

Supply chain research studies ways to keep things moving

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Credit: Penn State Harrisburg

Every day, thousands of items – from clothing to heavy equipment – arrive at U.S. ports, destined for retail shelves, warehouses and other locations across the country. According to Penn State Harrisburg's Peter

Swan, associate professor of logistics and operations management, 40 percent of all U.S. cargo comes through west coast ports alone, representing \$2 billion daily to the economy. An event like the work slowdown by longshoremen at these ports earlier this year can have a significant impact on getting goods to their final destination.

Supply chain management, or logistics, is the complex process by which goods arrive at a particular destination when they are most needed – something most of us don't think about much. But these issues are the subject of pioneering research by faculty at Penn State Harrisburg.

"If a supply chain is working well, it is probably invisible to people," says Richard R. Young, professor of supply chain management. "The only time people get excited about the supply chain is if it is not working – if there is no gas or toilet paper when we need it."

Reducing vulnerability

Swan studies how disruptive events, known as "black swans," impact the supply chain management of retailers that rely on U.S. ports to import goods.

Major retailers like Walmart and Home Depot used to import all Asian goods through the Port of Los Angeles. Since 2000, several major disruptions have occurred at this port, mostly involving labor disputes like the one this year. More weather-related disruptions at U.S. ports, similar to the impact of Hurricane Katrina on New Orleans and Hurricane Sandy on New York, also can be expected, Swan says. Terrorist events are another potential black swan, he adds.

The biggest retailers, like Walmart, already have adjusted. They no longer depend solely on Los Angeles but rely on a mix of ports, including Seattle, Houston, Charleston and New York, Swan says.

The biggest retailers have the resources to adjust on their own, so Swan sees his research as of greatest benefit to mid-level retailers like Staples and Toys R Us, which typically import up to 50,000 20-foot containers (or their equivalent) in a year. By comparison, Walmart imported over 731,000 containers in 2013, followed by Target which imported more than 500,000.

Young has studied the vulnerability of U.S. ports to terrorism and weapons of mass destruction, research funded by a \$250,000 federal grant from the Defense Threat Reduction Agency.

"We talked to dozens of parties – government agencies, container shipping lines, port authorities, industrial firms, banks, insurance companies and freight forwarders [who arrange maritime shipping]," Young says. This resulted in us "making a whole series of recommendations, from training freight forwarders to simplifying some of the regulations that pertain to international transactions."

In his research, Young also applies supply chain management principles to improve the flow of materials from governments, nonprofit agencies and private companies to natural disaster victims. He and co-researchers analyzed after-action reports submitted following Katrina, Sandy and the 2010 earthquake in Haiti.

These reports show public-private partnerships are best equipped to respond during a natural disaster, but agreements must be in place before disaster strikes. As an example of how this is done effectively, Young points to mutual aid agreements that make it possible for power companies from multiple states to respond when a major winter ice storm occurs in a specific location.

"Most supply chains are built with an eye toward improving service and reducing cost. This research has relieving human suffering as the proxy

for customer service. We can reduce human suffering," Young says.

Improving efficiency

Dinesh R. Pai, Penn State Harrisburg assistant professor of supply chain management, has studied how the "complexity" of the import process contributes to costs incurred by multi-billion dollar companies based in the U.S.

Complexity includes factors like number of suppliers, whether these suppliers are independent or subsidiaries, and whether the company relies on one port or many. Government rules and regulations also add to complexity, Pai says.

How well a company manages complexity can impact how long it takes goods to clear a port following arrival. The longer it takes, the more likelihood for increased costs that get passed on to consumers, Pai says.

Closer to home, Pai hopes to include hospitals and other medical providers in the greater Harrisburg region in research on how supply chain management can help these entities reduce the cost of doing business.

"Health care facilities are looking for ways to cut their cost to improve the bottom line," Pai says. "One way to do that is to streamline [supply chain management](#). Approximately 35 to 50 percent of any health care facility's costs are the costs of operations. There is a huge scope to bring down some of these costs."

Provided by Pennsylvania State University

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