AFD Ep 426 Links and Notes - Containerization Part 1 (Shipping Containers) [Bill/Rachel] - Recording May 15, 2022

- This shift had a profound effect, especially on downtown and inland-river ports (but also created inland warehouse logistics jobs in some places)
- https://archive.org/details/boxhowshippin00levi "The box : how the shipping container made the world smaller and the world economy bigger" by Marc Levinson (2006, Princeton University Press)
    - [Bill] Chapter 1 (the intro chapter)
        - Levinson uses 1956 as a benchmark year. (First modern container ship was the *Ideal-X*.)
        - Containerization rapidly destroyed the waterfront economies of any port without sufficient water depth for the new container ships and without sufficient space for the high-speed loader/unloader machines (which also required fewer workers and work-hours even in ports that could serve them). Containerization also destroyed the "local" industrial economy of almost everywhere that had one because now factories did not need to be proximate to customers (or suppliers if they were just part of a chain).
            - Re supply chains: One thing I noticed (and had been thinking about while doing economic research for my series about the 1970s) is that there is actually a pertinent overlap (not just differentiation) between the concepts of "outsourcing" and "offshoring." Sometimes people will correct blurry use of the terminology because technically 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. But the overlap that containerization helps trigger, which probably accounts for the public blurring the concept in say the 1980s and 1990s, if not beyond, is that sometimes companies decided not to offshore part of their production sequence but instead to outsource that aspect of their supply chain to an entirely external company, which was already operating overseas. (See also Chapter 14 notes below.) Probably one of the most visible and ubiquitous examples of this today is that the Taiwanese tech firm Foxconn, founded in the 1970s, produces iPhones for Apple. The production is outsourced overseas, rather than offshored within Apple but overseas. A huge amount of transistor-based technologies relevant to the early Third Industrial Revolution and places like Silicon Valley were built by 3rd-party companies from East Asia on behalf of American or European companies designing, commissioning, marketing, and selling them.
        - Containerization is the prerequisite to significant buildup of industrial production for export in developing nations. Prior to this, they would have only tended to export raw materials extracted or harvested domestically by necessity. After this, they could offer low-wage labor competitively without the very high shipping costs (and time) canceling out the savings.
        - Basic modern dimensions/statistics on the thing itself: Container ports have dozens of berths. One berth docks and loads or unloads a container ship. These ships are up to 1,100 feet long and 140 feet across. The containers (40 feet in length) are stacked 15-20 across and 6-7 high on deck with 6-8 below in the holds, cumulatively adding up to thousands per

ship. The tonnage is enormous. The crew is often just 20 people. The 200-foot tall port cranes move around on special rails on shore along the length of the ship, with an interim “rubber-tired transporter” that carries it to and from a temporary storage or staging area for rail and truck transport in and out. The boom swings out over the ship’s entire width. The boom has a little trolley moving back and forth to “precise locations” to position a “spreader” that secures the container by four of its corners and lifts it up and down and then carries it to where it needs to end up. Loading or unloading one container takes 90-120 seconds, shifting 30-40 containers per hour. Generally they’re trying to simultaneously load and unload a ship with new containers going into the emptied sections progressively. Everything is extremely computerized and automated because they need to unload or load every container in a specific order to make sure the ship doesn’t capsize from a weight balancing problem, especially since not every container holds equally heavy cargo. (Levinson notes there can be problems when the reported contents do not correspond to the real contents, either through errors or intentional misrepresentation. And the sheer volume of traffic through each port daily renders it impossible to inspect containers.)

- **The Vietnam War was a major factor in the US government endorsing and investing in containerization**, despite immense local, labor, and transportation company opposition [He goes into the Vietnam War more in a later chapter.]
- Mid-century shipping costs were so high that international (trans-oceanic) trade was extremely minimal. Today the shipping costs are so marginal per unit as to be almost ignored altogether.
- Containerization was adopted first for land-based shipping and then water-borne shipping. Logistically it was easier to implement on land first and the savings were more immediate with less capital investment required than container-capable intermodal seaports.
- The smooth and rapid transfers of containers dramatically shortened dwell times where cargo sat around in port warehouses or rail yards waiting to be moved somewhere else. This unlocked the cost-savings of just-in-time shipping with all its attendant vulnerabilities.
- “In the decade after the container first came into international use, in 1966, the volume of international trade in manufactured goods grew more than twice as fast as the volume of global manufacturing production, and two and a half times as fast as global economic output.” (p.11)
- Levinson notes that one of the central contradictions of containerization is that it forces a huge downward pressure on consumer retail goods prices, which keeps the public happy, but it also destroys the domestic economic base employing that public, which makes them very unhappy.
- {Levinson makes a bunch of incorrect comparative assertions about the adoption of electric power and electric technologies in the US}

- [Rachel] Chapter 2 (the pre-container docks system and “breakbulk” cargo)
  - Prior to containerization, loading and unloading freight was a labor- and time-intensive process. Each item (be it a wooden crate, or steel drum, or bale of cotton, or even a paperboard carton) had to be carefully transferred from the dock into the hold. Packing a hold was a skilled job; packing disparate items could cause damage if packed too loosely, as they would move and collide in rough waters. If cargo shifted too much, it

could even capsize the ship! Packing also depended on which items would be unloaded at each port. You wouldn't want to pack the items to be unloaded buried under 100-kilo bags of sugar that took two men to move. As a result, ships often stayed a week at each port while ships were unloaded and reloaded. Each day that a ship wasn't actively transporting freight added to the cost of shipping. In 1959, it was reported that *60-75% of the cost of transporting cargo by sea is accounted for by what takes place while the ship is at the dock and not by steaming time.*

- Inventory was also an arduous process. Each item had to be unloaded from trucks or trains parked at the dock - one at a time - and recorded on a tally sheet before it could be moved into transit sheds, warehouses where items were held before being loaded onto the ships. When ships were loaded, each item was counted again before going on the ship.
- Notable note: The immediate postwar shipping environment was dominated by thousands of America's retired, cheaply built Liberty Ships and Victory Ships that were intentionally built small during the war to minimize the amount of cargo lost per sinking by enemy submarines, ships, and planes during dangerous convoy runs. In civilian use, they were numerous, slow, and inefficient in terms of cargo volume. But they were inexpensive to buy from the government and they didn't require major capital investments on shore to load or unload them, however slow and labor-intensive that might have been.
- The demand for dock workers was highly irregular, depending on how many ships were docked and what they were carrying. Highly-perishable cargo needed a lot of labor one day, and the next, there was no work available. This created a lot of competition amongst longshoremen. Each day, men would show up at the docks first thing in the morning vying for a job that day. Once they were hired for the day, they had to wait for the ship to come in. This time was unpaid, but men would lose their spot if they left. This setup created a lot of corruption. Men would bribe pier foremen to ensure that they were on the list of favorite workers. *In New Orleans, a weekly payoff of two or three dollars was the norm to secure work the following week.* Another form of corruption was borrowing money from pier foremen who had a side business of moneylending. By taking a loan with a 25% interest rate, men were guaranteed a job so they could repay their loans, taken out of their wages.
- Labor unions and government agencies fought against this system. [give a listen to Episode 344 on the 1934 West Coast Longshoremen Strike]. After the strike, on the U.S. West Coast, the order of hiring was determined by the public drawing of longshoremen's badge numbers in union-controlled hiring halls. In Australia and Britain, government-run labor boards took over work assignments. In Rotterdam, strikes in 1945 and 1946 made it so that employers hired full-time staff rather than casual laborers. The Waterfront Commission of New York Harbor, created by New York and New Jersey, controlled hiring in the Port of New York starting in 1953.
- Another major problem in shipping was theft. Longshoremen justified theft as a response to poor economic and working conditions, but it was rampant everywhere, even where union contracts ensured good wages. In Portland, transistor radios and bottled liquor were stolen for family and

friends, not for sale. In New York, anything and everything was fair game. Even 60-kilo bags of coffee beans were stolen.
    - The solution to the high costs of transporting goods in a piecemeal fashion was clear: Put the freight in big boxes and move the boxes from Point A to Point B. But there were some obstacles to this plan.
    - One big obstacle was the way rail shipping rates were determined. The Interstate Commerce Commission (ICC), who regulated shipping rates, required that each commodity had its own rate, subject to ICC approval. Railroads had a hard time filling shipping containers with only one commodity, and sought approval for weight-based shipping rates, regardless of what was in the shipping containers. *After four months of hearings in 1931, the commission ruled weight-based rates illegal. Although it found the container to be "a commendable piece of equipment," the commission said that the railroads could not charge less to carry a container than to carry the equivalent weight of the most expensive commodity inside the container. With that ruling, containers no longer made economic sense on the rails.* Truck transportation could quickly come in to fill the transportation gap, and starting in the 1920s, trucks became a practical alternative to rail, especially for short-distance trips.
    - Another big obstacle to containerization is the fact that early containers didn't confer many advantages over loose freight. Containers were often packed alongside loose cargo, and took up valuable space. Many European containers had no tops, so they couldn't be stacked. There were no weight limits, so lifting could be a dangerous proposition, and many boxes had metal eyes on top of each corner, which meant that longshoremen had to climb the boxes to attach hooks for lifting, also a danger to workers. Docks weren't made to accommodate boxes, which made loading tricky. Ships also weren't made to accommodate containers, leaving workers maneuvering against built-in posts and ladders in the holds of ships. When boxes were emptied of their cargo, oftentimes they were shipped back empty, adding costs to shippers compared to loose freight. However, the concept was promising, provided that the industry made great changes. *The solution came from an outsider who had no experience with ships.*
- [Rachel] Chapter 3 (trucking)
    - A trucking magnate named Malcom McLean helped to revolutionize the shipping industry. Throughout the 1930s and 40s, McLean created a trucking empire in the Southeast at a time when railway freight was stagnating. However, he also ran into the limitations of the ICC. The Motor Carrier Act of 1935 brought interstate trucking under the authority of the ICC. The ICC controlled what commodities a trucking company could haul, the routes they took, and the rates they could charge. Any additional route or commodity that a trucking company wanted to take on required ICC approval. Major changes required hearings where other trucking companies and railroads could object. This made trucking inefficient; a truck would have to drive home empty if there weren't any approved goods to move. McLean had to find ways around the regulations. He purchased carriers and adopted their routes. If he couldn't buy a new company, he leased them. Through these deals, he expanded his network from Atlanta to Boston.

- McLean was obsessive about cost-cutting. He opened one of the earliest automated terminals in Winston-Salem, NC, using conveyors to transfer freight from one truck to another. He put diesel engines in his trucks at a time when most trucking companies used gasoline engines. He arranged corporate discounts at fueling stations along his routes, and had his drivers only refuel at those stations. Realizing that safe drivers save the company money in insurance and repair bills, McLean created a robust driver-training program, and created incentives for the trainers: *The senior driver got a bonus of one month's pay if a man he had trained made it through his first year without an accident.*
- As highway traffic became more congested, McLean looked to war-surplus cargo ships as a way to save money. *Why not just put truck trailers on ships that could ferry them up and down the coast?* The ICC also controlled domestic ship rates, which were well below rail and truck rates to compensate for slower service, which could save McLean money on moving cargo between North Carolina and the Northeast. McLean started looking for dockside real-estate for McLean Trucking's first waterfront terminal. His timing was excellent, as the Port of New York Authority was looking to drum up business in Newark, New Jersey. The port at Newark had plenty of space for trucks and access to the New Jersey Turnpike, making it an attractive prospect for McLean. *Even better, from McLean's point of view, the Port Authority had the power to issue revenue bonds; it could build the terminal and lease it to McLean Trucking, reducing the need for the company to raise funds.*
- While the Port Authority was working on renovating McLean's terminal in Newark, McLean had to buy a ship company. He set his sights on Pan-Atlantic Steamship Corporation, which operated four ships along the coast between Boston and Houston. Pan-Atlantic's business had been hurt by the longshore strike of 1954 in New York, but it owned the operating rights to serve 16 ports. Its parent company, Waterman Steamship, had 37 ships and $20 million in cash. McLean found that Waterman could be bought for $42 million.
- However, McLean had to get around ICC regulations that required them to approve the sale. To do this, McLean created a new company, McLean Industries, in January 1955. McLean, his brother and his sister put their controlling shares of McLean Trucking in a trust. Malcolm kept $5 million of stock, but the trustees were authorized to sell the rest. Once the trustees were put in place, the McLean family resigned from their roles in McLean Trucking, and immediately afterward McLean Industries bought Pan-Atlantic. Although the ICC didn't approve of this transaction, the McLeans didn't violate any laws. Using similar switcheroo tactics, McLean Industries took over the Waterman board and orchestrated the purchase of Waterman.
- Once McLean took over Pan-Atlantic, he started brainstorming ways to get truck trailers on ships. At first he thought of backing trailers onto ships, then unhooking them from the engines, but the wheels of the trailers would take up too much precious cargo space. Then he thought of trailer bodies that could be lifted from the chassis and then carried to the ship. However, these bodies were not available for purchase. He hired Keith Tantlinger, an engineer with a reputation as a container expert, to design the trailer body of his vision. The containers had to be stackable, and able

to be locked into frames installed on the decks of his tankers. Tantlinger came through and designed 33-foot long containers, much larger than any shipping container that existed at the time. Tantlinger also designed a way to lift the boxes with a crane to load them on the ship: A spreader bar that engaged hooks at the corners of each container with the flip of a switch. Once the box had been lifted and put in place, the hooks would disengage and the crane could then lift the next container. This eliminated the need of longshoremen to climb the containers and attach the hooks.
    - Even after the technology was figured out, McLean had to wait for the bureaucratic obstacles to be ironed out. After months of hearing, the ICC overruled objections from the railroads and authorized Pan-Atlantic to carry containers between Newark and Houston. Also, the Coast Guard had to approve of a test run to prove seaworthiness. Finally, on April 26, 1956, at Port Newark, a crane placed a container on the *Ideal-X* every seven minutes. The ship was loaded in less than eight hours and set sail the same day. McLean and his executives flew to Houston to watch its arrival. The concept worked, and furthermore, the cost savings were monumental. *Loading loose cargo on a medium-size cargo ship cost $5.83 per ton in 1956. McLean's experts pegged the cost of loading the* Ideal-X *at 15.8 cents per ton.*
- [Bill] Chapter 4 (this chapter is mostly on McLean/Sea-Land's mid-to-late 1950s prototype work on the east coast & Matson's west coast punch card computer research within shipping companies about economic optimizations)
    - Not going to get overly bogged down in the various prototypes here. You can read the book if you want to know more…
    - One observation: Early container "ports" often began as just one or two privately owned piers because a company experimenting with containers needed not only to convert or build specialized ships but also have specialized loading & unloading equipment on both ends. Early tests of ship-based cranes, rather than land-based cranes, showed that weight and balance factors simply did not work for ship-based cranes. However, no existing port was going to convert all its operations to experimental cranes for containers that initially made up a small share of arriving traffic. Thus, it made sense for a company to invest in upgrading a pier just for themselves for their specific container needs. These conversions of ships and facilities were multi-million dollar investments in money of the time (and Sea-Land took six years to become profitable). Focusing on minor ports for upgrades also had the advantages of being received gratefully by local workers and political leaders compared to the hostility at existing major ports. In ports where the port's owner, public or private, was willing to put up the investment money to upgrade to container infrastructure, the container ship company instead paid rent to use the berths, which was still expensive, even if it was not as expensive as investing money directly into upgrades.
    - 1958 was the first time a shipping company (Matson) had used a computer (rented time on an IBM) to run simulation calculations on how to structure their operations, soon to feature containers, to maximize revenues and reduce costs. Actual computerization of the container record-keeping and loading/unloading methodology did not begin until 1965.

    - Most container experiments were conducted on “domestic” American routes, such as mainland runs to US island territories or the state of Hawaii or later coastal runs along the mainland coasts (which competed with overland service). Puerto Rico specifically was embarking on an industrial development program, which meant they would have something to ship back to the US mainland, and also it was a proving ground for the kind of offshore supply chain outsourcing that we’ll talk more about later. In 1962, the first coast-to-coast (via Panama Canal) container service began. At the time there was actually not that much competition in general because it was so expensive to ship that way instead of by road or rail.
    - Basically from almost day 1 there was resistance among longshoremen to loading or unloading container ships, although never consistently either.
- [Rachel] Chapter 5 (Port of New York vs the Port Authority [of NY & NJ, per later name] – pretty interesting)
    - Very important: Over the course of the 1950s, “Port Elizabeth” on the NJ side was a brand new “redevelopment” of a marshland (harder to imagine from today’s vantage point!) south of Port Newark (an oil and lumber commodity-focused port) and across from the traditional cargo piers of the NYC boroughs. The construction of Port Elizabeth as an adjunct to Newark was financed by the Port Authority of NY & NJ, specifically to support the future of shipping, i.e. intermodal (roll-on/roll-off truck trailers) and container shipping. This is exactly the kind of situation repeated all over the world as containerization took off. Legacy ports nearby get completely left behind in favor of brand-new facilities in places that were hinterlands. Meanwhile, New York City’s government, as opposed to the interstate Port Authority, went all in on enormously costly redevelopment of the traditional cargo port facilities on the New York side in a historically doomed maneuver motivated by local politics and a desperate attempt to keep the economic center of gravity on the New York side despite all the geographical and transportation obstacles even before containerization. At least as early as 1959, city planners opposed to the waterfront port renovations were trying to make the case that the only sensible use of public investment and planning would be to obliterate the port before it died anyway and turn it into more upscale land uses. This is of course eventually what happened anyway – no surprise, given that new container traffic out of the Newark side exploded by leaps and bounds from 1956-60 – but not for many decades. Even the ILA by 1964 was conceding that maybe pier renovation projects should be mixed use and including housing projects, but by then it was too late and no one took them up on it. Private finance was eagerly already eyeing the waterfronts of Manhattan and Brooklyn for alternative uses, and by 1966 the city was already starting to hand off some of the waterfront to the Parks department. Port Elizabeth was begun before modern containers started in 1956 but took a while to be built, as it required a lot of dredging and filling and then waiting for it all to settle, and by the time it was in the home stretch in 1961, the final details could be fine-tuned to support container facility designs that literally had not existed when the forward-looking project was envisioned and broke ground. After that, Port Elizabeth was almost continuously expanded over and over to support more container traffic every year. By 1970, the New York side was

functionally dead, except for passenger traffic, and localized unemployment was astronomical. Meanwhile over in New Jersey, the container expansion was so fast and so massive that even with all its reductions in labor compared to units of cargo there were still frequent labor shortages. The collapse in direct employment on the docks and nearby warehouses was closely followed by a collapse in New York City's urban industrial base as containerization and expressway trucking both began moving production supply-chains away from a proximity-oriented model. A significant segment of the population soon exited as well.

- [Rachel] Chapter 6 (The respective east and west coast longshoremen's unions' response to mechanization & automation)
    - East (ILA, very chaotically organized and localized along each east coast port separately with powerful local bosses and weak senior leaders and weak members) Also, fractured along ethnic lines, Italian local bosses fought with Irish national leadership.
        - They negotiated the employers' right to automate in return for protecting longshoremen's incomes, funded by a per-ton royalty ($1.00 per ton for each container on a container ship, $0.70 per ton for each container on ships designed for both containers and mixed freight, and $0.35 per ton for containers being carried on conventional breakbulk ships) paid into a fund. However, ILA president Teddy Gleason, the union representative who worked on the negotiations, worried that this agreement hurt the union, because there were no directives on how the fund should be spent, and the fact that the term "container" was never defined in the agreement, an omission that could cause union-management conflict down the line. The royalties never materialized, due to a sharp drop in cargo volume, and militant ILA locals fought with more conciliatory locals. The lack of unification meant that containerization happened in a patchwork fashion, and the militant locals got left behind as the world advanced around them.
    - West (ILWU, very unified along the entire coast but very strong rank and file)
        - There is some good stuff in this chapter on ILWU leader and Australian-born radical Harry Bridges that might make for its own separate episode at some point, but today we'll stick more narrowly with a specific role he played in the debate over containerization
        - The West Coast ports had been in decline for decades when containerization and port mechanization started, which was not the case for the East Coast ports. Containerization was a big boost to the West Coast overall, albeit with some specific ports as casualties, in contrast to the general seaboard-wide devastation the East Coast ports experienced.
        - The big missed opportunity here (also missed elsewhere but perhaps slightly more recognized on the West Coast at the time) was that containerization was going to create so much new shipping business overall that it would actually grow and stabilize employment (and could have made those jobs vastly higher paid from the tens of millions in new profits) – BUT when automation was just seen as a marginal technological innovation on an

existing process (with no change to the fundamentals of the entire maritime trade sector), it was instead envisioned as a threat to existing employment. Initial contract negotiations thus focused on the wrong angles. As in New Jersey, the West Coast ports very rapidly experienced labor shortages, not labor surpluses. But the union had kind of negotiated badly, misunderstanding the situation, and many of the ship companies weren't actually mechanizing yet (the whole focus of negotiating to modernize port work) but were instead simply taking advantage of union concessions on men and hours per cargo to demand more of each worker physically, which isn't what the union had in mind. The union then had to pivot to *demanding* mechanization to lighten these physical workloads, after years of resisting mechanization fanatically. Suddenly *they* were demanding arbitrators award machines in the workplace and insisting on capital investments in the ports, under the talking point (from Harry Bridges) "The days of sweating on these jobs should be gone…" By the mid-1960s they were starting to achieve these new goals.

    - Disputes over jurisdiction on both coasts with Teamsters as supply chains evolved. Off-dock loading work was traditionally done by Teamsters; they saw the longshoremen as butting in on their turf. The courts settled in the Teamsters' favor.
    - Another sticking point: union representation of office workers whose computers controlled container operations would be a source of dispute for decades.
- [Rachel] Chapter 7 (standardization)
    - This is a pretty wonky chapter, but it illustrates the long and arduous process of creating industry standards. Standardization was an important step because it ensured the interoperability of containers no matter the country or company that was handling them. Without standardization containers could be waiting at port, while ships that couldn't handle them left without them. Docks and cranes for one ship line couldn't handle another line's containers, adding inefficiency and higher costs to shipping. Standardization was necessary for the success of the containerization project.
    - The players: The United States Maritime Administration, or Marad. They started the standardization process in 1958. A government agency that had immense power over the maritime industry, they - along with the Federal Maritime Board - dispensed subsidies to build ships. They could withhold subsidies to shippers that didn't adopt standard containers. Marad named two committees of experts, one to recommend standard container sizes and the other to study container construction.
    - Not included in these initial meetings were the existing containerized ship lines. They had already optimized sizes for their routes and biggest cargo. Asking them to adopt different standards would be a hardship for them.
    - Another player in the standardization process: the American Standards Association, supported by private industry. They were also trying to establish standards. The ASA created Materials Handling Sectional Committee 5, or MH-5 in 1958. The MH-5 tried to get Marad to let private industry handle the standardization process, but they refused. In contrast to Marad, which dealt with Maritime business only, MH-5 included trailer

manufacturers, truck lines and railroads. Despite their different interest groups, Marad was able to agree with MH-5's container sizes.
    - Yet another player: The National Defense Transportation Association, representing companies that handled military cargo. They created a different set of standard sizes that didn't accord with MH-5 and Marad's standards, which ended up being a problem in the mid-1960s during the Vietnam War, which we will get to soon. With two sets of standards in play, behind-the-scenes wheeling and dealing began at the American Standards Association. Finally on April 14, 1961, a "family" of approved sizes were approved: 8 feet wide, 8 feet tall, and 10, 20, 30 and 40 feet long. The Federal Maritime Board announced that only containerships designed for those sizes could receive construction subsidies.
    - After this, the International Standards Organization (ISO) got involved. At that time, only small containers were used for shipping international freight, but that was about to change. ISO standards would establish worldwide guidelines before firms made large financial commitments. Simultaneously, ASA was still working on domestic standards with the hope that ISO would later adopt them. ISO adopted the American standards as well as two smaller boxes that were 5 feet and 6 ⅔ feet long.
    - Another part of the standardization process that took a lot of time was the design of corner fittings that were used to lift the boxes. Different ship lines had different fittings that they used to lift their boxes. Standardization would mean that every crane would be able to lift a box that conformed to standards, no matter the origin. The debate raged on until September, 16, 1965, when a standard design was adopted by MH-5 and later by ISO on September 24. It's probably not a coincidence, as we will discuss soon, that the timing lines up with a key decision point in the Vietnam War.
    - Despite agreeing on a standard design, they didn't adopt performance standards for the corner fittings. After a series of tests in 1966, engineers found that the fittings failed under heavy loads. There was a mad scramble to modify the corner fittings, and engineers determined that thicker steel in the walls of each fitting would fix the performance problems. This "ad hoc" design was adopted in June 1967, and thousands of boxes that had the 1965 fitting had to have new fittings welded into place.
    - Matson and Sea-Land were completely outside this process and worried about missing out on subsidies that companies later to the game could take advantage of. They were able to lobby Congress to carve out an exemption to the Federal Maritime Board policy so they wouldn't be punished for being early adopters.
    - Finally, in 1970, the ISO was ready to publish the first full draft of shipping container standards, ending a process that spanned over a decade. *International container shipping could now become a reality.*
- [Bill] Chapter 8 ("the takeoff", a chapter mostly about corporate mergers & acquisitions in the 1960s as well as regulatory reforms to account for the new economics of container shipping as opposed to mixed commodity/goods shipping)
    - Container cargo evolved from an initial system closer to the status quo, basically packing containers with mixed cargo that happened to be going to the same port. This still required time-consuming, expensive, and

potentially multi-union-aggravating packing and unpacking operations near or in ports on both ends of a ship trip. The big jump forward came with the realization that the big savings would be non-mixed bulk cargo from a single source to a single destination, requiring no unpacking or reloading at any point in between. Sometimes this meant less frequent shipments or lighter shipments but eventually it meant small batch production in bursts, which we'll talk more about when we get to Just In Time shipping later. At any rate, this development in the use of containers was only made possible by truck and rail container infrastructure to move the containers to and from the ports on either end without that packing/unpacking phase nearby. Trucks especially had already proven the light or partial load model was potentially viable because they had used it to poach business from railroads in the interwar and immediate postwar period. The big railroads countered by experimenting with intermodal "piggyback" freight service wherein a truck would be put directly onto a long-distance train and moved across part or all of the United States and then complete that last little journey locally now that they had driven off most local railroad competition. Piggyback experiments were happening around the same time or just before shipping container experiments, but they faced similar problems like lack of equipment standardization, high upfront capital investments for new facilities, and disputes with labor unions. Some railroads worked in a consortium together on piggyback standardization and contracts, while several others pursued more of a container-style approach. Both of these remain in use today. However, the container system later ended up being the preferred rail mode for international commerce because it could be used on ships too, and initial experiments with also simply putting full truck trailers onto ships did not prove economically competitive with stackable containers. (The compromise method used more for perishables is a shipping container that can be quickly converted onshore to a wheeled trailer trucked on the highway.) Over the course of the 1960s, major companies like GE or Kodak revised their shipment schedules to fill up containers with products for staggered movements, rather than sending a continuous stream of smaller cargo that required more handling in rail yards and seaports. Less rail yard handling also increased shipment speeds overland, as was happening at the same time in seaports. On the other hand, the railroads still generally ran containers in slow trains with other kinds of freight, so even if they weren't being handled, they still spent more time sitting around than necessary until later periods.
    - By the late 1960s, with the experiments basically out of the way in the United States (although US railroads were largely still actively resisting container traffic anyway), European railroads (operating under a very different regulatory environment going back to the 1920s) became very enthusiastic adopters of ship-rail container traffic. US railroads instead mostly conceded ship container traffic to long-haul truckers for many years.
- [Bill] Chapter 9 (Vietnam War)
    - The prior chapter mentions the US Army initially testing shipping container contracts to support 250,000 troops stationed in West Germany.

This then vastly expanded into a more serious program as the Vietnam War grew in scope.

- In early 1965, the US began rapidly scaling up its military presence in South Vietnam, a country with one deepwater port (45 miles up-river from the coast in Saigon), and supposedly the operation was only going to last for one year. This meant on paper it didn't make much sense to spend a lot on long-term capital improvements to transportation networks, yet the military would require enormous volumes of supplies be rapidly and cost-effectively imported into South Vietnam, via chartered merchant ships. Initially, neither objective was being met. Ships would arrive from California and park offshore in deep water miles out from the many shallow coastal harbors while transfer barges went out to tediously unload them with ropes to lower cargo over the side, weather permitting. Sometimes there were so many idle ships waiting to unload that they were redirected to idle in the Philippines instead. The inland Port of Saigon had just 10 ship berths and no mechanical equipment or way to notify recipients a shipment had arrived. Theft was rampant and intimately connected to the South Vietnamese military.
- The US military and political leaders decided after some debate to set up a brand new deepwater port, entirely under US military control, at Cam Ranh Bay. They set up a rudimentary deepwater port with temporary equipment by December 1965, at which point it was starting to become clear that US military operations were only going to grow, not wind down. They also finally forced the South Vietnamese government and military to allow the creation of a new US military seaport outside of Saigon, constructed by a specialist company that dealt with weird small ports in Alaska, which was comparable enough to the problem at hand. The US Army was placed in supreme control of all materiel shipments into Vietnam, regardless of branch being supplied. Their officers also ordered that all shipments be unified going out of the US so that everything on board a single ship was bound for one specific point in Vietnam, even if it was going to have to do the idling offshore thing. They also then recommended that a similar process be followed with the cargo within a ship, putting it inside some type of box or container that was all going to the same place or military unit or whatever. Initially, they had in mind 5 ton metal "Conex" boxes, which had been used for military supply for a while but which were small and jumbled up in terms of contents. But Defense Secretary Robert McNamara, coming from the private sector, stepped in to overrule this and pointed toward the private sector's recent and rapidly growing embrace of much larger but now standardized trans-oceanic shipping containers. McLean (the modern container pioneer and still the head of Sea-Land) was one of the private sector leaders brought in to provide advice to the military and when he saw footage of the chaotic docks and barges, he began pursuing the goal of winning a contract to provide container service. He and two other employees flew to France and then Vietnam to see the various port and harbor facilities in person at several locations and he got the backing of the ILA leadership that also was touring the same facilities by coincidence to provide similar advice. McLean lobbied heavily, in an environment where the military logistics officers knew they had to do something but had no experience with the new technology, and eventually Sea-Land secured contracts for trucking

services at the Port of Saigon, container shipping to the US base at Okinawa to demonstrate the technology and its efficiencies, and then finally direct-service container shipping from the US west coast to Vietnam directly once a facility could be build in Vietnam to receive the container ships and handle their contents. The logisticians in Vietnam itself bitterly resisted the plan and delayed it as long as possible. Sea-Land ended up building a container port in the Philippines at a US Navy base as yet another proof-of-concept. Sea-Land finally offered to build the necessary terminals and cranes in South Vietnam themselves at their own cost. The proposed contract was $70 million on a fixed bid basis with all liability except enemy attack falling to the company. They were given approval in the fall of 1966 and retrofitted the temporary facilities at Cam Ranh Bay that the US military had erected the year before. They also brought a punch-card computer to help run the port and keep track of containers out for local delivery. It was up and running in 1967. The contract also guaranteed minimum numbers of containers would be shipped by the US military on various Pacific routes Sea-Land would operate to support the war effort. (Matson, Sea-Land's peer company, was also eventually awarded a contract to help provide container service to Vietnam.) The Army also guaranteed Sea-Land that all cargo that could be put in containers would be put in containers if they were coming out of the container ports in Seattle or Oakland. Excluding fuel shipments, which did not go by container, about 40% of all military cargo in 1968 went by container instead of breakbulk. The lost, stolen, or damaged cargo problem mostly disappeared. The savings were enormous. Eventually the Army renegotiated with Sea-Land to allow more of their rivals to use the Sea-Land-built and controlled container ports in Vietnam, so that traffic could be increased even more.

- The military also handed down the Three Cs directive to all teams preparing shipments from the US to Vietnam: "one container, one customer, one commodity" so they would reorganize their pre-Sea-Land methodologies for packing and bundling shipments. The Army itself also began purchasing modern, 20-foot containers directly for the first time in 1968. Army engineers began preparing plans for how to erect temporary container ports anywhere in the world at a moment's notice so that the logistical snarls of 1965 would never be repeated. McLean's lobbying for containerization of the war effort inadvertently made possible the massive escalation in Vietnam after 1965 and made it possible to do it anywhere, any time. Levinson argues that waging this war on the far side of the world was only sustainable for as long as it was because of containerization of the war's supply chain across the Pacific.
- DOD contracts delivered $450 million in revenues to Sea-Land between 1967 and 1973. But their buildout of trans-Pacific shipping to supply the US military in Vietnam, Philippines, and Okinawa (plus soon to include other nearby US bases like in South Korea) also created big opportunities for civilian shipping. Sea-Land, following the lead of rival Matson, decided to start shipping Japanese industrial goods back to the United States in empty containers returning from US military supply runs. Japan had already started building their own container ports, based on US standards, in 1967 just as Sea-Land was setting up operations in Vietnam. Japanese companies also began signing agreements with the

> container port in Oakland to do their own shipping independently of the two US companies. By the end of 1967, the era of Japanese exports to the US was already well in swing via containerization after a growing volume of imports in the breakbulk era. (The next year there were already millions of Japanese TVs being sold in the US. It nearly doubled again the year after that. p.218, ch11.)

We'll leave things off here to end part 1 now that we have the seeds firmly planted for a range of upcoming themes in our next part, focusing on the domestic side of the situation in the late 1960s and the transition through the 1970s toward global containerization and globe-bestriding supply chains, with all the benefits and enormous challenges associated.