AFD Ep 427 Links and Notes - Containerization Part 2 (Shipping Containers) [Bill/Rachel] - Recording May 22, 2022

- [Bill] Intro: Last week on the show in Part 1 on Containerization, we talked about the early development of modern container ships and terminals in the 1950s and 1960s, the role the Vietnam War played in building out trans-Pacific container shipping infrastructure, changes at the ports in and around New York, and the early tweaks to company business practices to better maximize the usefulness of the large new containers. With all those critical pieces in place, we can continue now to part 2, covering the remaining several chapters of the 2006 book "The box : how the shipping container made the world smaller and the world economy bigger" by Marc Levinson (2006, Princeton University Press), as we examine the transformation of shipping on the American West Coast, the consolidation of the industry during the oil crises of the 1970s, and the total revolution in business supply chains and international trade resulting from container shipping.
    - [Rachel] Chapter 10 (Port upgrades [non New York edition])
        - Oakland overtakes San Francisco
            - SF had similar geographic problems (peninsula) as NYC, with Oakland providing the analog to Newark
                - Also, officials in SF thought container shipping was a passing fad, so ignored shipping powerhouse Matson's request for a container terminal. The Oakland Port Commission seized the opportunity to take over container shipping for the Bay Area and invested in upgrading the port and deepening the harbor to permit large containerships. Oakland also became a terminal for Sea-Land.
        - Los Angeles-Long Beach makes a surprise comeback (once they stopped fighting each other)
            - Both ports spent money on construction to update the ports for containership traffic, but Long Beach had an advantage: Pumping oil from beneath the harbor had caused the harbor floor to subside and docks to collapse. When the cleanup was complete, the harbor floor was deeper than Los Angeles's, which made it more amenable to containerships. Long Beach was in a better financial position, as they invested the revenues from oil into port upgrades. Long Beach and LA started a wage war that LA couldn't win. However, soon there was enough traffic through Southern California that both ports were kept busy.
        - Seattle takes advantage of its shipping to Alaska
            - Seattle also realized by 1966 that if industrial production became big in East Asia and could be shipped to the US then it would make Seattle prosperous but wouldn't do much damage to local industrial manufacturing because there wasn't much there to begin with and there was not a big population at the time. We will talk more about offshoring and outsourcing later.
            - Portland did not have the resources to build a container port to compete with Seattle and the economic results were devastating. Soon, they were receiving Japanese goods by truck from Seattle because that was cheaper than directly by ship from Yokohama.
        - On the East Coast, Port Newark-Elizabeth continued to grow but very few other ports (basically just Baltimore and then with some reluctance

Philadelphia) made investments in container infrastructure at all, usually because they felt they had enough breakbulk revenue coming in (until it was too late) or because of ongoing labor disputes. Boston made a half-hearted attempt that failed for the latter reason. It was cheap for the container ship companies to load or unload in New Jersey and connect to all the other east coast cities by truck to or from Newark. And that did not require capital investments or labor negotiations in every one of those cities. On the Gulf Coast, pretty much only Houston became a container port and that was entirely because Sea-Land had made early investments there on their own initiative. Similarly, Charleston, South Carolina only became a major container port in the 70s because Sea-Land had decided to expand operations there and the state poured in money to expand capacity. Virtually all of the US East & Gulf Coast seaports from the pre-container era died as a result of containerization, apart from those already discussed.

- Small towns were often better positioned to convert to container shipping ports or even to establish ports for the first time ever because they had large undeveloped areas of waterfront that could be dredged and filled to create deepwater channels, extensive docks for the new cranes, and rail and road terminals free of congestion. In some cases they also were completely union-free.
- This phenomenon of traditional ports atrophying while new ports that embraced the container exploded was repeated all over the world.

- [Bill] Chapter 11 (“boom and bust”)
  - The billions of dollars in capital investments required to get into the container business and retrofit existing ships or order new ones compelled many of the existing non-American companies to merge or form consortium agreements to pool resources to enter the field.
  - The American companies tended to already have sufficient resources and access to private or public financing at levels required, but very notably they also tended not to be legacy companies in shipping & navigation but rather well-resourced conglomerate holding companies interested in diversifying operations or companies that entered from another transportation field with big-money non-bank private investors behind them or on their boards as major shareholders. In either of these cases, very few of the people involved cared about industry traditions or customs and just wanted to maximize profits.
    - Sea-Land sold itself in 1969 to tobacco company R.J. Reynolds which simultaneously faced a declining customer base (as anti-smoking efforts were about to take off finally) and still had enormous cash reserves and cash income with not much idea of what to do with it. The solution was to diversify into unrelated industries. They also really did not want to pay tax and Sea-Land was loaded to the hilt with debt from its early investments and experiments as well as its rapid expansion, which made it a good tax dodge to buy. R.J. Reynolds bought Sea-Land for over half a billion dollars in a combination of cash and its own shares. They also announced a further $435 million in purchases of a new ship design (although some of these were later resold in 1980 to the US Navy), effectively bringing the total acquisition to slightly under $1 billion in 1969 money. Later in 1969, they earmarked another

$1.2 billion, albeit spread over a 20-year agreement, to lease the entire fleet of one of Sea-Land's competitors, but federal regulators would not consent. The next year, however, they bought American Independent Oil Company basically for the sole purpose of supplying fuel internally to Sea-Land container ships without the market-rate profit markups. R.J. Reynolds held Sea-Land from 1969 to 1984.

- Japan's government very heavily subsidized Japanese shipyards to build new container ships for Japanese shipping companies. Very little money had to be put down in advance and the financing terms to cover the rest were extremely generous.
- Singapore, Hong Kong, Taiwan, and South Korea built container ports over the course of the late 1960s and early 1970s. (Also Australia, which pivoted suddenly from overwhelmingly extractive or farm exports to a more balanced economy heavily featuring industrial exports.)
- Because there was such a leveraged rush to shift into the container business and such a boom in container ship construction as standardization reached its final stages in the late 1960s, a rate war (with all its accompanying sketchy practices) ensued and it basically played out the same way as the railroad rate wars a century earlier that we discussed in our Standard Oil miniseries. There was yet another round of mergers and consolidations, as well as the emergence of the Alliance system we will come back to later. The gist of it is cartelization to pool resources to cut costs and division of territory to cut competition.
- Industrial production spiked in 1972 and 1973, creating another high-demand cycle for container shipping, and the 1973 oil crisis, although expensive for container ships and forcing them to slow down to save fuel, gave them a final lethal edge over the much more expensive per unit non-container shipping competition. Unfortunately the government policies around the world to mitigate general consumer price inflation began to damage industrial production levels, so the shipping boom times came to an end as well.
- Soviet container competition emerged in the mid-1970s as well. This is not addressed further.
    - I am wondering what effect if any containerization pressure had on the decline and fall of the Soviet-led Communist Bloc, but this is not really addressed in the book either way. It's interesting to imagine a fully containerized Soviet Union and Warsaw Pact sphere.

- [Bill] Chapter 12 (Bigness)
    - 20 foot containers were being supplanted by 40 foot containers over the course of the 1970s and the push was toward making the ships themselves larger to hold more containers (or the bigger containers)
    - The 70s fuel crisis forced slower speeds after the 60s emphasis on profits through speeding up, but those slower speeds in turn made it possible to design larger ships.
    - The widths of the Panama and Suez canals were still limiting factors on capacity per ship. However, some companies began ordering ships too large to go through those canals which would exclusively serve on dedicated routes across the Atlantic or Pacific or even around South Africa or South America if need be. These gigantic ships also required

even more specialized and massive port and channel infrastructures on both ends, further limiting the route options (and further consolidating port activity to fewer and fewer cities).
    - Some ships that are small enough to fit through both canals are used on one-way service around the entire world, continuously carrying cargo but stopping at say five regional hub ports instead of shuttling back and forth between two or three ports. But this has its own logistical challenges and economic problems.
    - In the 1980s there was a wave of privatization (or long-term leasing out) of government-owned ports around the world, not only due to neoliberal ideology but also because governments got tired of investing huge amounts of public money in further container port upgrades with marginal benefit or return to the public to keep container ship companies from taking their business to another city. Many of these ports are now owned in part by the container ship companies themselves, much like at the very beginning of the experiments with modern shipping containers.
- [Rachel] Chapter 13 (this chapter covers the rate structures & economics of 70s freight moves by various means)
    - While the early days of containerization saved ship lines money due to the efficiency and reduced idle time, shipping customers saw very little of those savings passed to them. This is because shipping rates were still based on the old breakbulk rates. If a container held mixed freight, each item was charged only slightly less than if it were being transported in a breakbulk ship. Containers filled with a single product received slightly larger discounts, but it was still not great. *At the start of service from Europe to Australia in 1969, for example, a Welsh refrigerator plant could save only 11 percent from breakbulk rates by shipping full containers of its product, and almost nothing by sending small shipments that would travel in mixed containers along with other cargo. Full refrigerated containers of Australian meat went to Britain at a fairly meager 8.65 percent discount from the breakbulk rate.*
    - Further complicating matters were all the costs associated with upgrading ship lines' fleets, as well as the long-term leases for wharves, cranes, and marshaling yards. Transporting empty containers back across trans-oceanic lines was a cost that didn't exist in the breakbulk era, as well as the new cost of computer systems to keep track of containers and prepare loading plans for ships.
    - However, a lack of freight led to lower shipping rates in the early 1970s as ship lines struggled to drum up business to keep their ships filled with enough containers to break even. Then the oil crisis struck, and the previously low freight costs skyrocketed. The second-generation containerships of the 1970s were designed to move fast, and they guzzled fuel; by 1974, fuel prices reached 50% of the total cost of running a ship. The liner shipping conferences responded by raising rates, adding fuel surcharges and currency adjustment surcharges to customers' bills. They repeatedly raised surcharges as fuel costs rose and the dollar fell. Importers and exporters drastically reduced long-distance trade in manufactured goods. Container shipping was no longer the enticing bargain it once seemed.
    - However, the rates set by shipping conferences weren't always what shippers paid. In an echo of the railroad shipping industry of the previous

century, large shipping customers received under-the-table rebates in return for paying the published rate. This was illegal in the United States, but was still common practice. Sea-Land was fined $4 million in 1977 for distributing $19 million in secret payments to customers between 1971 and 1975. Another way shippers saved was by signing “loyalty agreements” promising to use only conference members' ships, getting a 20% discount in return.
    - By the late 1970s, shipping customers began to assert their power. They began to join together to oppose rises in freight rates, and they began to use non-conference carriers to transport their product. As shippers’ councils began to form and grow, shipping conferences were forced to bargain with them. Shippers also began to shop around for the best deal; prices could vary wildly depending on how shippers described their cargo and how that matched up with freight classification guidelines.
    - Independent, non-conference carriers benefitted from lower shipbuilding costs as the demand collapsed in the wake of the oil crisis. Builders slashed prices and traditional ship lines such as Maersk of Denmark and Evergreen Marine of Taiwan could enter the containership market. As non-conference operators, they could offer way lower rates compared to conference operators. This proliferation of independent carriers struck a great blow to shipping conferences.
    - Also crucial to making all of this work was the abrupt political embrace in the second half of the 1970s of “deregulation” of transportation rates in sectors like trucking & rail (finally signed into law in 1980 for both). A series of rail bankruptcies drew attention to how rail regulation kept the railroads from adapting to truck competition. In 1975, President Gerald Ford proposed eliminating much of the ICC’s authority over interstate trucking. In 1976, Congress started easing regulation of railroads. As a result, shipping costs fell as trucking companies and railroads could set their own rates on just about any commodity. Railroads also finally embraced the container, designing railcars that allowed for transporting double-stacked containers. Trucks and railcars that used to return empty could now get cargo for backhauls. The biggest customers received huge discounts for their high volume of product.
    - After winning victories in trucking and rail, shipping customers also won a victory in maritime shipping. The Shipping Act of 1984 allowed them to sign long-term contracts with ship lines. Shippers guaranteed a minimum amount of cargo, and in return they received a low rate and specific terms of service, such as the frequency of ships. These contracts had to be public, so other shippers with similar freight could negotiate the same deal. Also, conferences were still permitted to set rates, but individual members could depart from conference rates whenever they wished, as long as they made those rates public.
- [Bill] Chapter 14 (Just in Time Shipping)
    - Levinson circles back to the point I noted last week in chapter 1, about de-integration of vertically integrated supply chains to start outsourcing part of the production to 3rd party companies. Recall that outsourcing means contracting with an external provider to provide a service or component, whereas offshoring refers to moving factories and operations overseas within the company. Historically, companies had saved money by owning the entire supply chain vertically, which sometimes included

offshoring but generally only for commodity production. With containerization, undoing the vertical integration in favor of outsourcing to contract providers actually saved more, although lately we obviously see the enormous vulnerabilities this creates. Nevertheless, this new market for outsourced overseas production allowed companies to become extreme specialists with resulting savings, instead of one company trying to do everything. Levinson makes a case that the biggest differentiation between late 20th century globalization of trade and earlier trans-oceanic trade booms is that instead of ships either carrying raw materials to the developed world or finished goods back to the developing world (both located at starting points of unavoidable necessity) now two-thirds of the goods being shipped were unfinished “intermediate goods” going from one part of a supply chain to the next. (To demonstrate this extreme specialization of production, he uses the example of Barbie dolls, where the molds and plastic dyes are shipped from two countries to one country where dyed plastic is extruded into the molds and the synthetic hair is made in a 4th country and the clothes are sewn in a fifth country, and so on, which means a bunch of international container shipments of unfinished Barbies before the final assembled product is shipped to some place like the US and then fanned out across the country to retailers.)

- Toyota invented the Just In Time shipping strategy. Levinson emphasizes that the real key to this wasn’t vertical integration but rather outsourcing supplies and signing long-term contracts to provide the exact, precision-made components on time every time (neither early nor late) in small batches as needed for Toyota’s assembly lines. The external suppliers need to become extremely good at their work and their shipping schedules because they’re only producing in small batches so there is not much financial padding to make mistakes or be sloppy (and the contracts reflected that with severe penalties). Toyota brought the JIT supply chain model to the United States directly after reaching a partnership with GM in California in 1984 to produce on-shore. About 40% of US Fortune 500 companies were copying the model by 1987, at least for part of their businesses.
- Retailers began ordering low-cost designs (especially fast fashion) once they realized they could work directly with developing nation suppliers to order and assemble specific components as needed without shopping via whatever a middle-man wholesaler had available. Again, the small-batch model works very well for one-off products.
- Obviously, as I noted before, there are severe vulnerabilities to the JIT supply chain model. Any disruptions like 9/11 or the pandemic or the Suez Canal’s Ever-Given blockage can grind the entire enterprise to a halt with US factories shutting down literally over a night or two because they have no parts to feed into the assembly line.
- Other savings from containerization and Just-in-Time shipping: Reducing stagnant inventory not only saves the warehouse expenses but also reduces the amount of time between paying a producer for a product and receiving end customer money for it, which streamlines corporate finances for the retailer. Both of these things mean the retailers also spend much less on debt financing payments, as well, to the tune of many tens or hundreds of billions collectively.

- Levinson estimates that nonfarm inventories in the US in 2004 were $1 trillion less than they would have been under the model used until the mid-1980s when Just in Time started being implemented.
- Another weird feature of containerization: The shipping costs do not scale up directly or exponentially with increases in distance. There is sort of a basic baseline cost to ship overseas and then after that additional distances are sort of marginal increases to the cost, which means that doubling the distance might raise the shipping cost by less than one-fifth, which could easily be offset by some cost advantage in the location twice as far away.
- Costs to or reorganization of private sector domestic jobs: Assembly Factories from the American interior, or anywhere even on the coast that did not quickly build container ports, tended to die off fastest in the 70s and 80s, not necessarily in favor of offshoring but in favor of locating them near big container ports so they could take maximum advantage of Just in Time shipping of incoming intermediate components.
- Further costs to the public: Some American and European cities spent billions on new or upgraded container ports to make sure they stayed relevant, while other cities wasted vast sums of money on non-container port upgrades just as containerization was becoming a massive phenomenon. Major container ports also tended to eclipse even minor ports with container capabilities because any difference in dwell times at all added significant costs relative to the nearly negligible shipping costs at the giant ports.
- International inequalities of the container era:
    - Not everyone got containerized, even into the modern era: African countries generally did not build container ports at all (and I would add have very little interior transportation infrastructure to support internal delivery of containers), so they have not experienced the boom in manufacturing that Asian nations with big container ports did, even though African countries obviously also have low labor costs and lax regulation.
    - Landlocked countries have been hit quite hard by containerization, for obvious reasons.
    - Seaports don't just need the technological and spatial or depth capabilities to handle container traffic, but they also need to maximize the goods being shipped in both directions. The ideal scenario is to be able to load and unload a ship simultaneously with goods. Places that are significantly net importers by volume of containers are annoying to shippers because they have to send back empty containers in the outbound direction. The companies compensate for this by charging more for the imports, which means that the cost of living goes up for those populations near that port with not much to export.
- Phased development: The first wave of container ports before the 1990s around the world tended to be retrofits or upgrades of existing ports. The second wave of container ports in the late 90s and early 2000s tended to be privately financed from scratch, sometimes with government assistance or incentives, specifically to become a huge hub for container traffic. The bigger the port and the more infrastructure it has, the more

traffic it attracts because it can handle cargo loading and unloading at higher and faster volumes, reducing costs per unit and dwell times.

- Legacy of a hard-to-forecast transformation: Levinson argues that almost everyone, even those in favor of containerization, completely underestimated how much it would transform and reorganize the entire world economy and all kinds of local economies across the world. Even the ship lines initially thought it was just a marginal improvement that would shave off some time and money at existing ports by speeding things up and automating away some unionized longshoreman jobs. The railroad and trucking companies mostly tried to ignore the potential transformation for many years, not bothering to invest in intermodal cargo handling infrastructure and not really grasping how much money it could make them. Even the hostile labor unions at the ports wildly miscalculated just how many jobs would be lost to port automation. Economists in the 1950s and 1960s completely failed to anticipate long-distance shipping and supply-chain reorganizations, even as containers were being first developed, because it was simply seen as a marginal innovation on existing shipping practices.
- The oceanic container ship companies themselves struggled for nearly two decades to figure out how to standardize the equipment and ship designs, as we talked about last week, and they incorrectly often didn't think super long distance routes would be very profitable or attractive to companies that did not initially have much reason to send cargo in either direction over those routes. Some of the early container ship companies went bust because they were either slightly too early or slightly uncompetitive to their peers and there was a declining interest in corporate loyalty to a particular shipping line if someone else could deliver faster and/or cheaper. In fact, Levinson points out that some of the eventual titans of the container shipping industry – like Evergreen, Mediterranean, or Maersk – basically did not form until the late 1960s or early 1970s, which gave them the financial advantage of joining a more developed industry without having to waste money on non-standard equipment or other capital investments to get the industry up and running, a problem Rachel covered in part 1. (Case in point, Maersk is now the parent company of Sea-Land which is the pioneer company that began developing the modern container shipping system in 1956 and which won the pivotal Vietnam War shipping contracts that unleashed the industry fully.)
    - As a side note, I looked up more recent stats on Wikipedia, and apparently, as of 2015, 16 of the ship lines controlled 95% of the global traffic by volume, and they are themselves united into three international cartels called "Alliances" where they work out "vessel sharing agreements, co-operative agreements, and slot-exchanges" that sort of just barely skirt certain countries' antitrust and anti-collusion laws. I think this was reduced to an even smaller number of nominally separate companies since 2015, as well.
      https://en.wikipedia.org/wiki/Container_ship#Shipping_industry_alliances
      https://www.joc.com/maritime-news/container-lines/ocean-three/sh

ippers-regulators-will-be-watching-closely-alliances-launch-services_20150107.html

    - One final note, obviously our unstated but never forgotten criticism of containerization is the catastrophic environmental consequences. These include: Container waste after their lifespans are worn out, as well as the diesel-related shipping and loading/unloading emissions that pose vast environmental harms worldwide.
- https://en.wikipedia.org/wiki/Containerization (we didn't use this much but it has some stats & info past the timeline of the book)