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The Impact of New Information Technologies on U.S. Containerized Agricultural Exports (Summary)

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This is a summary of “The Impact of New Information Technologies on U.S. Containerized Agricultural Exports” by Cyrus Ramezani and Chris Carr.¹ This research and analysis received funding from USDA’s Agricultural Marketing Service (AMS) through cooperative agreement number 20-TMTSD-CA-0007. The opinions and conclusions expressed are the authors’ and do not necessarily reflect the views of USDA or the Agricultural Marketing Service. The full report is available online at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4014603.

WHAT IS THE ISSUE?

Recent advances in data collection and information-sharing technologies have the potential to streamline containerized agricultural exports, reduce costs, and facilitate real-time data sharing among agricultural export logistics providers. Despite the advantages these digital technologies offer, agricultural exporters and logistics providers have been slow to adopt them. Would-be users are often discouraged by a variety of challenges, including high initial costs, fears of losing control of proprietary data, and lack of coordination across the supply chain. Partly because of the new technologies’ barriers to entry, the agricultural export industry is deeply fragmented—characterized by many disparate systems that are not well connected. Plus, many firms still use “legacy systems” based on older software that is incompatible with information-sharing technologies.

HOW WAS THE STUDY CONDUCTED?

The methodology for this study was investigative in nature. First, the authors gathered the views of various stakeholders, such as exporters, truckers, port officials, maritime terminal staff, chassis providers, and technology companies. They also analyzed relevant reports and analyses, from government, vendors, and industry stakeholders. To better understand the products themselves, the authors viewed relevant product demos and gathered the experiences of end users. Finally, the authors participated in industry sponsored events (e.g., webinars and professional conferences) and engaged with researchers and journalists who focus on information-sharing technologies.

¹ Cyrus Ramezani and Chris Carr are professors in California Polytechnic State University’s Orfalea College of Business.

WHAT DID THE STUDY FIND?

Integrating Agricultural Export Logistics Technologies

The study found enterprise resource planning systems, warehouse management systems, and transportation management systems all play key roles in the agricultural export supply chain. However, the use of these systems—especially for small- and medium-size agricultural exporters—is highly fragmented and typically involves little to no communication between systems. This is especially true across the various nodes of the supply chain—e.g., among exporters, transportation equipment owners, ports, ocean carriers, trucking companies, and railroads.

The study emphasized the need for integrating these fragmented systems to maximize and streamline communication among all the various supply-chain functions. The authors found application programming interfaces (APIs) could play a key role in this process by allowing software from different enterprise systems to communicate in real time, and in a less rigid fashion than legacy systems allow. If adopted across all participants in the supply chain, APIs would allow technology teams from all sides to reorient their integration strategies to make the system, as a whole, faster, and cheaper. One logical starting place seems to be establishing API connections between trucker transportation management systems and the enterprise resource planning systems used by the shippers, ports, terminals, railroads, chassis providers, and ocean carriers. Over the last few years, the Ports of Los Angeles and Long Beach have begun experimenting with API connections between drayage companies and marine terminals.

Some vendors are also looking to create a “holy grail” single logistics platform that integrates these systems to overcome the current information-disconnects. However, to achieve this goal will ultimately require coordination among not only technology providers and all the various supply chain nodes (including shippers, exporters, ports, marine terminals, chassis providers, etc.), but also banks, insurance companies, government agencies and their enterprise systems. Given the complexity involved, the authors noted it is unclear whether such a platform will continue to be developed in a way that fully meets the needs of agricultural exporters.²

Possible Benefits of the New Technologies

Chassis management. Currently, although chassis providers are frequently well integrated with ocean carriers and terminals, their communication is inefficient. The typical way chassis providers provide information to stakeholders, such as exporters and trucking companies, is through websites, mobile apps, and email. These passive communication systems are time consuming, as they require stakeholders to continually check for updated information. Another inefficiency of the current process lies in stakeholders’ inability to simultaneously book both a container and the chassis to carry it. Potentially, location-sharing devices attached to chassis could help to resolve these inefficiencies: the devices collect information on variables such as location, speed, direction, distance, tire pressure, and whether the chassis is mounted.

When the authors explored the feasibility of attaching location-sharing devices to chassis, they found chassis providers are deterred by both technical and financial constraints. From a technical perspective, it is unclear where on the chassis these devices would attach, given the non-standardized mix of existing chassis equipment, as well as the need to protect the devices from theft and from the wear of regular use (e.g., stacking and unstacking). Another technical hurdle is created by the scale of installing location-sharing devices on 20,000+ chassis that move continuously throughout the West Coast. Furthermore, because location-sharing devices are expensive, they have been used only for high-margin products, and have yet to be used with agricultural exports. So far, chassis providers and shippers agree that the benefits of location-sharing devices for hauling agricultural exports do not yet justify the costs.

Street Turns. “Street turns” represent a long-time, elusive industry goal that could be facilitated by better integrating data among links in the supply chain. A street turn (also sometimes called a “matchback”) is a maneuver that matches an import container move with an export container move to eliminate empty containers traveling to and from the port. The steps involve a carrier picking up a loaded import container; delivering it to its destination; and (instead of returning the empty container to the port) using it to pick up other export cargo before returning to the port.

² An effort at the Federal level is the [U.S. Department of Transportation’s Freight Logistics Optimization Works \(FLOW\) program](#). FLOW is a government and industry partnership to exchange forward looking and near-time information between supply chain stakeholders (e.g., marine and surface transportation carriers, terminal operators, and warehouse) to provide a common picture of goods movement throughout the supply chain.

By avoiding returning an empty container to the port of origin (as is often done), a successfully implemented street turn offers savings to the various parties involved—ocean carriers, shippers, truckers, etc. Better data integration among ocean carriers, trucking companies, and exporters could help make coordinating street turns less complicated. However, even with better data sharing, accomplishing a street turn, in practice, raises significant logistical obstacles. Several vendors offer technological products to facilitate street turns, but at this point, the authors found these technologies have remained more aspirational than proven.

Recommendations

Based on the report findings, the authors propose the following recommendations to increase the industry's rates of adopting data-sharing technologies:

- Establish State/Federal Government funding for education and training events;
- Include technology, data sharing, and API integration in broader discussions about the state of supply chain infrastructure;
- Create common technology standards for the industry;³
- Start an agricultural cooperative for digital information technology; and
- Provide incentives for adopting new technologies.

PREFERRED CITATION

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³ The report specifically references the Digital Container Shipping Association (DCSA). The DCSA aims to be the de facto technology standard-setting body for the container shipping industry. Examples of DCSA initiatives include electronic bill of lading (eBL), Internet of Things (IoT) for Smart Containers, and just-in-time port calls.