Metrics and key indicators can help a port improve its performance, if used in a meaningful way

By Kathy A. Smith

The job of determining what data and key performance indicators ports need to track and monitor is an ever-evolving one. One size does not fit all as performance measures are assessed based on a variety of factors – operations, facilities and geography, just to name a few. However, metrics are now playing a much larger role in the business of shipping, particularly as customer – and government – expectations are changing.

“There is a real substantial lack of transfer of information between what is really a very highly-siloed supply chain,” said Mike Christensen, senior executive lead for supply chain optimization for the Port of Long Beach. “Particularly siloed information related to inbound vessels. Also information related to the utilization of shifts and gate hours.”

Earlier this year, the Port of Los Angeles and the Port of Long Beach created a Supply Chain Optimization Program after the Federal Maritime Commission agreed to allow the two ports to cooperate on finding new ways to prevent congestion and cargo delays, among other initiatives. “We’ve seen tremendous value in opening up the lines of communication and going beyond the contractual lines that have been established,” said Christensen.

The Supply Chain Optimization Program has two working groups that include beneficial cargo owners, steamship lines, several marine terminal operators, railroad representatives, chassis pool operators and several licensed motor carriers that do drayage work. The Peak Season 2015 group has been charged with developing solutions that could be immediately implemented during the peak season. The second working group is concentrating on specific container terminal issues.

One of the reasons there are issues with data intel moving between the complex supply chain relationships is the proprietary nature of much of the information. “When you look at who can filter that, there aren’t very many entities,” said Christensen. “The two San Pedro Bay ports are going to need to take on a new role and become the honest broker of that data, in first obtaining and filtering it, then making it available.”

As far as port efficiency, the ports of LA and Long Beach are currently benchmarking performance against the Port of New York & New Jersey and Seattle and Tacoma. “I have to tip my hat to Rick Larrabee and his team at New York/New Jersey because they’re about a year ahead of us in their port efficiency,” said Christensen. “We’re learning from other AAPA members and taking lessons and applying them to what we believe are some unique circumstances in San Pedro Bay and hope to share what we learn as well. We’re all competitive but from a professional standpoint, we’d like to see the standard increased for everyone.”

Earlier this year, the U.S. Senate incorporated new port performance requirements into a larger surface transportation bill, which Congress should finalize this fall. The latest Senate provisions call on the U.S. Department of Transportation to collect certain port performance metrics.
Christensen said, “We’re not averse to having port performance standards. We’re monitoring the developments of this legislation closely and continue to work with Sen. Thune and Commerce Committee staff to resolve issues of access to metrics, as well as the need for a high degree of flexibility in any standards adopted. What was meaningful two years ago may not be as meaningful today, so highly precise metric requirements that are legislated have an extraordinarily high probability of not being applicable if circumstances change.”

The Port of New York & New Jersey’s Council on Port Performance (CCP) has been hard at work on several different fronts. The council was formed in August 2014 as a follow-on group after the Port Performance Task Force (PPTF) was created in late 2013. The CPP is a consortium of industry representatives who are working to increase service reliability and efficiency.

One of the 23 recommendations the PPTF put forth in its final report issued in June 2014 was to focus on key performance indicators. “Most ports, if not all ports, have been only talking about volume of activity,” said Bethann Rooney, the Port Authority of New York & New Jersey’s assistant director, port commerce department. “Those numbers are important, but they don’t talk to performance and productivity.”

In 2014, the CPP began collecting four important metrics it identified that could be used to predict problems. These markers included details on gate moves, inventory levels, container dwell time and trouble tickets. By looking at the data on a week-by-week basis in the aggregate across the port, it can better predict, assess and act on changing variables.

On the topic of the Senate’s port performance provisions, Rooney said, “In comments to the legislators, we’ve attempted to focus the bill on things that make sense and not just collecting data for the sake of collecting data. In doing that, it’s critical that we not compare one port to another or one terminal in a port to another terminal in a port. Instead, compare to itself and its past performance.”

Radio frequency identification tags (RFID), optical character recognition cameras and differential global positioning systems are used at the Port of Savannah to track various terminal events and movements. “Those three elements of technology roll into what we refer to as our terminal operating system, or TOS,” said Executive Director Curtis Foltz. “It’s the computer system that both collects all this data and runs our terminal.”

Monitoring begins with anticipated vessel arrival. A seven-day ship schedule report is updated every 12 hours. After arrival, several activities are measured. For example, the number of crane moves per hour, in addition to recording any downtime that may occur from equipment issues.

Train arrivals and departures are measured similarly, but container and shipment dwell times are measured by the day. “Those measurements are done on behalf of customers wanting to know how quickly their cargo is either being unloaded or loaded on a train to go to its destination,” Foltz said.

On the truck side, the port measures queue time, as well as turn time. Separate records are kept for standard and refrigerated containers, and the data is further broken down by import, export and empty units. “We finish with an average productivity per working hour per crane while working on a ship, and the total productivity of a ship in terms of containers moved per hour while the ship was at berth,” Foltz said.

In Canada, the Port of Prince Rupert has recently installed a Port Enterprise System, a technology platform that helps centralize and manage all the data it gathers on various port activities.

The data pulled from the system enables the port to identify areas of improvement in service or to highlight infrastructure investment priorities. “We look closely at how terminals are performing, berth utilization, rail car supplies, crane productivity and overall transportation time,” said Shaun Stevenson, vice president of trade development and public affairs. “We’re constantly monitoring and benchmarking ourselves against
competing gateways.”

He said looking at performance measures through the entire trade lane perspective continues to evolve. “I think [data] serves to be the basis of collaboration and of greater supply chain visibility for the users of the system. And that’s what the market is demanding.”

Donald Ludlow, managing director of CPCS Transcom’s operations in the U.S., a management consulting and strategic advisory firm, suggested that most ports are not taking full advantage of readily-available Automatic Identification System (AIS) data to optimize operations and strategic planning.

“It’s a very robust source that I think people are starting to tap for a number of marketing and analytic purposes,” he said. He also said that many ports are not yet capturing big data streams for performance measures: “It’s an area where I think we’ll see a lot of interest and growth in the future.”

However, he cautioned: “It takes understanding how to strike that balance between getting the right data to really affect efficiency and getting too much data and spending time managing it all.”

As is evident, deciding what data is important to capture is unique to each entity. “There are also some metrics tied to the work rules of longshore unions and paying employees who are not physically moving cargo,” said Paul Bingham, vice president of the Boston-based EDR Group, a firm that studies economic impact on industry. “What’s really important is consistency over time for the same measures, so you’re comparing apples to apples in terms of port productivity.”

A 2010 industry report, titled Improving Marine Container Terminal Productivity: Development of Productivity Measures, Proposed Sources of Data, revealed just how extensive variables are in determining performance. (The report was a joint effort between MARAD and several industry port and terminal operators.)

Dan Smith of The Tioga Group, Inc., who helped prepare the report for the Cargo Handling Cooperative Program, highlighted some of the factors. For example, researchers looked at data on the length of berths, how deep the water was at the berths, how much acreage was available, and how many cranes were used in order to determine overall capacity. An often-overlooked factor in that equation is time – whether or not a terminal operates eight or 16 hours a day, for instance.

Other factors that have varying impacts on ports also included measuring TEUs per acre. The numbers will differ greatly depending on stacking configurations. In Hong Kong and Rotterdam, where land is expensive, ports may stack containers higher than their North American counterparts. Yet a new facility here can have lower numbers as its utilization is expected to grow with future traffic.

“At the time we worked on the report, we found a lot of U.S. terminals had excess capacity. Since large ports tend to be made up of multiple terminals, even within a port, there were some terminals that were very busy and others less utilized,” explained Smith.

The change in vessel mix with the advent of mega ships is bringing a lot more concentrated activity to ports, and the peak times can be challenging to handle. Annual throughput may stay the same, but higher costs can be incurred due to the need to use more laborers and machines to get the work done in shorter periods.

Other factors beyond metrics also have to be assessed in gauging overall performance. The Port Authority of New York & New Jersey has been dealing with an influx of post-Panamax ships from Asia transiting through the Suez Canal. It also had to handle a spike in traffic due to West Coast ports labor issues, and the port had to contend with one of the region’s worst winter storms that arrived in late in 2014. Meanwhile, the U.S. West Coast ports, while under fire during the recent long labor dispute, have also been involved
in the ongoing transition from wheeled terminals to stacking terminals – a necessary shift due to the ocean carriers removing themselves from the chassis business. As Smith pointed out, it can take multiple seasons to prepare those terminals for this new way of operating.

“Each terminal has a different story,” he added. “And I think anybody who latches on to one single measure and tries to simplify the whole thing is going to mislead themselves.”

JOC Ranks Port Productivity

The Journal of Commerce recently released its 2014 Port Productivity rankings, based on seven elements provided by ocean carriers representing more than 75 percent of global capacity. Those data points are: vessel name, terminal name, port city, port country, berth arrival, berth departure and number of moves (including lift-ons, lift-offs and re-stows).

Berth arrival and departure refer to lines down and lines up — that is, the actual arrival and departure of the ship at berth. The calculation of moves per hour between these two times is referred to as unadjusted gross berth productivity.

It’s the same calculation for all 483 terminals and 771 ports the JOC evaluates, allowing for basic apples-to-apples comparison globally. The data enters a data warehouse in standardized format so that it’s accessible for reports, rankings, analysis and other uses.

Rankings were determined by analyzing more than 125,000 port calls in 2014.

Productivity is defined as the average of the gross moves per hour for each call recorded in 2014. Gross moves per hour for a single vessel call is defined as the container moves (onload, offload and repositioning) divided by the number of hours the vessel is at berth.

Top 10 ports in the Americas (based on average 2014 container moves per ship, per hour on all vessel sizes) were:

1. Balboa (Panama)
2. Baltimore (U.S.)
3. Lázaro Cárdenas (Mexico)
4. Pointe-à-Pitre (Guadeloupe)
5. Los Angeles (U.S.)
6. Prince Rupert (Canada)
7. Long Beach (U.S.)
8. Mobile (U.S.)
9. Charleston (U.S.)
10. Savannah (U.S.)

For more news and information about productivity at global ports, please see JOC.com’s dedicated Port Productivity section at www.joc.com/special-topics/port-productivity.