of the American economy, which is a positive thing, but also from the outsourcing and offshoring of American production, which is more controversial.

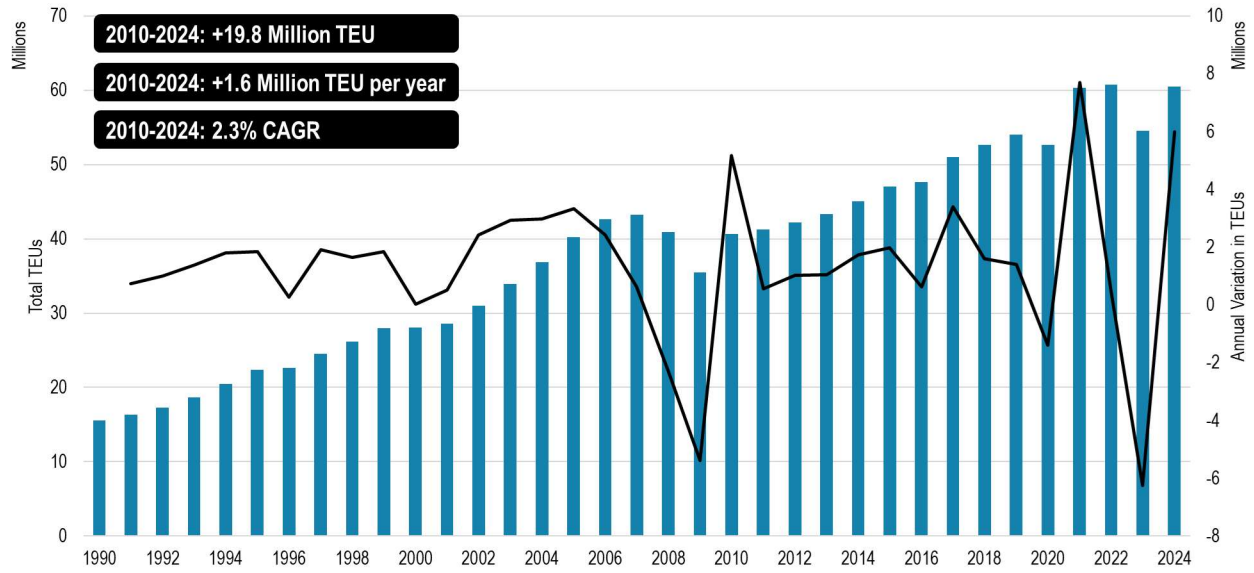

Figure 1 Container Traffic at American Ports, 1990-2024 (in Twenty Foot Equivalent Units, TEUs). Source: Own compilation based on reports from port authorities.

The ongoing growth of the containers handled by American ports requires a constant commitment to maintain, upgrade, and expand our port infrastructure, including constructing new terminal facilities. Further, port infrastructure is subject to vulnerabilities and occasional failures, such as the 2024 bridge collapse in Baltimore after a containership collided.

Barrier 2. A matter of scale

The maritime industry pushes for scale economies in ports worldwide. The American port system, particularly on the East and Gulf coasts, was designed around the Panamax standard, the largest ship that could fit in the Panama Canal when it was initially designed. In the late 1990s, ships beyond the Panamax standard were introduced, opening Pandora's box (Figure 2). When the Panama Canal was expanded in 2016, a new standard called New-Panamax was set. It was also accompanied by a wave of port infrastructure investments on the East and Gulf Coasts to ensure that major ports would be able to accommodate this new ship class. However, it also resulted in a skewed distribution of the costs and the benefits. Maritime shipping lines assumed the benefits of economies of scale, but public port authorities mainly assume the infrastructure costs.

There are significant variations in the capability of American ports to handle larger container ships (Figure 3). While West Coast ports tend to have deep drafts, many East and Gulf Coast ports are challenged to keep up with costly dredging and harbor improvement programs.

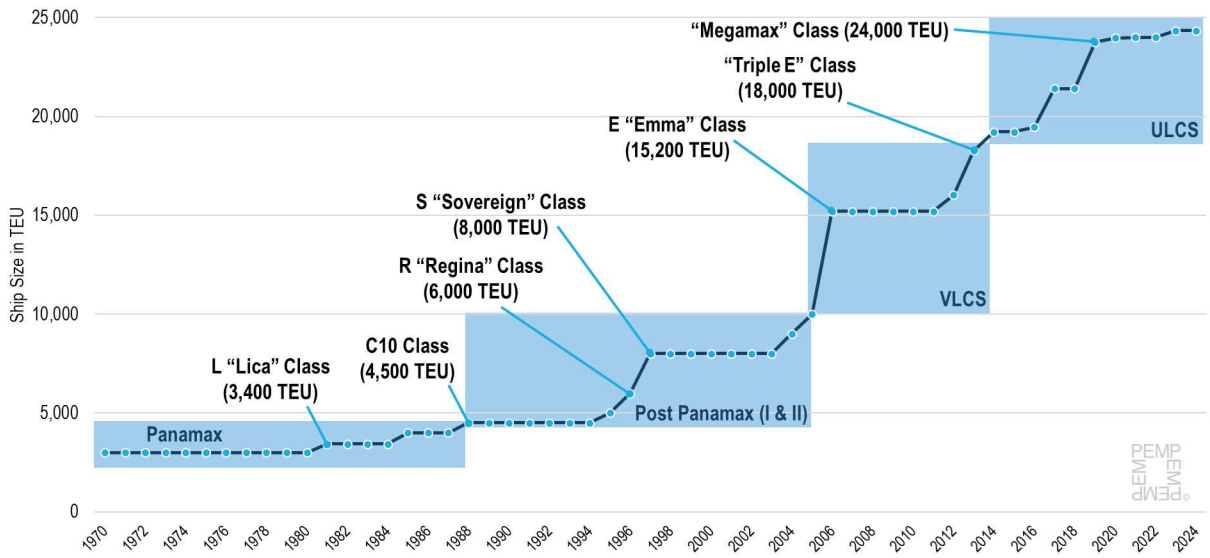

Figure 2 The Largest Available Containership, 1970-2024. Source: Own compilation[1].

[1] https://porteconomicsmanagement.org/pemp/contents/part6/ports-and-container-shipping/largest-available-containership-teus/

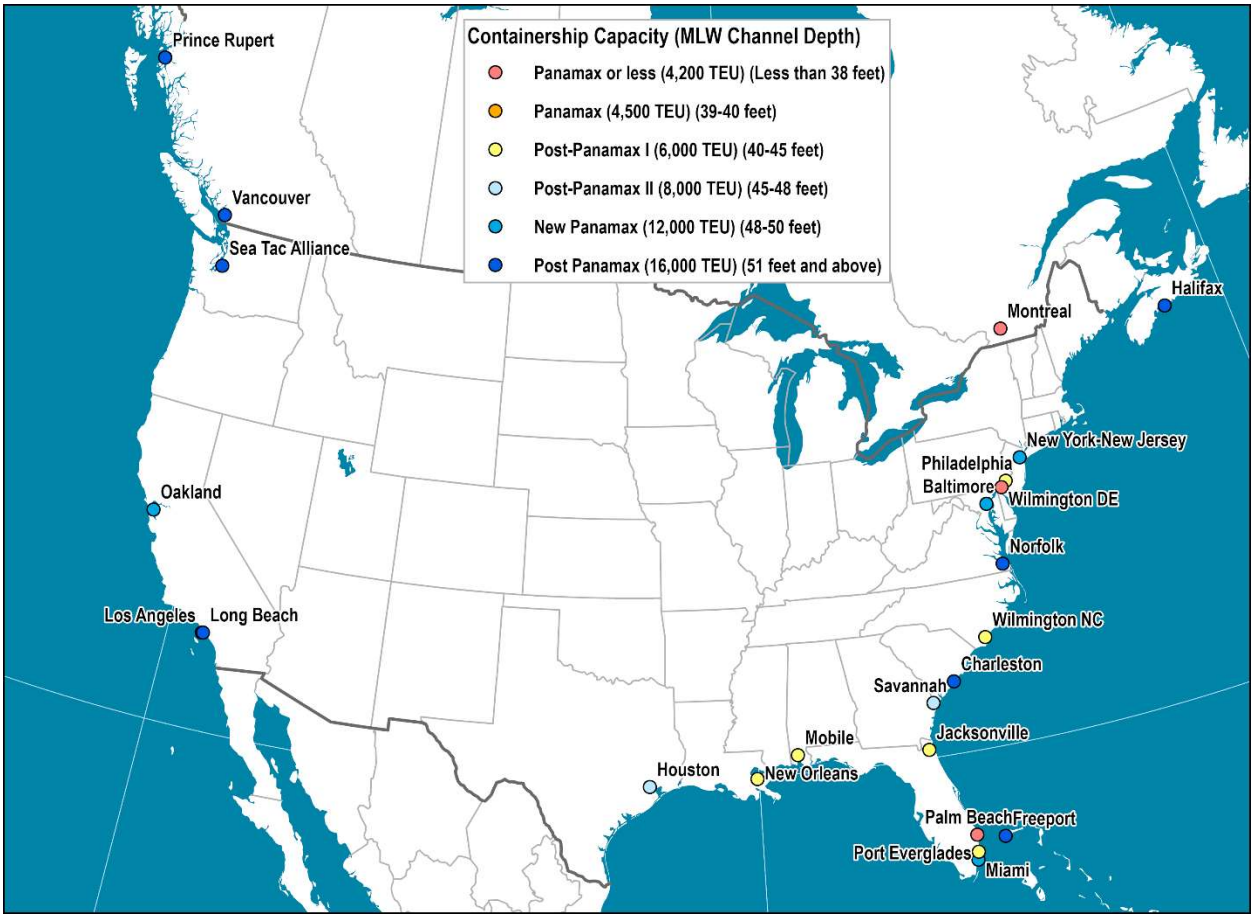

Figure 3 Channel Depth at Major North American Container Ports. Source: Own compilation based on port authorities and terminal operators[2].

The above calls for consideration of whether there should be ship size limits calling at American ports and if New Panamax should be the frame of reference. An analogy would be the restrictions on truck size and weight on the Interstate because of the related infrastructure, maintenance, and safety costs.

For competitiveness and resilience, ports should be able to engage more effectively in infrastructure programs, particularly dredging. These programs are usually affected by delays and cost overruns. The turnaround time between the design, approval, and construction of an infrastructure project should be shortened, as uncertainties and delays are substantial barriers to private investments.

[2] https://transportgeography.org/contents/chapter6/port-terminals/channel-depth-ports-north-america/

Barrier 3. A matter of composition and seasonality

The differences in the composition of imports and exports handled by ports are substantial, which is associated with logistical complexity. While the majority of American containerized imports are linked with the retail sector, exporters are entirely different (Figure 4). They mainly involve resource-based and agribusiness sectors, recycled goods, plastics, resins, and chemicals. The composition of this trade is also associated with seasonality, with a peak level of activity between July and October and low activity in January and February (Figure 5). Like most transportation infrastructure, this creates a capacity planning problem.

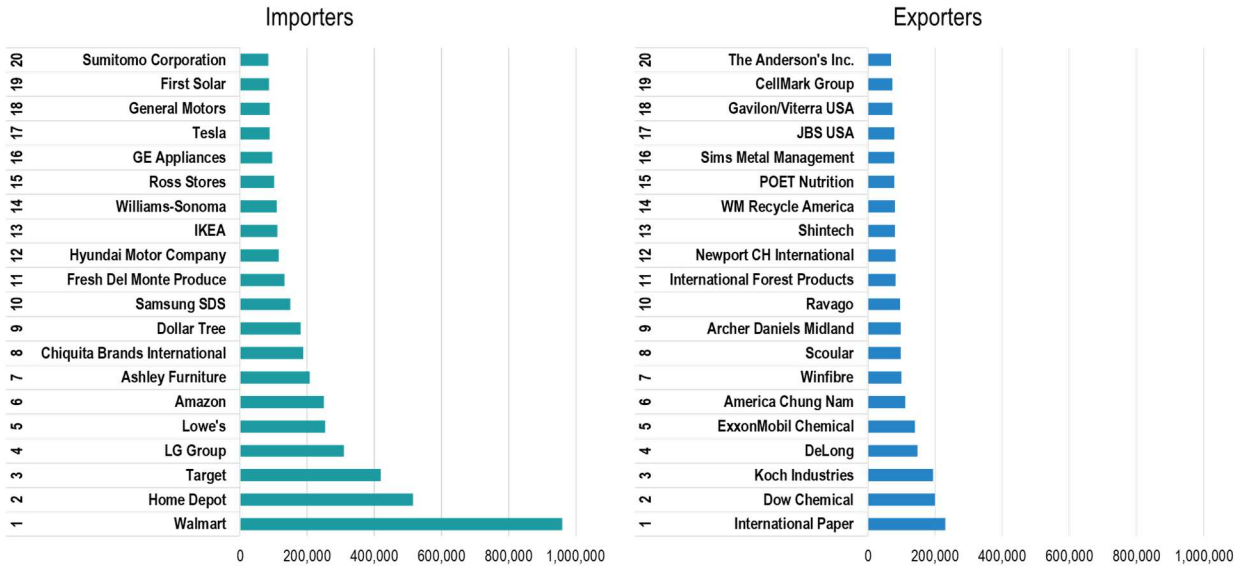

Figure 4 American Foreign Trade by Maritime Containers, 2024 (in TEUs). Source: Journal of Commerce[3].

[3] https://porteconomicsmanagement.org/pemp/contents/part1/maritime-shipping-and-international-trade/american-foreign-trade-maritime-containers/

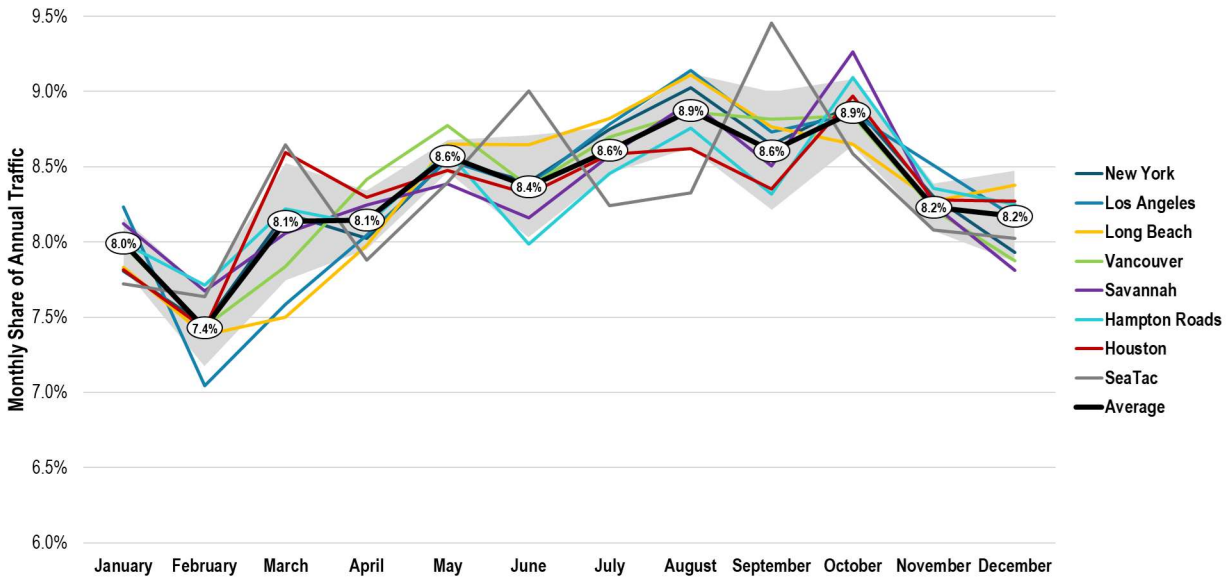

Figure 5 Average Monthly Container Traffic Share, Selected North American Ports, 2005-2023. Note: The grey area represents one standard deviation. Source: Port Authorities.

The composition of imports and exports and their seasonality cannot be effectively abated, as ports are not the drivers of the composition of the traffic they handle. A switch from a trade by convenience to a trade by necessity regime may provide some mitigation, but it is outside port policy considerations.

Barrier 4. A matter of imbalances

The systemic negative trade balance the United States maintains with several trade partners is well known. It has profound implications for container flows, as there are substantially more inbound full containers than outbound full containers (Figure 6, which was also evident in Figure 4). We have strong import-based supply chains and prioritization of the infrastructure and processes supporting these flows. The leading export of American container ports is fresh air, as around 70% of all outbound containers are empty. When container shipping faces a capacity shortage, the availability of export containers inland can be curtailed, as the priority of shipping lines is for importers. This imbalance has incited import-based logistics clusters to be in proximity to ports, contributing to regional congestion.

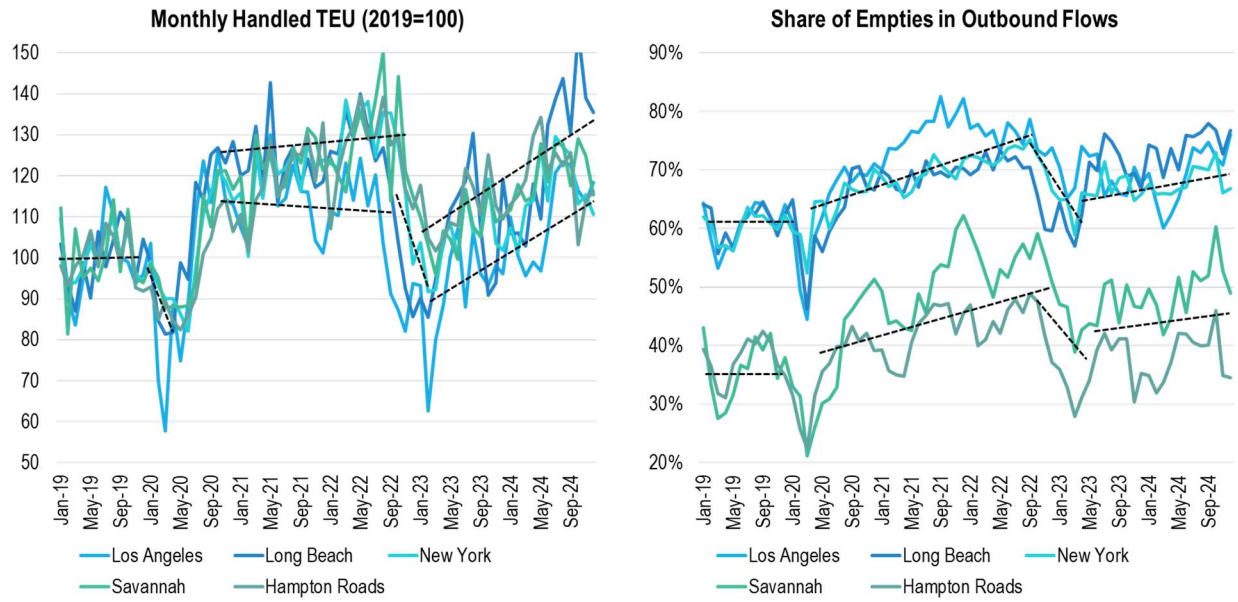

Figure 6 Container Flows, Selected American Container Ports, 2019-2024. Source: Port Authorities.

There are no apparent mitigations to the acute imbalances in containerized trade flows handled by American ports, outside substantial changes in the trade regime.

Barrier 5. A matter of labor and technology

Most of the port workforce is under the jurisdiction of two powerful labor unions. On the West Coast, the International Longshore and Warehouse Union (ILWU) and on the East and Gulf Coast, the International Longshoremen's Association (ILA). Although the workforce is highly qualified, its essential role within supply chains is often used for rent extraction purposes. Union leaders have also opposed automation, a process that can be traced back to the introduction of the container in the 1960s. This opposition was apparent during the ILA 3-day strike in October 2024, where automation remained the core contention.

Automation and related technologies are essential to the future of port operations and logistics. There are strong barriers to its implementation in the United States, and only six container terminals have a level of automation: three on the West Coast and three on the East Coast (Figure 7). There are also restrictions on the level of automation, with East Coast terminals having a partial level of automation.

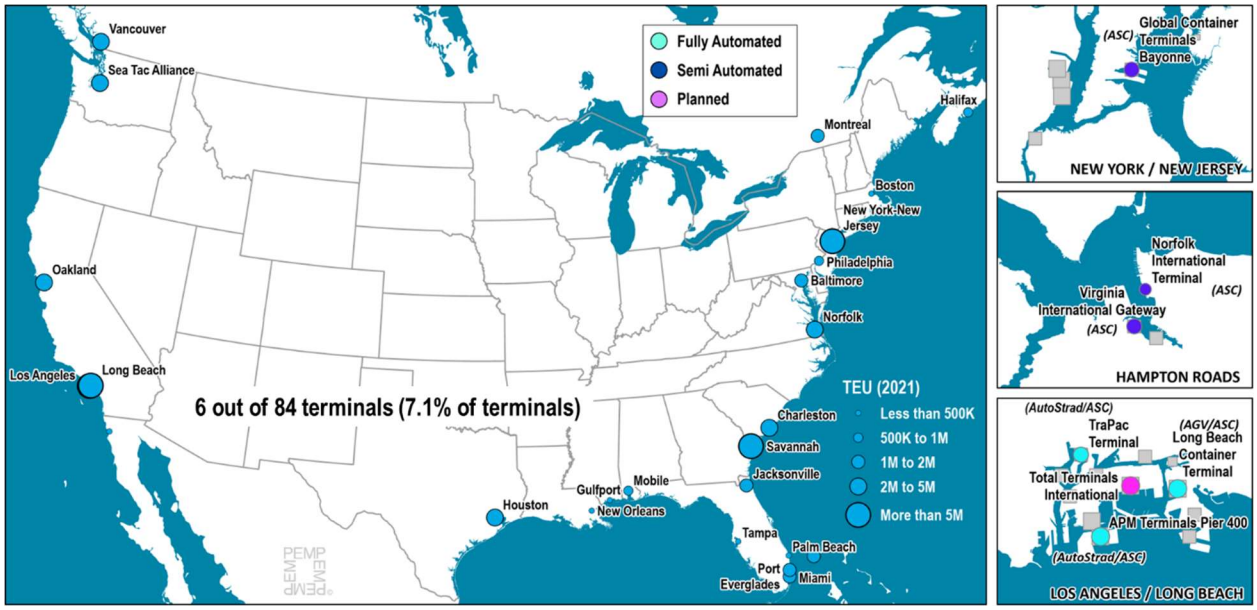

Figure 7 Automated Terminals in the United States. Source: Own compilation[4].

Impediments to automation remain a barrier to the improvement of American supply chains. As container volumes continue to grow, more container terminals will need to be automated, which will be a logistical challenge on their own. This will need to be associated with a labor transition strategy and coordination with the inland logistics infrastructure.

Barrier 6. A matter of efficiency

According to the Container Port Productivity Index (CPPI) released by the World Bank[5], no American port figures among the top 50 in terms of their time performance. Using a national average, American container ports are about 30% less time-efficient than the global average (Figure 8). These productivity figures are of concern and related to the barriers discussed above, including the strong import-orientation of logistics flows.

[4] https://porteconomicsmanagement.org/pemp/contents/part6/terminal-automation/automated-terminals-united-states/

[5] https://openknowledge.worldbank.org/entities/publication/87d77e6d-6b7b-4bbe-b292-ae0f3b4827e8

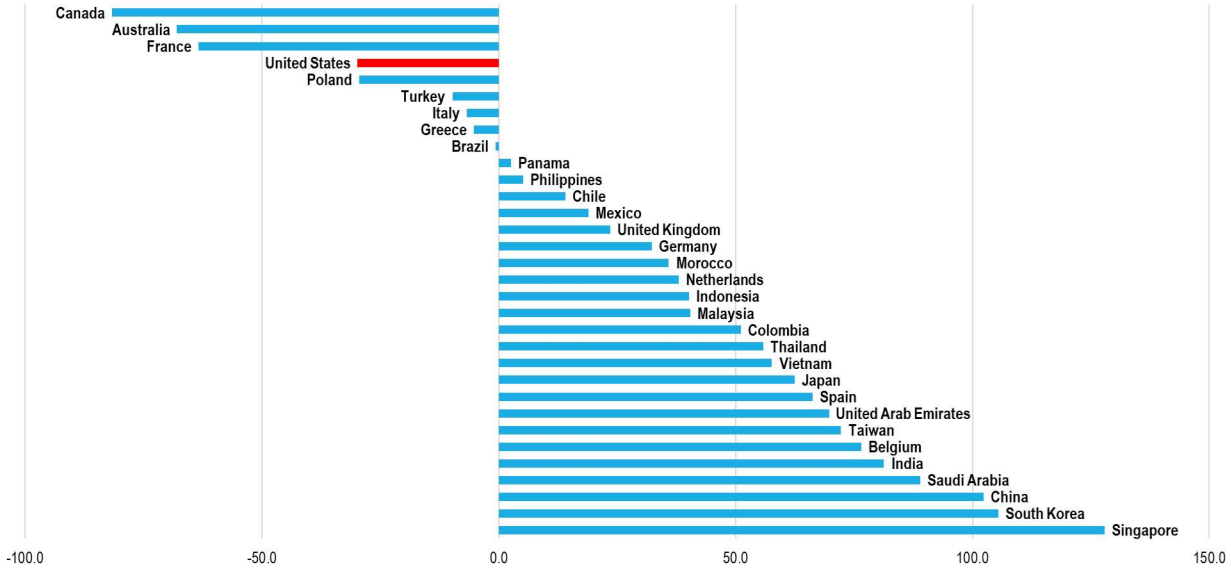

Figure 8 Container Port Productivity Index (Value), National Average, 2023. Source: World Bank. Note: A value of 0 represents a time performance similar to the global average. A value above zero represents a time performance above the global average. A negative value indicates a time performance below the global average.

Increasing the efficiency of port operations is fundamental, but requires addressing very uncomfortable issues related to labor and automation. Terminal automation is fundamental in the medium-to-long term, as ports run out of land to deal with traffic growth and the associated logistics. A core strategy is to increase the utilization level of this land, which may require a change in vision and a push for additional automation. Ports should not be perceived as mere pieces of interchangeable real estate. They are strategic assets fundamental to national economic and geopolitical security.

Conclusion: A National Maritime Supply Chain Strategy

To conclude, American ports, particularly container ports, are in a tight spot. They are adapting to several barriers to their performance, many of which are outside their control. Our port system needs to reflect this adaptability with a national supply chain strategy. One potential element of this strategy is greater autonomy for port authorities with expanded governance. Many are landlords who may be required to act more as entrepreneurs. As observed worldwide, port authorities and terminal operators have acquired or merged with others. Some have developed parent companies in logistics, infrastructure development, drone technology, and information technology. American ports have much to benefit from this perspective.

The United States has a long maritime tradition that supported its national commercial ambitions, a tradition which, unfortunately, has been substantially eroded. It will need to be revamped to reflect the challenges of the 21st century.