

BREAKBULK AMERICAS

The Flaws in U.S. Ports exposed by COVID-19 Necessitates a Port Community System (P.C.S)

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Abstract & Methodology

The compiled research will examine how the COVID-19 pandemic negatively highlighted the already existing problems in the United States logistics system by demonstrating how the lack of a central organization and communication platform can hinder supply chain operations and disrupt the economy. It will propose a comprehensive solution- an automated Port Community System- that is built by improving and connecting existing infrastructure in the U.S. logistics system. The research will present an example of a successful Port Community System in the Port of Rotterdam, showing that this can be done. While disruptions occurred globally, the United States' ports' lack of adaptability was evidenced in comparison to other ports around the world, specifically those with an intentional and established Port Community System (34,35). Our research suggests that developing a central platform to be shared could assist in navigating future disruptions in the supply chain, as the economic impact of a poorly structured port system extends far beyond the port itself.

Literature review using the University of Houston online library and Academic Search Complete database for peer-reviewed academic journal articles related to Port Community Systems (P.C.S.), the performance of American ports during COVID-19, and the Port of Rotterdam along with internet search of government agencies, NGO's, trade associations, professional associations, business publications, and port websites.

Introduction

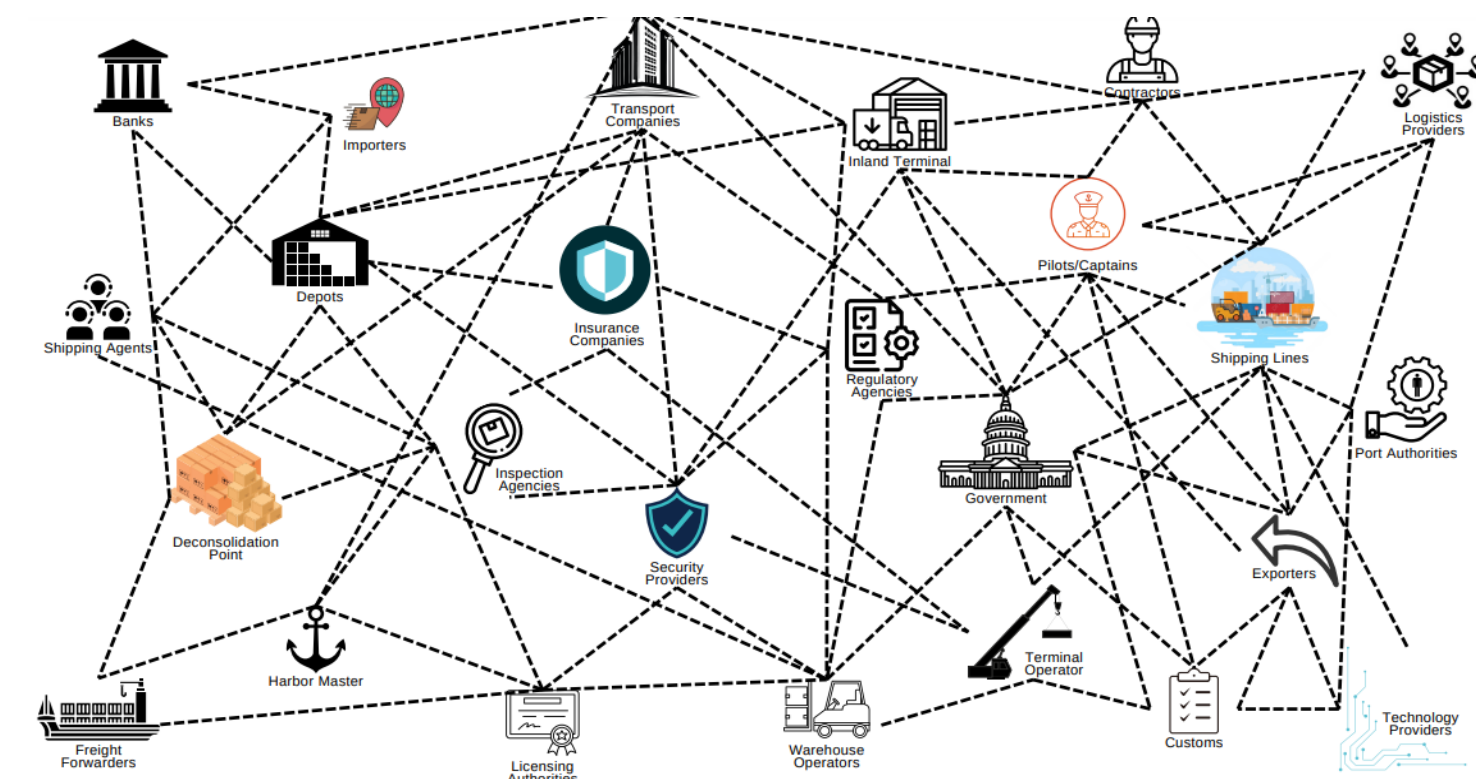
The COVID-19 pandemic significantly disrupted U.S. port operations, leading to substantial delays caused by several interconnected factors. Labor shortages throughout the port network (22) coincided with a surge in shipments from China, causing a demand shock and blank sailings, which are sailings that have been canceled by the carrier. Additionally, a nationwide shortage of intermodal chassis—specialized trailers essential for transporting containers from ports to their next destinations—exacerbated the situation. At its peak, this confluence of factors led to unprecedented port backlogs, with ships waiting days or even weeks to dock and unload. While ports have managed to reduce the backlog of ships by an average of 70%, the challenge has shifted to decreasing "dwell times," the period goods sit in port awaiting transportation (7). These delays are further compounded by disorganized port systems and practices, reduced chassis availability, labor shortages, and limited operating hours in trucking. The ongoing issues continue to hinder the flow of goods from ports to their final destinations.

60% Increase in Dwell Times

Figure 1: Port Logistics without a P.C.S. adapted from (22)

COVID-19 Disruptions in U.S. Ports

During the COVID-19 pandemic, U.S. ports faced significant disruptions, primarily due to increased dwell times and labor problems in the trucking and station operator sectors. The surge in different imports from China, particularly noticeable in the latter half of 2020 and into 2021, led to substantial delays as U.S. ports struggled to keep pace. For instance, dwell times at ports increased by 60% from pre-pandemic levels as containers waited longer to be transported from docks to warehouses (22). This issue was exacerbated by a shortage of intermodal chassis, essential for transferring containers from ships to trucks, which saw a decrease of 25,000 to 30,000 units in 2019 due to tariffs and production shortfalls (7). Truck drivers move around 71% of the U.S. economy's products nationwide. The industry has lost 6% of its workers since the pandemic began and struggles to recruit. Truckers are currently fighting with hours-of-service laws that create smaller windows for potential hours of work, which means more trucks are needed to haul the same amount of load. (13) Port truckers are often paid by the trip, so the long wait they typically experience outside port gates reduces their earnings. Truckers often face long waits to deliver loads at inland warehouses, where personnel are not ready to unload their trucks. This largely unpaid "detention time" counts toward the maximum hours they can drive daily, reducing drivers' income. (13)



Port Logistics Without PCS

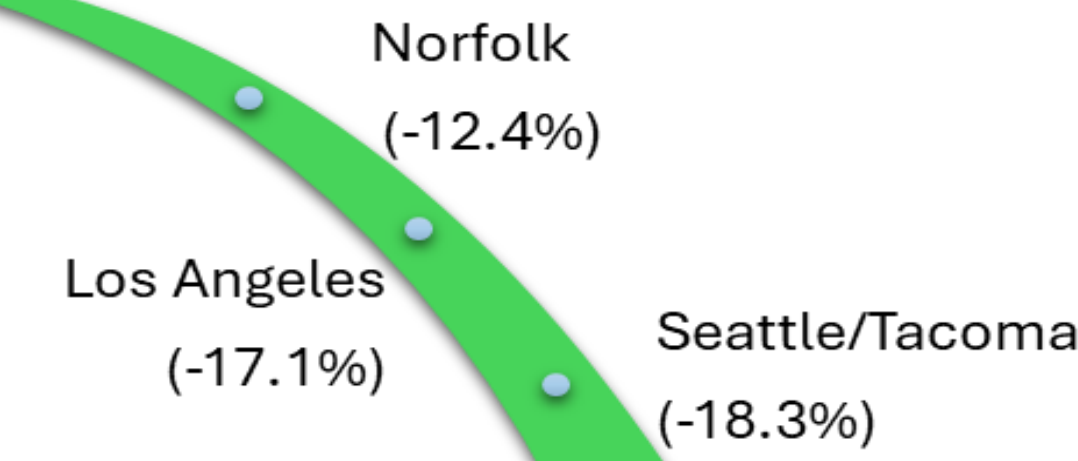
Figure 2: Port Logistics without a P.C.S. adapted from (6, 18, 43, 45)6



Successful P.C.S.

The Port of Rotterdam is in South Holland, Netherlands, and is jointly owned by The Municipality of Rotterdam and The Dutch State. The development of a PCS for the Port of Rotterdam began in the 1980s with an electronic network and messaging software. This continued to evolve into the 1990s. By 2002, Port Infolink was established as a separate governance entity by the Port of Rotterdam Authority (PRA), which then merged with PortNet of Amsterdam to become the single Dutch PCS Portbase in 2009. Portbase is funded by the Ministry of Infrastructure and Water, The Municipality of Rotterdam, and the PRA. Because of the port's location in the Nieuwe Maas Channel, it has become a gateway for European hinterlands since it enables easy transportation of goods to and from Europe (42). Before a PCS was implemented in Rotterdam, the port moved 291.8 million tonnes of cargo in the year of 1989 (5). Now after Portbase in 2023, Rotterdam moved 438.8 million tonnes of cargo (15). Portbase has reduced annual business logistics costs by an average of 245 million euros (\$ 327 million USD), providing 43 open services to its community (5). The port of Rotterdam felt some effects from COVID-19, as it affected shipping activities for the port. However, the Port of Rotterdam still transported 436.8 million tonnes of cargo across the port in 2020 (39). Portbase provided a system for the Port of Rotterdam during COVID-19 that made it easier to know vessel arrival and departure times to avoid traffic jams by using a COVID dashboard to provide specific insight. This minimized the issue of congestion that many ports, including those in the United States, faced during this same period.

Growth Rate (H1 2020)

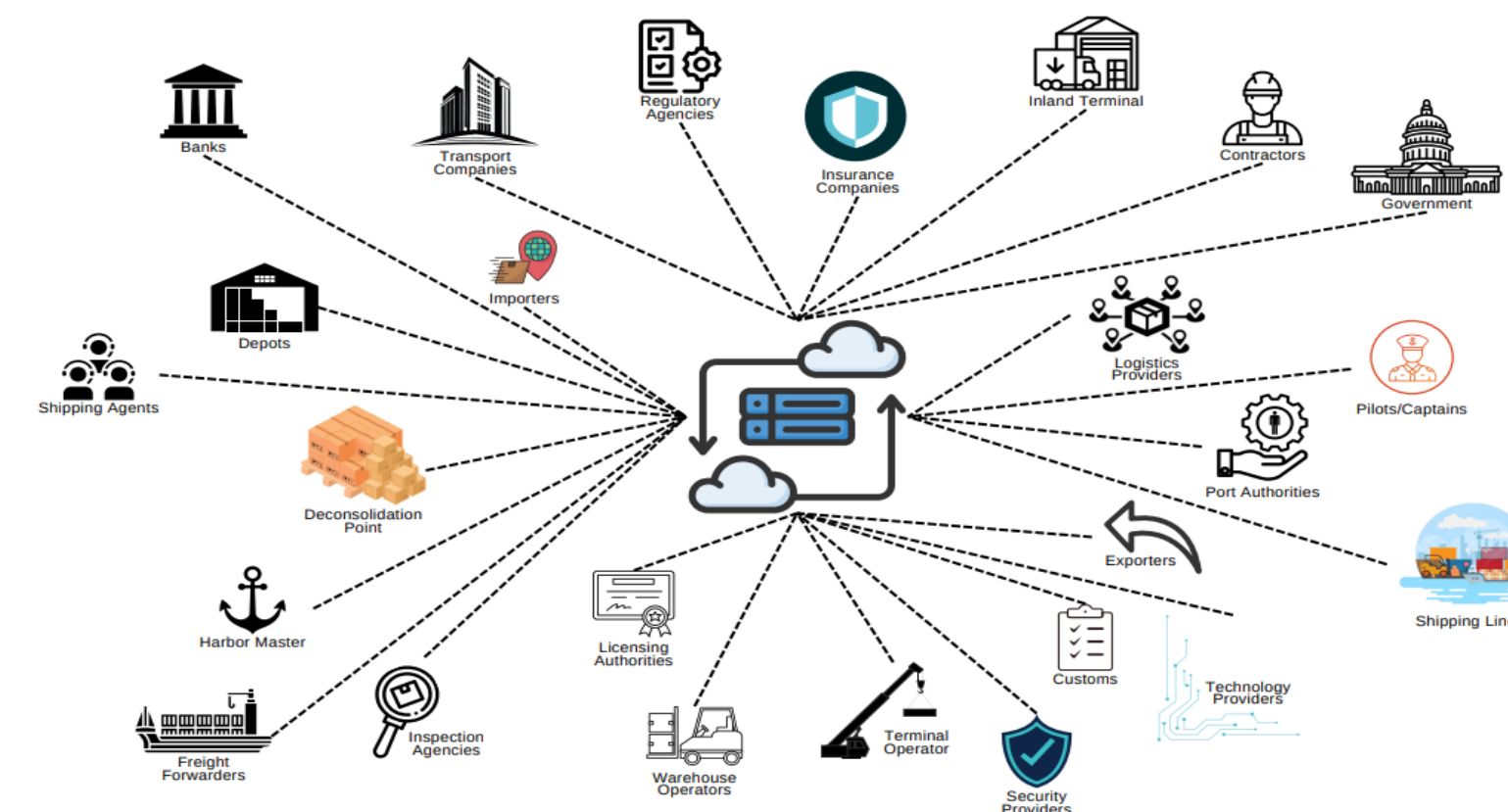


During the first half of 2020, all of the top ten major U.S. ports reported negative growth. This graphic illustrates a few of these ports most affected by this, while operations in the Port of Rotterdam were relatively unaffected.

Figure 3: Growth Rate (H1 2020) adapted from (35)

Port Community System (P.C.S.)

A P.C.S. is a digital platform that integrates and facilitates the exchange of information among stakeholders in port operations to improve efficiency, reduce operational costs, enhance the accuracy of information exchange, and reduce paper by implementing the latest technology (4). Stakeholders in port operations developed P.C.S. to respond to the new and revolutionary approach for an ecosystem metaphor: Industrial Ecology (17). "Industrial ecology is the study of systemic relationships between society, the economy, and the natural environment. It focuses on the use of technology to reduce environmental impacts and reconcile human development with environmental stewardship while recognizing the importance of socioeconomic factors in achieving these goals" (17). By streamlining port operations and practicing industrial ecology, P.C.S. not only mitigates operational challenges but also establishes a foundation for sustainable and resilient port operations in the evolving global landscape.



Port Logistics With PCS

Figure 4: Port Logistics with a P.C.S. adapted from (6, 18, 34, 45)



Application of a P.C.S. in the United States

Creating a successful Port Community System (P.C.S.) requires collaboration with the Federal Maritime Commission (F.M.C.) to establish a standardized framework, ensuring seamless coordination across different levels of government. Utilizing F.L.O.W. (Freight Logistics Optimization Works) to centralize real-time data enables smooth information exchange and enhances communication throughout the supply chain. Funding models such as public funding, public-private partnerships (P.P.P.), or private funding can be implemented to kickstart operations. Sustained funding can be achieved through an annual subscription fee, fees based on the number of E.D.I. transactions, or fees calculated by TEU/Tons of goods moved through the port (10). Significant investments in technology, digitization, cybersecurity, infrastructure, and automation are pivotal to elevating port logistics. Integrating A.I., machine learning, IoT devices, and blockchain will revolutionize ports into intelligent, automated ecosystems, reducing errors and expediting processes. As data becomes the backbone of port operations, establishing a comprehensive legal and cybersecurity framework is crucial to safeguard sensitive information and ensure secure communications in compliance with the International Maritime Organization (I.M.O.) standards (10). Integrating P.C.S. with U.S. Customs and Border Protection (C.B.P.) and the World Customs Organization (W.C.O.) will streamline customs processes, minimize delays, and optimize supply chain efficiency, ultimately leading to expedited service for customers (10). Pilot programs in major ports like Los Angeles, New York, and New Jersey will serve as testing grounds to refine the system before a nationwide rollout. The successful implementation of P.C.S. will connect ports across the U.S., creating a unified network that enhances data sharing and operations.



Figure 5: Port Community System. adapted from (34)

Conclusion

The COVID-19 pandemic has emphasized the need for a unified P.C.S. in U.S. ports. Unlike leading ports such as Rotterdam, fragmented systems in U.S. ports complicate communications and disrupt logistics. Implementing a national P.C.S. would centralize real-time data, enhancing coordination between port authorities, shipping lines, and logistics providers and thereby elevating U.S. ports to a globally competitive status. Efficient operations with fast turnaround times and reduced costs are imperative for customer satisfaction and loyalty. A P.C.S. will enable port agility, ensuring reliable, synchronized, and responsive logistics services. It is a proactive measure to future-proof U.S. ports, driving innovation, fostering collaboration, and preparing ports to tackle new challenges. Embracing a national P.C.S. positions U.S. ports as pioneers of operational excellence in efficiency, innovation, and resilience, providing a model that the rest of the world will look to follow.

Citations



Meet the Team

