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CHECKINGIN

Felecia Stratton

by Felecia Stratton | **Editor**

Supply Chain Therapy Strikes a Balance

There's nothing like a spur-of-the-moment urge, then splurge, to improve temperament. Retailers today are all too willing to facilitate "retail therapy" and oblige customers by making it easier than ever to satisfy their random impulses. Advertising–subliminal or overt–is quick to connect happiness with material possession, regardless of what kind. Then the supply chain takes over.

Retailers are hyper-sensitive to consumer proclivities because they have to be. Demand forecasting is a competitive differentiator, especially when consumerism is fickle in a rebounding economy. Knowing whether a product is likely to sell or not triggers new product orders, then fulfillment, inventory management, and replenishment machinations that keep supply flows in check with demand. Stocking too little or too much can make a world of difference at the bottom of a balance sheet.

As retailers look to grow their business, the challenge becomes exponentially greater–especially as new channels emerge. Amy Roach Partridge's article, *You Are Everywhere: Mapping the New Retail Supply Chain* (pg. 36) explores how apparel retailers are managing an increasingly diverse supply chain stream that includes brick-and-mortar stores, outlet locations, e-commerce sites, social and mobile commerce, catalogs, pop-up stores, and broadcast retail.

The pharmaceutical sector has found a similar purpose by steering strategy toward a more conventional means–reducing costs. In *Navigating Pharma Logistics* (pg. 54), Merrill Douglas reveals that while pharma companies have long relied on supply chain management best practices to deal with temperature control, security, chain of custody, and regulatory compliance, a trend to outsource certain logistics functions–especially as popular drugs come off patent and profit margins shrink–is emerging.

The food service industry illustrates another example. Restaurants want speedy replenishment so they can order in small quantities, use fresh produce, and reduce spoilage. Consumers want their orders faster–and cheaper–without sacrificing quality. When consumer and market pressures pull restaurants in different directions, the supply chain logically becomes a pivot for balancing these opposing challenges to find shared gains. You can read about this in *Restaurant Logistics: Serving Up the Perfect Meal* (pg. 47).

Regardless of industry, supply chain management is an important platform–internal therapy group even–where organizations can exorcise the inevitable costs and inefficiencies that come with brand building and market expansion. It's a place where marketing impulses, logistics constraints, and operational reality converge and strike a balance. ■

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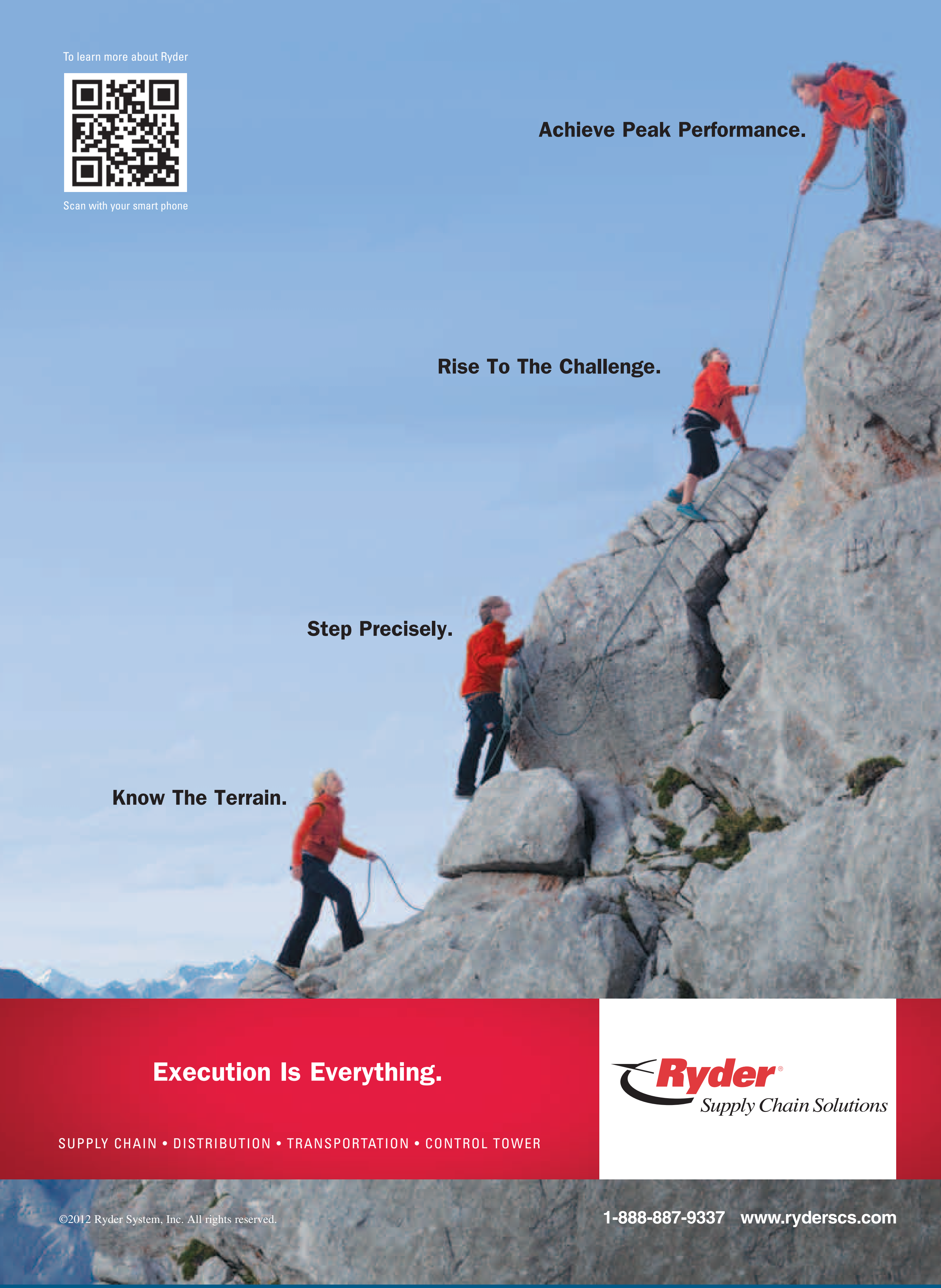
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Neighbors to the North

Everybody here at Paradox Software Consulting loves your magazine. Can members of my team working from Canada subscribe? It will be a pleasure, not a favor.

—**Ellie Glenn,** President, Paradox Software Consulting

Editor's response: Please direct your Canadian colleagues to subscribe to our free digital issue for access to all our supply chain and logistics coverage: http://bit.ly/IL_Sub

A Tip of the Hat to Panama

I recently read the article *Beating the Odds in Latin America* (June 2012). As a supply chain professional from and working in Panama, I was pleasantly surprised that the article's cover art included a casino chip with the Panamanian flag.

Panama is a key country for global logistics due to the Panama Canal. In addition to this, we have become a logistics hub for Latin America because of our solid logistics infrastructure, which includes the two biggest port cities in Latin America by TEUs, the second-largest free trade zone in the world, an ocean-to-ocean railway connecting Pacific and Atlantic ports, and an important airfreight hub at Tocumen International Airport.

All these logistics assets have resulted in a large number of multinational companies choosing Panama for their Central America, Caribbean, and northern South America distribution centers. We have been able to attract top pharmaceutical companies, including Pfizer, Roche, and Novartis; electronics firms such as Sony, Panasonic, Samsung, and LG; and consumer goods firms, including Adidas and Payless Shoes. These firms together sell more than $4.5 billion out of the Colón Free Trade Zone every year, making this area a key commercial and logistics center for the region.

Although we still have some challenges, Panama has been able to "beat the odds" and set up a world-class logistics center.

—**Cristian Smith Cain,** Director, J. Cain & Co.

Military Leaders

Thank you for your great article *Battlefields and Boardrooms* (June 2012). In my job at Northrop Grumman, I routinely interact with former military members now working in the private sector. Actually, one of our executives is a former Navy admiral, and an exceptional leader within the company.

With the current defense cutbacks, the need for superior logistics is critical for our military, as it must sustain and maintain products for longer periods than anticipated, and ensure spares do not become obsolete.

—**Amy Akmal,** Northrop Grumman Aerospace Systems

A Green Resource

I was surprised to read in your April 2012 article *Packaging Grows Green* the statement by Oliver Campbell, director of procurement at computer manufacturer Dell, that no packaging materials exist that are "locally sourced, cleanly manufactured, constructed from plentiful and sustainable agricultural waste materials, high performance, low weight, moisture- and heat-resistant, food-grade, and priced lower than petroleum-based materials."

In fact, Pratt Industries makes boxes and packaging solutions from 100-percent post-consumer waste paper and boxes. Our manufacturing process does not kill any trees, and saves thousands of gallons of water and other resources.

—**Jerry Ward,** Regional Operations Manager, Pratt Industries

Department of Corrections: The July 2012 article *Loading Dock Safety: No More Risky Business* was contributed by Joe Manone, president/CEO, Rite-Hite Products. In the same issue, the source for *The Last Mile* was www.scm-operations.com.

by Deborah Catalano Ruriani

Ensuring Routing Guide Compliance

When vendors fail to comply with shippers' routing guide instructions, all parties involved experience frustration. To improve compliance, shippers must provide clear and concise instructions about how they want their freight to move. Here is advice on ensuring routing guide compliance from Harold B. Friedman, senior vice president of global corporate development at freight payment and auditing service provider Data2Logistics.

1 **Make your routing guide easily accessible.** Post the routing guide on your Web site. If you don't have the ability to host the routing guide on your site, many services can do it for you.

2 **Keep routing guide information current.** If a carrier is no longer in business or is no longer a preferred carrier, make sure you update your routing guide immediately to prevent non-compliance.

3 **Be upfront about chargebacks.** Your purchase order should stipulate that you will charge vendors back for the cost of non-compliance, plus a fee for the violation. Non-compliance creates a situation where you have to handle an extra carrier at your dock. It is not unusual for best-in-class companies to add non-compliance fees—and it gets vendors' attention.

4 **Create a point of contact within your company.** Vendors will inevitably have questions regarding carriers. By providing a point of contact at your company, you eliminate guesswork for the vendor—and provide a live person to speak with if specified carriers are unavailable to pick up the freight.

5 **Stipulate the criteria for mode selection.** For example, all shipments weighing less than 50 pounds should be sent via a parcel carrier.

6 **Clearly state the actions required.** Your purchase order should state that, as part of the terms and conditions for purchasing the vendor's product, the vendor must select a carrier to deliver the product in accordance with your routing guide, or one of your preferred carriers, if specified.

7 **Be specific about geography.** If your routing guide is segmented by region, clearly identify the geography that is included in a region. Use states or ZIP codes to define regions.

8 **Provide carrier contact information.** Include the name, address, phone number, e-mail address, and any other pertinent information carriers provide. This will make it easier for your vendors to do business with them.

9 **Divide carriers into categories.** The routing guide should list carriers by mode and weight breaks that you want applied in the carrier selection process. This will help the vendor understand your threshold for less-than-truckload vs. truckload carriers.

10 **Identify a process for premium freight.** If a customer is late ordering a product and requires expedited delivery, the routing guide should detail the procedures the vendor should follow, in addition to the carrier it should use —for example, the vendor may be required to obtain a premium freight authorization number. ■

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READER PROFILE

as told to Merrill Douglas

Sherry Askew is transportation manager at Revlon Consumer Products in Oxford, N.C. She has held this position since 2010.

RESPONSIBILITIES

Managing pricing and contracts, analyzing data, and serving as a liaison with the freight payment provider for Revlon's U.S. and Canadian transportation, both inbound and outbound.

EXPERIENCE

Retail associate, data entry clerk, buyer's secretary, Rose's Stores Inc.; administrative assistant in customer service, executive administrative assistant to the vice president of transportation, transportation administrator, Revlon Consumer Products Corporation.

EDUCATION

Institute of Logistics Management, certification in logistics, 2000; Barton College, business administration, 2008-2012; plans to transfer to East Carolina University to major in logistics.

Sherry Askew: Beauty Calls

I DISCOVERED MY PASSION FOR TRANSPORTATION when I moved from the customer service department at Revlon to become executive assistant to the vice president of transportation. The son of a truck driver, he lived and breathed transportation. His enthusiasm rubbed off on me.

He encouraged me to pursue a certification in logistics, and when I earned that, he promoted me to transportation administrator. I love transportation because it's fast-paced, with constant activity. Transportation is responsible for making things happen from the beginning, when the product is just a collection of raw materials, all the way to delivery to the customer as finished goods.

Revlon successfully manages just-in-time raw materials delivery without spending money on expedited freight. One reason we've done so well is that most of the suppliers that ship materials to our manufacturing plant in Oxford, N.C., are located in the Northeast. A lot of freight flows into that region, leaving carriers looking for backhaul loads. This demand enables us to negotiate good rates.

We found a niche carrier based in Greensboro, N.C., that makes overnight runs from the Northeast, and serves Kennedy International Airport in New York. Before we found this carrier, it took two or three days to get product out of the Northeast, unless we paid three to four times the regular less-than-truckload rate to an expedited carrier. Now we have our shipments the next day.

Right now, I'm excited to be working on a project that is a first for our company: implementing a single freight payment provider for global transportation.

The Big Questions

What's the worst job you've ever held?
When I was 14, I worked on my uncle's tobacco farm, placing tobacco leaves on a conveyor belt. I worked next to an elderly lady, and every day she swatted me on the back of the head with wet tobacco.

Do you have a guilty pleasure?
Every chance I get, I head to Wilmington for a day at the beach.

Is there something you love to do, even though you're not especially good at it?
Dancing the Carolina Shag.

Last three books you read?
EntreLeadership by Dave Ramsey; *Choosing to See* by Mary Beth Chapman; and *Don't Waste Your Life* by John Piper.

Favorite Revlon product?
Revlon Ultimate Lipcolor.

Today, when the chief financial officer wants to know the company's global transportation spend, staff in Revlon offices around the world must pull data from different systems, then someone compiles it.

With one freight payment vendor operating on a single system, the CFO will be able to access the information easily.

I'm tasked with finding a provider that can handle all our business in the United States, Canada, Asia-Pacific, Australia, Latin America, and Mexico. Then we'll need to modify the processes used in the various global organizations to match the already-successful U.S. and Canada operations.

One of the proudest moments in my career occurred in 2010, when I received an employee recognition award for my efforts to improve Revlon's international inventory flow.

Our three-person team implemented a container and trailer pooling process to give our distribution operations greater flexibility in accommodating international markets. It resulted in more efficient product flow and cycle time.

For example, we improved the cycle time to Mexico by more than two weeks. We also reduced the number of touches required to move freight to Latin America, and we achieved savings.

The company recognized me in front of the entire global organization. That certainly boosted my morale. ■


The new way to view your supply chain

NOTED

THE SUPPLY CHAIN IN BRIEF

UP THE CHAIN

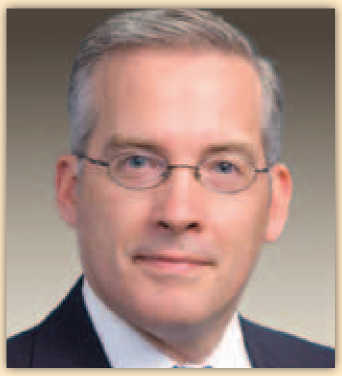
Jim Lawrence succeeded Barry Moullet as senior vice president and chief supply chain officer for **Darden Restaurants.** In his new role, Lawrence assumes responsibility for sourcing, distribution, and quality assurance across the Darden enterprise.

Atrium Corporation, which manufactures residential vinyl and aluminum windows and patio doors, hired **Jeff Vogt** as its new vice president of materials and logistics management. Vogt is responsible for improving efficiency through optimizing material movement through the value chain, and boosting cost savings via a strategic sourcing and tactical buying approach. He also coordinates the company's logistics and fleet activities.

Orbital Sciences Corporation appointed **Stephanie Foster** senior vice president of supply chain management, responsible for managing the space technology company's extensive supplier network. Foster joins Orbital from Raytheon Company, where she was vice president of integrated supply chain, overseeing procurement, compliance, supply chain technology, logistics, and asset management.

Electronics e-tailer **Newegg Inc.** appointed **Kunal Thakkar** as vice president of operations. In his new role, Thakkar oversees all Newegg logistics and transportation functions, including managing warehouse operations and transportation service providers.

The Premier healthcare alliance promoted **Durral Gilbert** to president of supply chain services. Gilbert joined Premier in 2006, and previously served as senior vice president of supply chain emerging services. In that position, Gilbert helped lead alliance members to save more than $4.2 billion last year through improved processes and efficiencies.



GREEN SEEDS

Mitsui O.S.K. Lines' new hybrid car carrier, *Emerald Ace*, is equipped with a hybrid electric power supply system combined with a 160kW solar generation system. The solar power generation system creates electricity while the vessel is underway, and stores it in lithium-ion batteries. The diesel-powered generator is completely shut down when the ship is in berth, and the batteries provide all electricity needs, resulting in zero emissions at the pier.

SEALED DEALS

Mobile broadband company **FreedomPop** chose **BrightPoint North America** to handle its critical logistics services including inventory management, kitting, packaging, transportation management, order fulfillment, and reverse logistics. BrightPoint's scalable, customized services platform accelerates the availability of FreedomPop's products and utilizes Clearwire's 4G network to provide wireless Internet service to consumers.

recognition

► Anheuser-Busch named **C.H. Robinson** its **2011 Non-Asset-Based Carrier of the Year**, based on eight objective metrics, including on-time pickup, trailer pool compliance, SmartWay requirements, responsiveness, and overall business ease. C.H. Robinson provided both dry and refrigerated capacity during the 2011 spring and summer selling seasons at multiple brewery locations.

For the second consecutive year, **Shippers Warehouse** received the **PepsiCo-Frito Lay Service Award**. The 3PL was selected for its 99.93-percent perfect-order compliance, customer service, and volume growth in terms of both weight and number of cases handled compared to the previous year.

▼ PC maker Lenovo recognized **CEVA Logistics** with its **Innovation and Operations Excellence Award** for the second year in a row. CEVA was honored for its freight consolidation, transportation optimization, focus on the technology sector, and end-to-end operation that enhances the customer experience and increases cost savings for Lenovo.

m&a

Universal Truckload Services Inc., an asset-light transportation service provider, has acquired **LINC Logistics Company,** a custom-developed third-party logistics solutions provider in North America. The combination of Universal and LINC creates one of the largest full-service, asset-light logistics platforms in North America.

Transportation and supply chain management service provider **Echo Global Logistics** acquired **Shipper Direct Logistics,** a non-asset-based truckload provider serving the southeastern and south central United States. With this acquisition, Echo expands its sales organization, and customer and carrier relations, while further developing its geographic footprint in these regions.

To complement its existing international logistics software offerings, **CargoWise** purchased logistics software pioneer **TransLogix.** The combined companies will increase research and development investment, accelerate the creation of new software capabilities, and expand the company into new geographies.

Roadrunner Transportation Systems Inc. purchased two Omaha, Neb.-based truckload services providers – **R&M Transportation** and **Sortino Transportation** – for approximately $24.4 million. The acquisition expands Roadrunner's refrigerated capacity in key lanes.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TRENDS

SHAPING THE FUTURE OF LOGISTICS

Ocean Freight Industry Seeks Delivery Time Reliability

by Joseph O'Reilly

Awash with capacity and beset by rate fluctuations, the ocean container shipping industry reflects the global economy. Shippers are trying to find a measure of consistency as they navigate the peaks and troughs. While cost is often the common denominator linking shippers, carriers, intermediaries, and consignees, recent collaboration and research between ocean carrier-owned portal INTTRA and Danish consultant SeaIntel is exploring another metric to gauge performance: reliability.

Parsippany, N.J.-based INTTRA originates 18 percent of all global containerized trade, and has visibility to about 30 percent, according to CEO Ken Bloom. Trade lane analysis comparing vessel arrival reliability from SeaIntel's data with actual container delivery reliability provided by INTTRA has identified a significant gap between measurements.

"In the post-recession new normal, improved container reliability is important to shippers," says Bloom. "Vessel timeliness to a port is one thing, but container arrival at destination is another. Shippers asked us to show them what reliability looks like."

INTTRA's collaboration with SeaIntel is manifest in the publication of a shipping reliability report that combines on-time performance with schedule reliability information. The advantage for shippers is that they can better forecast reliability if they know how certain carriers, ports, and trade lanes around the world measure up in terms of delivery times to destination. This analysis presents a new way of thinking about the ocean container trade, says Bloom. Shippers get better reliability and pull out costs from the supply chain, while carriers deal with fewer exceptions.

For example, initial report findings indicate positive improvements in overall on-time performance for the ocean shipping industry. Global on-time delivery in June 2012 improved to 64 percent from 61 percent in May 2012. Asia-to-Europe

Integrated Services Amplify Outsourcing Success

Companies are outsourcing more logistics functions to 3PLs, raising the importance and efficacy of supply chain integration, suggests *Top Business Drivers for Integrated Logistics Outsourcing*, a new Saddle Creek Logistics Services study. Controlling costs, accommodating business fluctuations, and returning focus to core competencies are just a few advantages identified in the Lakeland, Fla.-based 3PL's report.

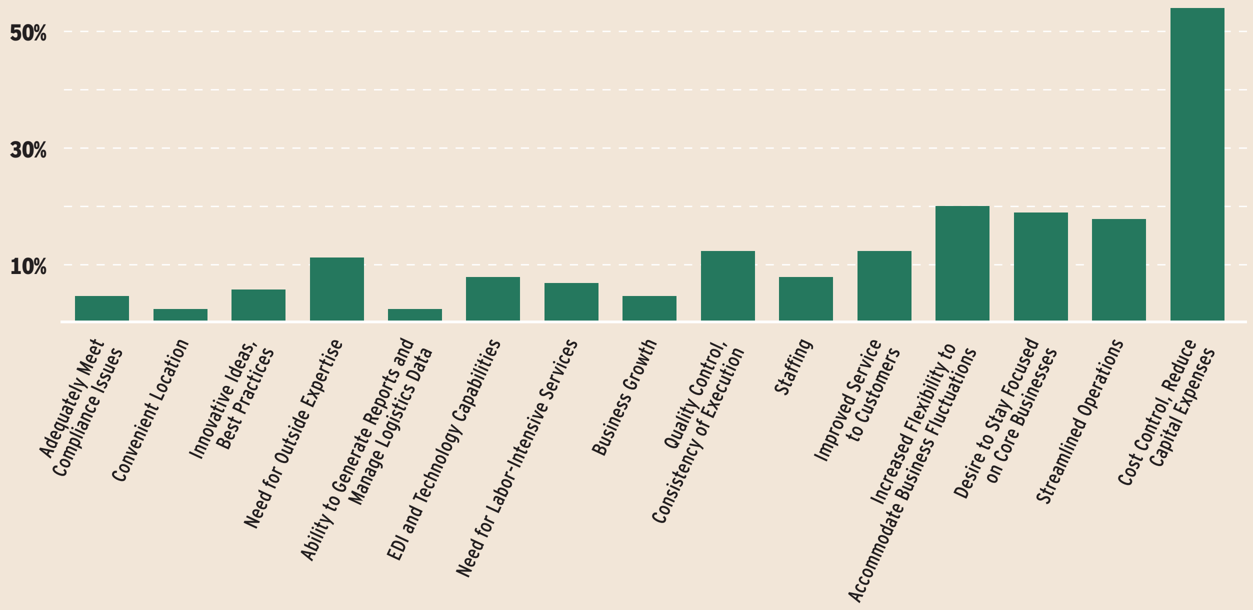
The study is based on online survey responses from manufacturers, distributors, retailers, and multi-channel merchants with influence over various logistics functions at their companies. Research highlights include:

- Most respondents (74 percent) outsource to providers who offer two or more logistics services, confirming the prevalence of integrated logistics outsourcing.
- Respondents find value in outsourcing to a provider with the ability to offer integrated logistics services. More than half (52 percent) rate the importance of integration as four or five on a scale of one to five.
- Transportation (36 percent) and warehousing services (33 percent) are the most critical outsourcing functions when working with a single provider. Fewer respondents look to their logistics provider for services such as packaging, product customization, or order fulfillment.
- Top business needs driving respondents to outsource to an integrated logistics provider include: controlling costs and reducing capital expenditures, accommodating business fluctuations, focusing on core competency, and streamlining operations (*see chart*).

"While companies are finding value in using a single provider for multiple logistics services, the survey results suggest an opportunity for even deeper integration beyond traditional services such as warehousing and transportation," says Rob Pericht, senior vice president of operations at Saddle Creek Logistics Services. "Expanding the 3PL's role to include services such as packaging or order fulfillment can help companies increase speed to market, accommodate business fluctuations, and control costs."

Business Needs Driving Outsourcing to Integrated Logistics Providers

Source: *Top Business Drivers for Integrated Logistics Outsourcing*, Saddle Creek Logistics Services



on-time delivery rose from 65 percent in 2011 to 74 percent in 2012. During that same period, performance increased from 46 percent to 68 percent in the Asia-to-Mediterranean trade.

"Carriers are dedicated to creating significant quarter-on-quarter – even month-to-month – improvements in container reliability," says Bloom. "We're not talking about transit time. In fact, carriers can improve reliability by providing a more reasonable estimated date that is likely to be right 95 percent of the time."

Bloom discounts the possibility that external market pressures – steamship lines rationalizing capacity to demand, for example – are driving these performance improvements.

"Shippers say they need reliability to improve costs in a sustainable way—period," he says. "I don't think it relates to external issues."

Still, it's hard to fathom that recurring market volatility over the past few years hasn't had some impact on steamship line efforts to provide more reliable and efficient service. In some areas, carriers are now purposefully – in 2009 it was reactively – idling ships to bring ocean capacity more in line with demand and artificially stimulate rates. Vessel carrying arrangements have also become commonplace as carriers collaborate in certain lanes to fill ships and reduce costs. Others are tinkering with port calls and service strings to manage shifts in demand.

A Question of Inconsistency

Currently, vessel reliability has held consistent at about 81 percent across the board among steamship lines. Still, according to INTTRA and SeaIntel's research, a container is at a shipper's dock plus or minus one day only 64 percent of the time. This inconsistency might raise questions as to variables that delay transport from the vessel to the consignee's dock.

But that is missing the point, says Bloom. If product keeps arriving late, the best solution is to adjust the forecast, and therefore build more reliability into the move.

"If ocean carrier X on trade lane Y is running a 32-day transit 95 percent of the time, shippers shouldn't expect a 25-day transit time and apologize," he says. "If another carrier is running a 28-day transit 95 percent of the time, then they can look at the price differential and see whether it matches up."

The INTTRA and SeaIntel report looks strictly at the success rate of delivering to the promised date at the right destination, plus or minus one day. A next iteration might include more end-to-end supply chain analysis.

Southwest Airlines Introduces Cargo Companion

While cargo security has become a standard operating procedure for the airline industry, visibility gaps still exist between origin pickups and destination deliveries. Southwest Airlines' new Cargo Companion asset-tracking service aims to fill these voids.

Designed for shippers, third-party intermediaries, and couriers, the airline's service features wireless asset reporting devices that monitor the location, shock, light, temperature, pressure, and humidity of freight during transit; an online tracking portal; and e-mail alerts that inform shippers when their cargo crosses predefined checkpoints, arrives at its destination, or is delayed.

Shippers using Southwest's Cargo Companion prearrange the service for a specific flight. Asset-tracking devices are then sent overnight and packed with shipments. Regardless of where the freight is between origin and destination, in the air or on the ground, with Southwest or not, users can track its location and metrics, and initiate contingency plans in the event of an exception. After a move, the tracking devices are returned to Southwest for subsequent use.

Inbound Logistics recently tracked down Colin Rogers, senior manager specialty sales, Southwest Airlines, to learn more about Cargo Companion and how it benefits shippers.

Q: How did this idea originate?

Rogers: Customers asked, 'If we can ship by boat, truck, and rail with GPS-type wireless tracking, why isn't the same capability available on the most expensive and quickest transport mode?' The challenge for us has been patience—waiting for the right technology that is smart enough to know when to shut off the transmitting function so that a device would be safe and approved for airplanes.

The tracking technology is relatively new, and we had a few customers try it first. Those successes made us comfortable branding Cargo Companion as a Southwest product, and offering it to customers on a transactional basis so they don't have to make a significant upfront investment or enter into a service contract.

Q: How does Cargo Companion satisfy shippers' need for visibility?

Rogers: Shippers want a total solution. When exceptions happen—plane swaps, weight restrictions, snowstorms—shippers still need to know where their shipments are. If New York is hit with a huge snowstorm, for example, a shipper backed up with a day's worth of freight might face delays such as a ramp search, or the cargo might have moved on an earlier flight. Now a shipper can go to the Southwest Web site and find out a shipment's proximate location.

Q: What about security considerations?

Rogers: Prior to launching Cargo Companion, Southwest was pretty good at reporting to the shipper or consignee when freight was in our control. But, we know from experience that most theft occurs on the ground before or after we take custody of a shipment.

The Longer End of the Short Line

Genesee & Wyoming (GWI) Inc.'s agreement to acquire Jacksonville-based RailAmerica for approximately $1.4 billion, thereby combining the two largest shortline and regional rail operators in North America, marks a notable turn for the U.S. rail industry.

As domestic shippers continue to test the efficacy of rail/intermodal solutions, smaller railroads play an important role in serving captive shipper needs, as well as feeding Class I carrier networks.

GWI has a reputation for growing through mergers and acquisitions, having integrated 65 railroads through 36 acquisitions since 1985. Following the incorporation of RailAmerica, its North American network will feature 108 railroads and 12,900 miles of track. The Greenwich, Conn.-based carrier also owns assets and track in Bolivia, Australia, the Netherlands, and Belgium.

Pending approval from the U.S. Surface Transportation Board, the acquisition will significantly increase GWI's customer and commodity diversification. In 2011, on a combined basis, no single customer represented more than three percent of revenues, and no single commodity group controlled more than 16 percent of freight revenues.

Rail America's largest segment is agricultural products and chemicals, while GWI ships coal and metals. The deal is expected to diversify the railroad's commodity base, offering protection against volatility in certain industries and making GWI less dependent on certain big customers.

In terms of geography, GWI's footprint expands from 24 to 37 U.S. states, while the United States overall will represent about 70 percent of GWI's revenue, followed by Australia (20 percent), Canada (10 percent) and Europe (less than one percent).

Bringing RailAmerica into the fold, the shortline expects to originate or terminate more than four percent of carload traffic in the United States, with volumes well-balanced across all Class I carriers.

Southwest Airlines' Cargo Companion provides shippers complete visibility to the location and environmental status of high-value and time/temperature-sensitive items.

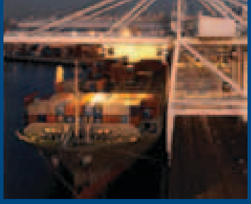
What's different is that customers can use Cargo Companion when they are packaging a shipment. This way it tracks freight all the way to the final destination. It includes places where Southwest isn't touching the product, and extends the reach of the information we can provide customers.

Q: Do you expect Cargo Companion to eventually become a standard service for shippers with time- or temperature-sensitive products?

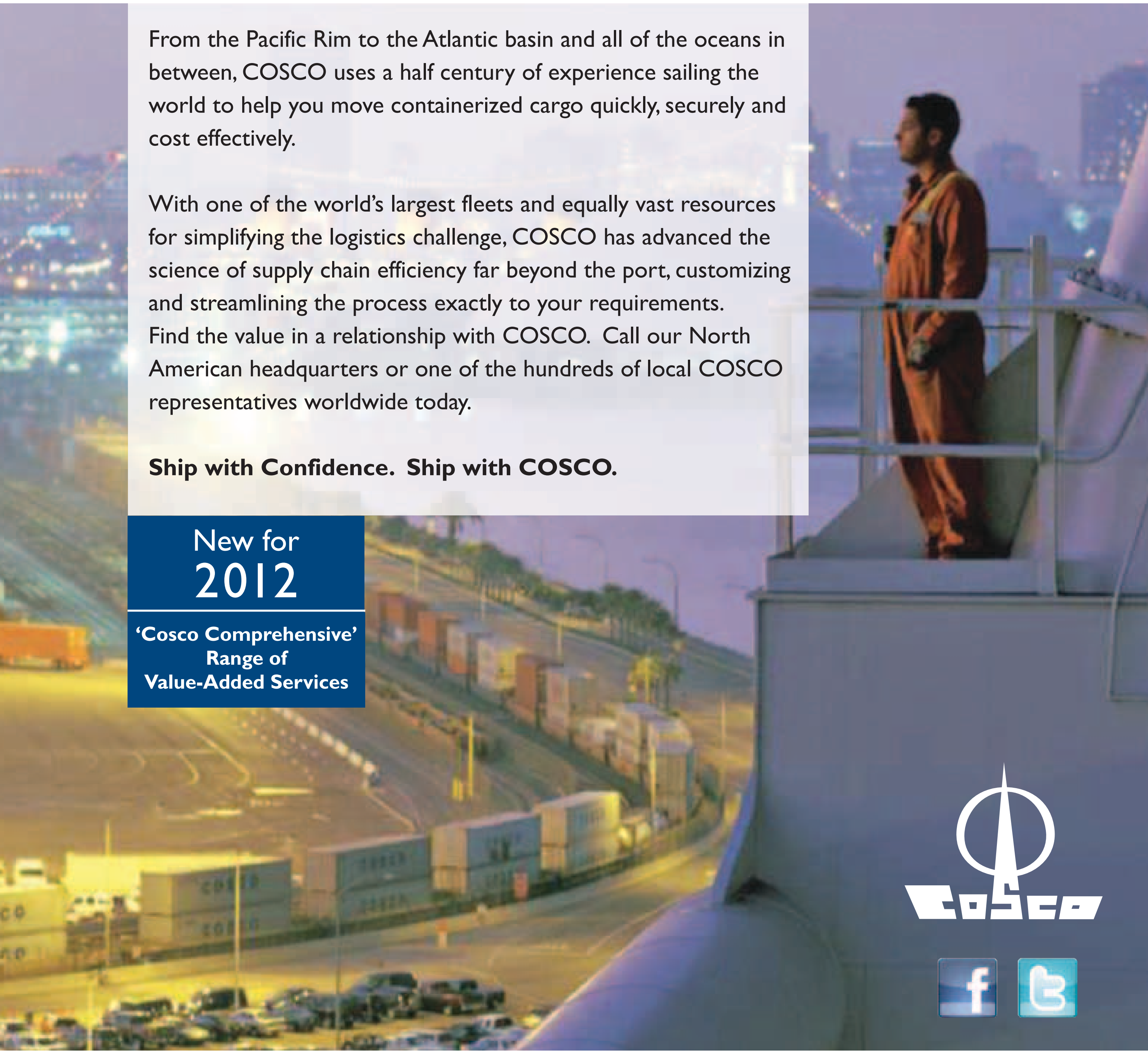
Rogers: We've seen this with other technologies in the past. Every rollout has early adopters, and those looking over the shoulders of early adopters. Then it becomes the next must-have item. Right now, about 50 percent of our customers are a fit for this product—shippers moving perishables, medical shipments, and mission-critical cargo. There is a reason why the other 50 percent are using air freight to begin with, so it may ultimately make sense for them to use Cargo Companion as well.

Q: Can shippers/consignees create alerts using Cargo Companion so they know when a shipment exceeds a pre-determined threshold, then take necessary action?

Rogers: Currently we're focusing on the device's security and location reporting elements, although shippers are able to monitor these other metrics. We can provide an alert, but we need procedures in place so we can react to an exception quickly if it occurs. It's not good enough to provide an alerting capability if we can't act on it. ■



A Unique Perspective



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GLOBAL

THE WORLD AT A GLANCE

by Joseph O'Reilly

Port of Prince Rupert

U.S., Canada Confront Port Insecurities

The U.S. Federal Maritime Commission (FMC) is taking Canadian ports to task over concerns they are siphoning U.S.-bound container volumes while threatening homeland security.

The agency's primary target is Prince Rupert, North America's deepest natural harbor port. While Montreal, Halifax, and Vancouver participate in U.S. Customs and Border Protection's (CBP) Container Security Initiative—which prescreens more than 86 percent of U.S.-bound container freight—Prince Rupert does not. Also, Canada does not comply with CBP's Importer Security Filing program, which extends requirements for reporting cargo information prior to departure.

Congress asked the FMC to probe allegations about Canada's port practices in 2011 after Washington state senators Patty Murray (D) and Maria Cantwell (D) raised complaints. Even though the agency has no overriding authority in Washington, the report could steer future legislation toward repealing or reforming the U.S. Harbor Maintenance Tax (HMT).

The HMT is imposed on shippers/consignees based on the value of goods being imported and exported through U.S. ports. Revenue is used to fund dredging projects. The HMT has long been criticized for preventing short-sea shipping activity between

Canada and the United States, and the FMC says doing away with it is the best way to counteract U.S. shippers who prefer bringing freight through Canada.

While most Canadian ports charge importers a user fee instead of a tax to similarly help maintain harbors, Prince Rupert and Vancouver have deep channels and don't require routine dredging as other U.S. West Coast ports do. So it's less expensive to bring containers into Prince Rupert and transport them via rail across the border.

Canadian port authorities are affronted by FMC's suggestion that security is compromised because companies legally re-route freight through their hubs. Some say containers entering the United States from Canadian ports are actually more secure.

"Every container that comes into Canada undergoes radiation screening," says Robin Silvester, chairman and CEO of the Vancouver Port Authority. "When it crosses into the United States, it's screened again as a further security measure. That doesn't happen with containers entering the United States from other countries."

Blue Skies Ahead for Jamaican Container Trade

Lost in the conversation surrounding the Panama Canal's impact on U.S. ports when a third set of locks opens in 2015 is the emergence of new competitors—a Cuban port under development in Mariel; Caucedo, Dominican Republic; Freeport in the Bahamas; and Kingston, Jamaica.

Uncongested, natural deepwater harbors are hallmarks for Caribbean countries, and a container boom is likely when heavily laden New Panamax vessels begin transiting the Canal. The region's proximity to major east-west and north-south shipping routes makes it an ideal transshipment hub for large freight volumes that can be offloaded onto smaller ships bound for North and South America. At the same time, Caribbean ports will have ample opportunities to develop value-added assembly and logistics activities.

In Jamaica, optimism is palpable. Consider a recent article in the *Jamaican Observer* by David Mullings, CEO of Orlando, Fla.-based diversified holdings company Keystone Augusta, which maintains offices in Kingston.

"Each time I attend a conference with other countries pitching their advantages and why I should consider doing business there, I always picture the map of the Western Hemisphere in my head," writes Mullings. "I mentally draw lines from China through the Panama Canal to the seventh-largest natural harbor in the world—Kingston Harbor—and then on to the east coast of the United States and Europe."

He references Singapore's success in leveraging a deep natural harbor to become the world's busiest cargo hub. It took the Asian city-state 50 years to achieve this status. Mullings ponders whether Jamaica could ever replicate that success.

Jamaica's transportation and logistics

An Olympic Thirst For Better Forecasting

Venues that experienced food and drink shortages during the opening days of the London 2012 Olympics suffered from poor demand forecasting, rather than supply chain execution, according to a recent article by UK retail magazine *The Grocer*. Organizers failed to consider that attendees would stay on-site for a longer time. As the Games commenced, stockouts and long lines occurred at locations including Wembley, Old Trafford, Greenwich Park, Horseguard's Parade, and Olympic Park. The shortages came as a surprise to observers who had otherwise praised the organizers' transportation and logistics planning, in particular the Olympic Route Network.

Attendees take a break in Olympic Park. Many Games venues were not stocked to handle the needs of the lingering crowds.

Photo Courtesy Getty Images for LOCOG

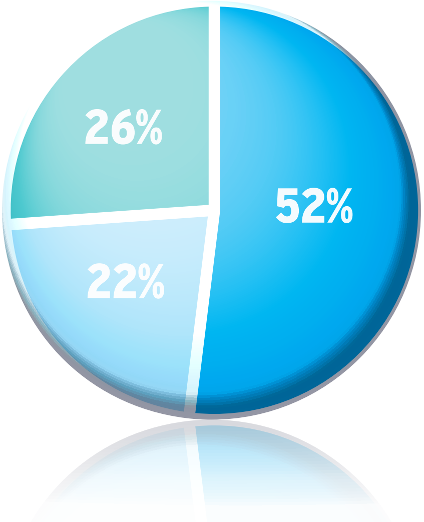
infrastructure is lacking compared to countries such as Panama, for example, especially in terms of railroad and highway connectivity. But potential exists to transform Jamaica's economy by focusing on transportation and logistics, and taking advantage of this expected container boom.

"Imagine a car body made in Mexico, an engine coming from Germany, and parts from China, all landing in Jamaica at the port, then sent to Vernam [an abandoned U.S. Army Air Force base under development] to be assembled, and the finished car shipping to Port Everglades for delivery to a dealership," writes Mullings.

"This is not blue sky thinking," he adds. "This makes complete sense, and saves money for the manufacturer. We may have missed the first boat, but 2015 presents a real opportunity for us to take advantage of our unique geographic advantage that cannot be copied."

U.S. Imports by Transport Mode (Jan.-May 2012)

About half of the imports into the United States arrive by ocean vessel, followed by about one-fourth arriving by truck, rail, or pipeline from Canada or Mexico. The percentage of imports by air—the fastest and most expensive transport mode—has declined in recent years.



- **Ocean**
- **Truck/Rail/Pipeline**
- **Air**

Source: Zepol Corporation, www.zepol.com

Japan's Bitter Pill

In the context of economic growth, Japan's cultural mores and aging workforce have been widely discussed and debated. Its population is expected to shrink 33 percent by 2060, which will have major implications on how the country approaches socio-economic policies over the next 50 years. That said, Japan is already beginning to feel some unintended consequences.

For example, pharmaceutical companies are being forced to improve operational efficiency and rationalize sourcing and distribution strategies because of the country's aging population, drug price changes, and patent expirations, according to a new report from New York City-based GBI Research.

Japan's pharma supply chain still follows a traditional model, where drugs are distributed to patients only through wholesalers. A price quotation system that heightened competition among distributors created a wholesale monopoly, which has affected pricing and profit margins. Beyond that, government regulations that prohibit foreign producers from entering the market has led to an insular supply chain susceptible to risk–as evidenced by the crippling impact of the 2011 earthquake and tsunami.

Since then, manufacturers have instituted changes to ensure continued production in the event of a disaster, thereby improving supply chain stability, according to the GBI report.

Economic Unease Spreads

Today's economic news ticker is anything but optimistic: Europe faces economic disaster, Asian exports continue to weaken, and North American growth sputters. Even Germany, which was remarkably immune to Europe's woes earlier in the year, is now showing signs of uncertainty, with GDP growth for 2012 expected to fall below one percent.

European-based third-party logistics providers such as CEVA Logistics have an up-close view of the proceedings.

"It was a challenging quarter, with flat air and ocean markets, increasing pessimism from customers, and a significant economic downturn in southern Europe–Italy, Spain, and Greece, in particular," says John Pattullo, CEO, CEVA Logistics.

While Pattullo has seen a marked slowdown in China, where growth rates have stalled–especially in the automotive sector–he has yet to see an impact elsewhere in Southeast Asia. In Europe, it's a much different story.

"A lot of the reduction in southern Europe has already happened, so we will begin to see year-on-year growth flatten out," he observes. "In northern Europe, we are now seeing slower growth. The Eastern European market, however, is still buoyant. The European pie is comprised of three different pieces, and each is at a different place in the economic cycle."

As far as Europe's third-party logistics sector, Pattullo expects further consolidation following UPS and FedEx's well-publicized M&A activities.

"The contract logistics and freight forwarding market in Europe–and for that matter, the world–is a fragmented landscape," he notes. "The top 10 companies only have about 28-percent market share. It's inevitable that further consolidation will occur over the next five to 10 years. It's also highly likely that a significant player will emerge from a developing economy." [ ]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THE **LEAN** SUPPLY CHAIN

BY PAUL A. MYERSON
Managing Partner, LPA, LLC and author of
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Minimizing Wasted Movement

Ideally, material should flow smoothly from Point A to Point B in a process, and be touched only once. That is rarely the case, however. More likely, material is touched and moved many times before its ultimate use.

In Lean terms, this excess transportation or movement is waste that occurs when temporarily locating, filing, stocking, stacking, or moving materials, people, tools, or information. It can negatively impact your bottom line through increased costs due to excess labor, damage, or lost product.

When identifying transportation or movement waste in your supply chain, evaluate all areas for improvement opportunities, including the office, warehouse, and transportation system.

In both the office and warehouse, it is critical to consider layout and flow to minimize transportation and movement waste. At some companies, the travel distance of specific office and warehouse employees adds up to miles of unnecessary movement over the course of a year. This is great exercise, but bad for productivity.

Unnecessary movement can be the result of not considering the flow of material and people as operations change over time, or not having laid out a facility correctly initially.

In an office, identifying wasted movement might involve considering where people or equipment are located. In a warehouse, where travel time and cases per hour are critical, you must evaluate not only the movement of people and materials, but also equipment such as forklift trucks. In this example, consider not only forklift movement, but also the operator's movement to locate the forklift, which can waste a lot of time.

The same idea applies to mechanics who spend time traveling back and forth to get tools and parts, rather than using a mobile tool cart or permanently locating tools by the equipment.

No factor is too small to consider. Even time spent looking for cleaning materials such as brooms and mops can be a real waste.

In transportation operations, it is important to streamline vehicle routes, including minimizing empty backhaul miles and circuitous routing. Any excess transportation should be considered waste. Transportation management systems can be a great help in this effort.

THE 8 WASTES

1. Transportation
2. Inventory
3. Motion
4. Waiting
5. Overproduction
6. Overprocessing
7. Defects
8. Underused employees

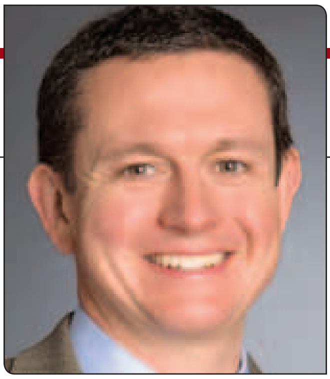
Identifying Opportunities

It is sometimes useful to draw a "spaghetti diagram" to track the movement of materials, information, and employees. This is a good first step in identifying action items to optimize layout.

For a higher-level view, map the flow in your entire supply chain for a particular value stream—that is, an individual item or family of products or services. Focus on where material stops, and look for ways to gain better flow. This may involve shipping ocean containers from overseas directly to inland regional warehouses, or bypassing distribution centers for large orders so they travel directly from factory to customer.

Eliminating unnecessary movements will go a long way toward improving your supply chain's Lean profile. ■

Parts of this column are adapted from *Lean Supply Chain & Logistics Management* (McGraw-Hill; 2012) by Paul A. Myerson with permission from McGraw-Hill.



BY MICHAEL WATSON, PH.D.
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Discovering the Value of Analytics

Many companies are building analytics strategies, which use data to facilitate better decisions. To develop improved analytics strategies, consider the three different types of analytics: descriptive, predictive, and prescriptive. Each type uses data in a different way to provide a different type of value.

■ **Descriptive analytics:** Using data to improve how you describe or report on your supply chain. Obtaining a lot of data does not guarantee the ability to better understand what is happening in the supply chain. A good descriptive analytics strategy lets you easily use the data to drill down to meaningful details.

Descriptive analytics strategies typically include a business intelligence (BI) tool that provides this drill-down capability. It also often includes a real-time visibility tool that alerts supply chain managers when it is time to take action.

For example, if a supplier's shipment misses its scheduled vessel, the BI tool alerts management to take action, such as using air freight if arrival time is important, or waiting for the next ship if inventory is available to meet upcoming orders.

■ **Predictive analytics:** Using data to better predict what may happen next in your supply chain. Examples include forecasting future demand patterns based on past demand patterns; using internal and external data to estimate rates on various transportation lanes; and consulting customer order patterns to predict which items move together and which move in the opposite direction.

Being able to accurately predict outcomes allows you to develop smarter strategies. Predictive analytics relies heavily on statistical techniques. While traditional statistical analysis used only the data available within the organization, predictive analytics now merges your data with externally available data to develop better results.

■ **Prescriptive analytics:** Using data to recommend a course of action. This type of analytics is based on using a mathematical optimization engine that sorts through millions of options to determine the best scenario. Routing trucks to make a set of deliveries is a good example. If you know the deliveries and the cost of the trucks, an optimization engine can find a solution that is 10 to 15 percent better than what you could find manually.

One strategic example includes using network design optimization to determine the right number and location of plants or warehouses, and how products should flow through the supply chain. Another involves using inventory optimization techniques to help determine where to buffer inventory in the supply chain, and how much safety stock to keep of each item.

The trend toward prescriptive analytics and optimization involves embedding optimization to help make decisions closer to real time. For instance, ocean carriers can use optimization to determine how to best return empty containers to demand points. Retailers can supplement their replenishment systems with optimization to better balance inventory levels, promotional pricing, full truck pricing, and service levels.

Which type of analytics is best? When you develop an analytics strategy for your supply chain, you will most likely need a balance of all three approaches. ■

BY PAUL FITZGERALD
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Reusable Shipping Dunnage Protects Sustainability Efforts

Containers and packaging account for 30 percent of all U.S. municipal solid waste, according to a 2009 EPA study. Small wonder, considering the contribution of millions of tons of disposable corrugated and wood filler used to protect products in transit across America every day.

By road and rail, goods move about in the temporary company of short-lived packaging such as cardboard void fillers, inflatable air bags, and plywood braces—all destined for disposal upon delivery. Protective reusable dunnage can take the place of single- or limited-use corrugated or wood filler to move pallets and products securely, in an environmentally conscious manner.

Two major factors are driving the growth of reusable packaging:

1. Increased emphasis on preserving, protecting, and sustaining the environment. Sustainability has become more than a buzzword; it's a movement—and big business is at the forefront. The environmental benefits of reusable packaging are huge. Corrugated cardboard produce packaging requires an average 39 percent less energy to manufacture, creates 95 percent less waste, and results in 29 percent fewer greenhouse gas emissions than plastic reusable packaging, according to a study by Franklin Associates, a Kansas-based lifecycle assessment and solid waste management consulting firm.

As of 2011, more than 70 percent of Fortune 500 companies had sustainability mandates in place. A large number—130, according to one report—have appointed a chief sustainability officer.

One benefit corporations gain from reusable dunnage is eliminating the aggravation and expense that can accompany disposable dunnage. "Cardboard packaging often uses glue, so recyclers won't take it," one receiving manager in Ohio explains. "You either have to store the packaging in a warehouse, or pay a refuse company to take it away—and it ends up in a landfill. Meanwhile, reusable materials are easily loaded on railcars and sent back."

2. Favorable bottom-line impact. Presenting a "green face" to the buying public can help spur increased sales among environmentally conscious consumers. The biggest gains, however, come from the cost savings sustainability initiatives can generate.

For instance, cased goods shipper Lyons Magnus adopted reusable plastic dunnage in its shipments, replacing corrugated dunnage that could only be used two or three times before ending up in landfills. After only five uses, the plastic dunnage paid for itself and generated return on investment.

Optimum supply chain conditions for a reusables program are similar to those for a milk run—any setting in which one entity, in close proximity to another or entirely within its own operation, makes frequent deliveries and is able to regularly retrieve and re-use its dunnage. The key is frequent travel to limited shipping points, with the ability to consistently retrieve dunnage.

If your supply chain does not fit this profile, you can still implement a cost-effective reusables program. Many companies offer third-party reusables management services. Their economies of scale, wide geographic scope, and tracking technology may offset any inefficiencies in shippers' supply chains.

Adding sustainability to the supply chain is simple. A reusable dunnage program can demonstrate your company's commitment to reducing its natural resources needs, while quickly paying back your investment. ■

VIEWPOINT

BY RONALD LIEBMAN
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FMCSA Abandons Carrier Oversight

For 75 years, the U.S. Department of Transportation stood as the arbiter of interstate motor carrier safety. That significantly changed on May 16, 2012, when the Federal Motor Carrier Safety Administration (FMCSA) issued three notices on its Web site signaling a retreat from its statutory and historical oversight of carrier safety, in favor of placing more due diligence responsibilities on shippers and brokers.

Entitled *Shipper and Insurer Briefing Addendum*, *FMCSA Data–Information for Shippers, Brokers, and Insurers*, and *Just the Facts About SMS*, the notices represent FMCSA's abdication. The agency has told the public to no longer rely on FMCSA safety ratings as they are only a snapshot in time, and that even a Satisfactory rating "does not mean a carrier is currently in compliance and operating safely."

Instead, shippers and brokers are encouraged to use publicly available information, including FMCSA's controversial Compliance Safety Accountability (CSA) data, "to help make sound business judgements." FMCSA offers no guidelines for how to consider, manage, and weigh this information, however, leaving shippers and brokers to fend for themselves.

Of major concern to shippers and brokers is the effect FMCSA's advisory may have on private litigation for negligent hiring and/or vicarious liability relating to carrier vehicle accidents. FMCSA's new position on shipper and broker due diligence is an arrow in the quiver of plaintiffs' attorneys, because it could possibly support claims that shippers did not act reasonably.

Only time will tell whether such arguments win over judges and juries. What is clear is that FMCSA recognized this issue, but deemed private litigation matters to be "outside the scope…of its area of responsibility."

A Question of Authority

FMCSA issued its advisories on the Internet, which raises other issues—namely, whether the agency has the requisite authority to, in effect, create a rule that alters its statutory obligations without going through Congress; and whether its actions would pass muster under the Administrative Procedure Act, which calls for a Notice of Proposed Rulemaking and an opportunity for the industry to respond to proposals.

Shippers are receiving conflicting advice from attorneys, insurers, and risk managers as to the use of CSA data, and what constitutes proper due diligence. FMCSA has complicated matters by offering its "guidance."

Further, we can expect a continued proliferation of commercial data management service providers. While these service providers offer useful tools for manipulating data, they give no guarantee that data management alone will constitute adequate due diligence.

Without the comfort of FMCSA's safety rating system, shippers are left with an amorphous reasonableness test. Until either government or the courts clarify shipper due diligence responsibilities, transportation professionals, with their legal and risk management advisors, have no choice but to develop internal due diligence practices.

Shippers can be proactive by working with industry associations and cross-industrial trade groups—even the FMCSA itself—to encourage the agency to reexamine its May 16 pronouncements. ■

Nothing in this article should be relied upon as legal advice in any particular matter.

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MAPPING THE NEW RETAIL SUPPLY CHAIN

Gone are the days of single-channel apparel retailing—and supply chains servicing that model. Today, apparel retailers must optimize their supply chains to deliver products from any point where consumers want to buy them.

by Amy Roach Partridge

The formula for apparel retail success used to be straightforward: give consumers quality, on-trend garments at the right price point, in an attractive store setting with helpful sales associates, and watch the dollars roll in. Behind the scenes, the supply chain needed only to support the single mission of getting goods to retail stores on time—a largely predictable process.

Today, however, the apparel retail environment is vastly different. Brick-and-mortar stores exist as merely one channel in a rapidly expanding multi-channel world that has complicated the retail landscape. The typical channel lineup for apparel retailers can now include brick-and-mortar stores; outlet locations; e-commerce sites; social and mobile commerce; catalogs; and other seasonal or single-use channels such as pop-up stores and flash sales.

Consider even the emerging channel of "broadcast retail," pioneered by the reality TV show *Fashion Star*. Contestants designed apparel in hopes of convincing buyers from Macy's, Saks Fifth Avenue, and H&M to carry the designs in their stores. The winning garments were made available for consumers to buy in stores and online immediately following each episode. It's easy to imagine the supply chain headaches that scenario could cause.

The availability of these myriad channels has, in turn, boosted shoppers' expectations within each channel. "Today, a typical American consumer expects cross-channel services such as 'click-and-collect' and 'order-to-deliver'; wider online SKU offerings; in-store kiosks; free delivery; free returns through any channel; and a mobile retail site," notes *E-Commerce & Multichannel Fulfillment: Supply Chain Flexibility Key to Meeting Changing Demands*, a whitepaper sponsored by third-party logistics (3PL) provider Exel.

THE NEW RETAIL REALITY

Retail shoppers have also come to expect a reliable brand experience—a consistent set of products, promotions, prices, product descriptions, delivery charges, and return policies—regardless of which channel they are shopping. Sixty-six percent of consumers in a recent Gartner study view this cross-channel consistency as important, notes Gartner analyst Jessica O'Brien.

"Typical apparel consumers shop a brand, not a channel," she explains. "They want the merchandise where they want it, when they want it, and how they want it."

These new demands are being added to the already hyper-competitive apparel market—characterized by seasonal merchandise with short cycles, fickle consumers, and fierce price scrutiny. Finding a way to optimize supply chains to meet the new pressures of channel proliferation, while still servicing the standard need to keep costs under control and deliver the right products to the right place at the right time, is the new reality for apparel retailers.

"The addition of these new channels has greatly increased the apparel supply chain's complexity," says Frank Scappatori, director of strategic accounts for Damco, a global logistics company with U.S. headquarters in Madison, N.J. "Apparel has always been time-bound. Companies are trying to drive fashion and keep up with product launches, which adds a huge speed-to-market component.

"But having multiple sales channels has forced apparel supply chain managers to simultaneously accommodate and

Nordstrom achieves consistently high inventory turns without increasing costs by making better use of inventory across all its channels, which include full-line stores, Nordstrom Rack outlets, and Nordstrom.com.


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anticipate varying internal and external demands so they can continue to meet time windows; keep costs at certain levels; ensure inventory can satisfy multiple channels; and continue to help their organizations fuel growth," he adds. "Supply chains are being asked to deliver a tremendous amount of flexibility."

Not surprisingly, no one-size-fits-all game plan works for managing multi-channel apparel retail supply chains. But while each retailer's approach may differ, one must-have for succeeding in the new apparel retail environment is supply chain visibility.

"Knowing where your product is, whether it is moving in the most cost-efficient manner, and if it will be available to ship from a distribution center on time is key to handling multiple sales channels," Scappatori explains. "That visibility element is vital to managing multiple supply chains."

Here is a closer look at how this landscape of multi-channel apparel retail is playing out across various aspects of the supply chain.

INVENTORY MANAGEMENT/ORDER FULFILLMENT

GOING BEYOND THE DC FOR CROSS-CHANNEL INVENTORY STRATEGIES

From malls to mobile phones to mail-order, apparel purchases originate from many points these days, and that means apparel retailers must grapple with how best to fulfill those different orders—and how to handle the inventory behind the purchases. Unlike pure-play Internet merchants or brick-and-mortar-only retailers, multi-channel apparel brands need the flexibility to fill orders in numerous ways.

"Some apparel retailers operate dedicated distribution centers to satisfy the e-tailing part of their business," Scappatori notes. "Others prefer to service all channels out of all their DCs; select a combination of those two options; or use their stores to help fill e-commerce orders."

While maintaining multiple sales channels complicates the inventory management and order fulfillment process, it can also provide an advantage, notes Gartner's O'Brien."If a multi-channel retailer can execute well, it can leverage its entire network—including store locations and drop-shippers—for order fulfillment, instead of just being able to ship from a DC," she explains.

But executing on multi-channel inventory strategies can be a challenge for apparel retailers that do not possess the necessary resources or technology. "In many cases, the infrastructure to support cross-channel inventory isn't there. Retailers may not have the necessary inventory visibility or multi-channel order management systems to support it," O'Brien says. "And, they might have multiple warehouse management systems that aren't operating together to allow inventory to flow through the network."

Nordstrom is one multi-channel apparel retailer capitalizing on the ability to provide cross-channel inventory visibility. The upscale fashion chain, based in Seattle, operates 231 stores in 31 states, including 117 full-line stores, 110 Nordstrom Racks, two Jeffrey boutiques, one treasure&bond store, and one clearance store. Nordstrom also serves customers through Nordstrom.com, catalogs, and in the online private-sale marketplace through its subsidiary, HauteLook.

Over the past few years, Nordstrom has been able to achieve consistently high inventory turns (5.6 in 2010 and 2011, its highest inventory turns of all time) without increasing inventory costs by simply making better use of inventory across all its channels.

The company gives shoppers the option to buy online and pick up in stores, and displays both its Web and store inventory online. So if a shopper wants to purchase a Burberry trenchcoat from Nordstrom.com and pick it up later that day at their local Nordstrom store, they will know instantly if it is available. In addition, the company uses its stores as de-facto fulfillment centers—so if another customer wants the same trenchcoat and the Web DC is out of stock, the garment can be shipped from any of Nordstrom's physical store locations.

Melding store and Web inventory can also help retailers avoid markdowns, because items do not linger as long on sales floors or DC shelves. "Companies that have flexibility to move inventory around can gain a large advantage," explains O'Brien. "If a sweater, for example, is not selling well in Los Angeles but is selling like hotcakes online or in New York, retailers that can ship the sweater from those poor-performing stores and send it to other stores or directly to the consumer make better margins."

A BOOST TO THE BOTTOM LINE

Gaining a single view of inventory visibility, and using it to leverage inventory across the network, has helped Nordstrom maintain synergy between its channels, boosting the brand's already strong reputation for customer service and consistency. The inventory management overhaul has also helped its bottom line. In fiscal 2011, the company achieved an all-time sales high, exceeding $10 billion. And it again achieved a 5.6 inventory turn, which "reflects the ongoing benefits from our multi-channel capabilities," explained CFO Mike Koppel during Nordstrom's 2011 earnings conference call.

During the call, President Blake Nordstrom also outlined the company's goals for 2012, which clearly show the retailer's commitment to excelling in multi-channel commerce. The goals included: enhancing the overall Web and mobile Web experience; building out IT infrastructure to fuel e-commerce growth; beginning implementation of enhanced tools to improve initial inventory allocation and assortment; expanding online merchandise selection; and developing a more customized approach to all aspects of customer engagement.

TRANSPORTATION

MIXING UP THE MODAL MIX

As the number of sales channels continues to increase, so does the complexity of transportation management. The standard apparel retail distribution model—in which garments come inbound to a distribution center and are delivered to local stores via ground transport in a reasonably fixed fashion and timeframe—is no longer a given. As such, the need for apparel retailers to profitably optimize their transportation network has never been greater, says Fabrizio Brasca, vice president of global logistics at JDA, a Scottsdale, Ariz.-based supply chain software provider.

With the growth of Web and mobile channels, apparel retailers are no longer just dealing with a network of transportation providers who deliver garments to brick-and-mortar stores via ongoing replenishment processes. They now must also service e-commerce order patterns—typically a higher volume of orders, each with a small number of items, delivered to consumers' homes instead of to distribution centers or stores. The nuances of shipping goods direct-to-consumer are very different challenges than transporting inventory in bulk.

"A change in the modal mix has occurred, with parcel shipping now becoming an important part of the game," Brasca explains. "Many apparel retailers have treated online or mobile orders as 'one-offs,' separate from their traditional transportation applications and planning. That strategy was feasible when the number of orders was small, but e-commerce volume has been growing rapidly, and is becoming an important part of the consumer experience."

A HOLISTIC VIEW OF THE TRANSPORTATION NETWORK

To stay competitive and profitable in a multi-channel world, apparel retailers must embrace consumer-centric transportation management processes and integrate new channels into traditional transportation planning.

"Companies must take a holistic view of their transportation network," advises Brasca. "Don't treat orders from new and evolving channels as one-offs, but rather look at the aggregate, and find ways to mitigate the risk, complexity, and costs of that particular channel by leveraging other channels.

"For example," he continues, "the common initial assumption about Web channels is that all orders should be shipped direct-to-consumer via parcel, often from a central fulfillment location. This ultimately is an expensive proposition for whoever is paying for the shipment, whether it is the retailer or consumer."

Instead, to reduce costs, companies can consider alternatives such as in-store pickup; local delivery from a store, because same-city delivery rates can be more cost-effective than shipping nationwide from a fulfillment center; or postponed delivery from the store, where inventory is delivered to the store via existing transportation routes, then shipped locally direct to the consumer.

Continually evaluating and modeling your transportation network is also key, as sales channels mature and new channels pop up.

"A one-size-fits-all transportation strategy is not appropriate," Brasca says. "Every company needs to have the ability and technology to fine-tune its solutions and analyze its transportation plans, looking intelligently at different trends and how they stress the multi-channel network."

REVERSE LOGISTICS

MOVING FORWARD WHILE TAKING PRODUCTS BACK

Returns are a fact of life in apparel retail. For multi-channel retailers, reverse logistics is even more complicated because of the very nature of orders via Internet, mobile, or social channels—you can't try anything on—and because customers who bought a garment via one channel may want to return it through a different channel.

This set-up creates some interesting back-end challenges. "Apparel retailers often use order and warehouse management systems that have been in place for years, and are structured to support the brick-and-mortar environment," explains Kevin Brown, director of product marketing for Newgistics, a reverse logistics provider based in Austin, Texas. "When companies expand to include alternate sales channels, they often add a new set of systems to support that particular buying behavior, and those two sets of systems don't necessarily talk to each other."

When returns occur in a multi-channel environment where systems are disconnected, it becomes more difficult and time-consuming to process customer, transaction, and credit or exchange information, which can strike a sour note with customers.

In addition, multi-channel apparel retailers often offer additional stockkeeping units (SKUs) online. For example, a T-shirt may only come in blue and white in the store, but online customers can also choose purple, grey, or red. In some cases, inventory for those online-only SKUs is handled by a third party, who drop-ships goods on the retailer's behalf. When a shopper returns the online-only shirt to the store, that merchant may have yet another set of systems to contend with.

"Each of these segments can contribute to either a robust customer experience or a painful one when it comes to the return, based on how the merchant is set up to handle it," Brown explains.

CHANNEL CROSSING

Cross-channel returns also present interesting inventory scenarios. "Any time you introduce a non-standard SKU into the retail environment, the merchant has to decide what to do with that

particular garment," Brown notes. In the example above, returning an online-only T-shirt to a store means the store must now either stock an item it doesn't usually sell, or absorb the time and cost of returning it to a centralized DC location. In the fast world of fashion, time is often a luxury that retailers don't have.

Seasonal merchandise, in particular, can be problematic for multi-channel apparel retailers. Say a shopper buys a bathing suit online and decides to return it to a physical store location at a time when the store is beginning to stock fall merchandise.

"The retailer will likely have to put that item on the sales floor at break-even or lower cost just to liquidate it," Brown explains.

REELING IN RETURNS

How then, to combat returns snafus? Many retailers are turning to technology, implementing systems that allow them to view inventory levels across the store network, which means returned merchandise can more easily be redirected to the appropriate location.

"Smart retailers are using returns to help fill orders in various channels," Brown notes. "They can ship a garment returned to a store directly to a Web consumer, for instance. This strategy allows the retailer to get rid of that merchandise—which it may not normally manage—as well as cut the

MULTI-FUNCTIONAL TECHNOLOGY ENABLES MULTI-CHANNEL FASHION

Like many apparel retailers seeking to keep pace with modern consumers' demands for wherever/whenever shopping, United Kingdom-based fashion company the Jacques Vert Group has embraced a multi-channel approach to retail. The company, which operates four women's fashion brands—Jacques Vert, Planet, Precis, and Windsmoor—sells its apparel and accessories in approximately 1,000 stand-

Enhanced technology tools allow the Jacques Vert Group to boost stock replenishment capabilities and improve product availability in its stores.

alone and department store concession stores (the European term for the "store-within-a-store" concept) within the United Kingdom, Ireland, and Canada, as well as through online and social/mobile channels.

"Developing additional sales channels has been a key strategy and critical success factor for us because the UK fashion market is mature, competitive, fragmented, and a market-share game," notes Jacques Vert Group Commercial Director John Bovill. "Consumers are also adopting technologies such as social and mobile that are increasingly shaping purchasing behavior and leading to increased demand for availability across all brand touchpoints."

The company's supply chain technology systems, however, could not keep pace with this forward-thinking, multi-channel approach. Its end-of-life legacy systems provided poor planning, ordering, allocation, and stock management capabilities.

"Fashion changes in rapid and unpredictable ways, and the connectedness of consumers to media and technology has resulted in a need for instant availability," says Bovill. "It was critical for us to gain clear stock management in order to react and plan more efficiently and quickly."

Also, the previous systems were not robust enough to manage the more reactive and complex supply chain inherent to a multi-channel retail model. "Jacques Vert needed an effective and scalable solution to help us compete," he says.

A Two-System Solution

The company also needed technology that would allow it to maximize its multi-channel opportunities now and in the future—a key step, because it recently merged with European retailer Irisa Group, which operates seven womenswear brands. The solution came in the form of two systems: *Merret*, an end-to-end integrated supply chain solution from IT firm Retail Assist in the UK; and Toronto-based Maple Lake's *QuickAssortment* merchandise and assortment planning software. Although the implementation occurred in February 2012, the company has already reaped several key benefits.

Thanks to *Merret*'s dynamic stock-replenishment capabilities, the Jacques Vert Group moved from once-a-day batch processing to receiving stock updates every 15 minutes, enabling more reactive stock management—a key feature for the company's e-commerce channel. It has also boosted productivity through the systems' improved performance, resilience, and availability. That technology availability, in turn, has been crucial in facilitating the company's increased DC and store cycle time on the delivery side, and also reduce the operations and transportation costs surrounding that return."

Whether it is revamping reverse logistics procedures, changing inventory strategies, tweaking transportation management, or implementing new technologies, it is clear that today's apparel retailers are optimizing their supply chains to keep up with the rapidly evolving world of multi-channel retail. ■

operating hours to support its international growth channels.

In addition, the Jacques Vert Group has been able to improve margins because the solution allows it to offer targeted price markdowns that are reactive to local markets.

"The solutions from Retail Assist and Maple Lake provide the Jacques Vert Group with a fully integrated 'single version of the truth,' and have improved the company's buying and merchandising decision-making," says Nigel Illingworth, CEO of *Merret* at Retail Assist. "In addition, the company now has more confidence in its data, vastly improved historic information, more accurate cost information, better control and understanding of its stock allocation, simplified store solutions, and a more efficient and cost-effective warehousing infrastructure."

"The data warehouse and business intelligence solutions developed in-house have brought us supply chain visibility to enable improved and more responsive trading decisions," Bovill adds. "With the Maple Lake software, our teams can plan product launches more effectively. And the system implementation has provided a scalable platform we can adopt across the wider group that has resulted from the Irisa merger."

Most importantly, the Jacques Vert Group now has a technology platform that can flex and grow with the company, allowing it to add new channels and new markets whenever opportunities arise.

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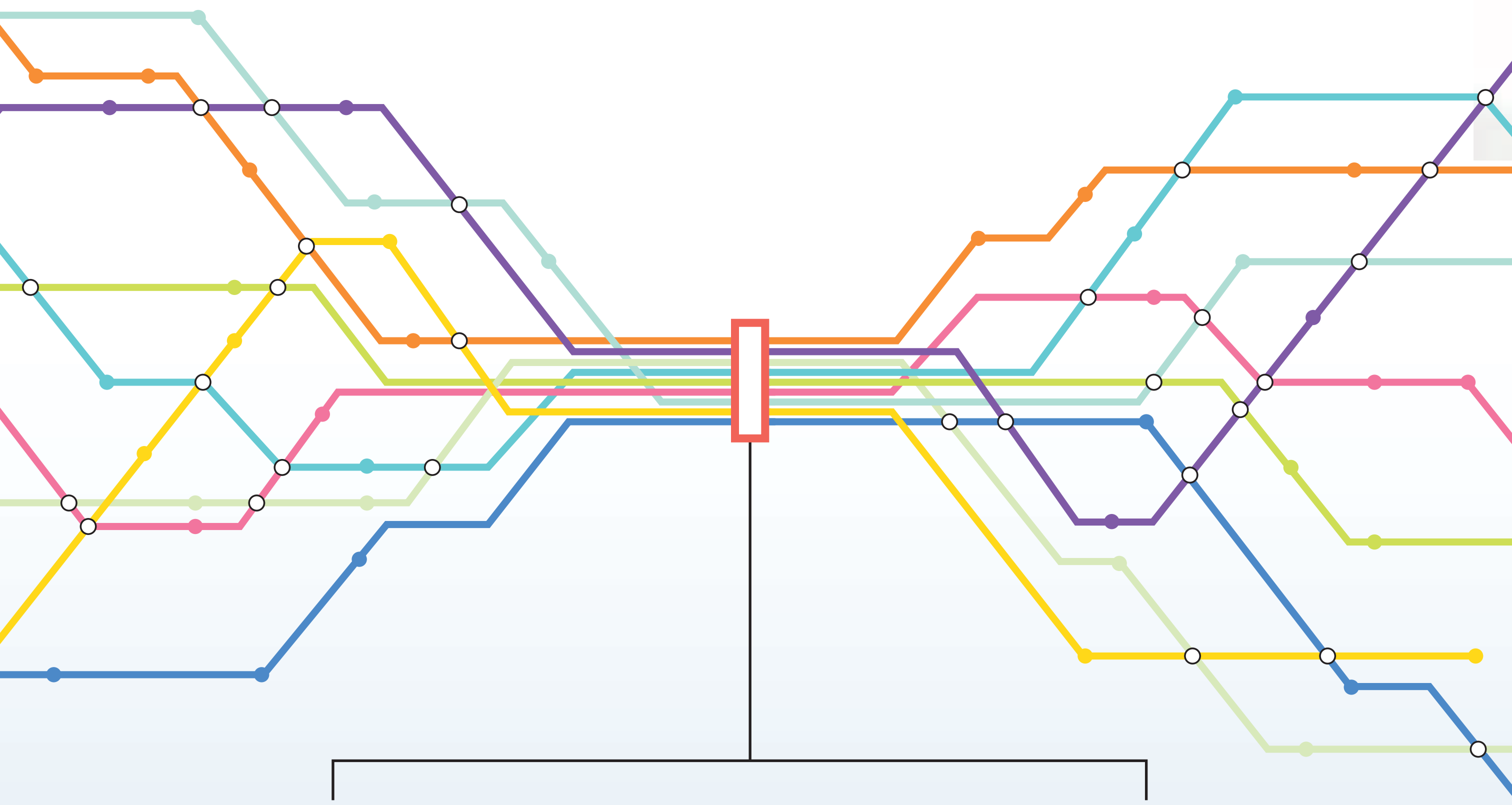

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RESTAURANT LOGISTICS

Serving Up the Perfect Meal

To satisfy consumers' hunger for quality food at low prices, the restaurant industry adds enhanced supply chain management processes to the menu.

By Joseph O'Reilly

In many ways, the restaurant industry is defined by paradoxes. Consumers want quality food at affordable prices. Product freshness is a must, regardless of seasonal variability. Cost and customer service come bundled—not à la carte.

On the supply side, menu selection competes with supplier selectivity. Restaurants demand sourcing reliability and consistency, when Mother Nature is nothing if not fickle.

Beyond that, restaurants want replenishment fast. Consumers want orders faster. "What you want is what you get" and "Have it your way" aren't simply slogans. They are expectations.

So when consumer and market pressures pull restaurants in different directions, the supply chain logically becomes a platform for leveraging these opposing challenges to find shared gains.

EXTRA VALUE MEALS

The U.S. economic recession put a cinch on discretionary spending. As budgets tightened, many consumers opted to eat in rather than dine out. Consequently, the restaurant industry endured a noticeable drop in demand.

The total number of restaurant visits in the country fell from 62.7 billion in 2008 to 60.6 billion in 2011, according to consumer market research firm NPD Group. More telling, 87 percent of the loss was in visits to independent operators, even though at the start of the recession, only one-quarter of all restaurant visits took place at these non-chain restaurants.

One notable exception, however, is quick-service restaurants. The U.S. fast food industry is growing more rapidly than the restaurant industry at large, according to research analyst RNCOS. It expects the quick-service segment to register a compound annual growth rate of about four percent between 2011 and 2014, thanks to a growing younger population, changing social dynamics, expediency, and cost.

In fact, some chains proved to be recession-proof, expanding even as the economy contracted. Subway, for example, added 6,000 restaurants between 2008 and 2010. Restaurants that were able to keep costs down and prices low still capitalized on demand for fast food convenience. The supply chain played a key role in these successes. Now, it is more important than ever.

Given current drought conditions in the United States, managing commodity costs is one of the foremost challenges food service companies face, says Todd Bernitt, general manager for C.H. Robinson. The Eden Prairie, Minn.-based 3PL has an established presence in produce sourcing and transportation, and has been recognized by T.G.I. Friday's and Subway for its work.

"Managing commodities starts at the ground level with grains," Bernitt says. "Due to the summer 2012 drought in many regions of the United States, grain prices are on the rise as crop yields plummet compared to years past. In turn, this creates a tighter market for grain, resulting in higher feed prices for cattle, poultry, and pork. When those costs go up, so do the costs of purchasing the raw meat, and in the end, the final consumable product on our plates."

These types of capricious cause-and-effect situations challenge food service companies. Many are targeting specific ways they can better predict demand, and work closer with suppliers to level these variations. Darden Restaurants, for example, has automated ordering between restaurants and suppliers, and is using intelligent forecasting tools to help restaurants more accurately measure demand—which directly impacts transport and purchasing costs.

Overall, however, supply chain solutions that drive down costs are unique to individual restaurants. "What may fit for a casual dining concept—which has room for more inventory and fewer weekly deliveries—won't fit at a quick-serve restaurant that drives volume and has less cooler and freezer space," explains Bernitt.

"One thing all restaurants are doing is managing labor farther up the supply chain, and pushing inventory levels back to suppliers to manage, thereby controlling costs, keeping inventory fresh, and allowing menu planning variability," he adds.

Cost is often the deciding factor for fast food consumers. But in some instances, they are willing to pay more for quality. One chain that has found such a niche is Chipotle Mexican Grill.

To fulfill its commitment to high-quality, fresh food, Chipotle plans to source more than 10 million pounds of locally grown produce—which will also cut its transportation costs.

"Chipotle buys higher-quality food, and therefore can charge more. It isn't buying based on the lowest margin," says Rupert Spies, chef and senior lecturer, food and beverage management, at Cornell University's School of Hotel Administration.

Chipotle plans to source more than 10 million pounds of locally grown produce—including bell peppers, red onions, jalapenos, oregano, and romaine lettuce—up from five million pounds two years ago. The program procures food from farms within 350 miles of restaurants where it will be served. Committed to supporting local farms and sustainable agriculture, Chipotle is also receiving fresher product and reducing transportation costs—even if it sacrifices economies of scale.

LAW & ORDER...AND FOOD

While managing costs is an important challenge, the food service industry's top priorities will always be quality and safety. The ramifications of food-borne illnesses and product recalls are costly, so companies have been proactive in exploring ways to create new and better standards throughout the supply chain. For example, the Produce Traceability Initiative—an industry-wide effort to integrate corporate and market-driven traceability programs—is driving much of the technology investment.

"Having visibility to the entire supply chain—not just from distribution centers to stores, but all the way down to suppliers and growers—allows for better information gathering and, in the end, better decision-making," says Bernitt.

The government has standards, too. When the U.S. Food and Drug Administration (FDA) passed the Food Safety Modernization Act in January 2011, it presented the food service industry with new traceability requirements. The long-overdue action was largely attributed to a spate of high-profile food-borne disease outbreaks. The pending provisions instruct the administration on better managing and responding to product recalls, while creating a regulatory architecture that seeks to prevent epidemics from occurring.

The new legislation is expected to bring dated food-safety protocol in line with current industry needs. But many companies are already well down that road.

Darden Restaurants is among the more familiar food service organizations in the world, counting restaurants such as Red Lobster, Olive Garden, Capital Grille, and Longhorn Steakhouse among its seven brands and more than 2,000 establishments. The company is America's 27th-largest private-sector employer.

Darden's supply chain manages more than $3 billion in capital and food product expenditures annually, and sources about 35 million cases of product from 1,500 vendors in 35 countries around the world. Because of its organization's sheer size, Darden recently initiated a major supply chain overhaul that it expects will save $45 million annually through lower prices and less wasted food. In 2012, it named Jim Lawrence its new chief supply chain officer.

Under Lawrence's guidance, the company is upgrading its internal communication infrastructure to better connect restaurants, distributors, and suppliers. Darden is also pushing a new approach to standards throughout its supply chain.

Presenting at the GS1 Conference in Las Vegas in June 2012, Jim Thomas, vice president of supply chain, shared Darden's vision of total quality and the important role standards play in this process. The challenge he and other supply chain practitioners in the restaurant industry face is unpredictability.

"Nature makes food, but it doesn't follow rules or have standards," explained Thomas. "Our manufacturers, as good as they are, face problems every day. Imagine there's a food-borne illness and they need to stop the supply chain and notify warehouse providers to pull a product number. The warehouse providers have to look in their records and tell the distributors, who then have to translate that number and call our restaurants. That sounds more like a rumor than a recall."

Darden Restaurants' supply chain overhaul will save $45 million annually through lower prices and less wasted food in its Olive Garden, Red Lobster, and Capital Grille restaurants.

STANDARD OPERATING PROCEDURES

To address this complexity, Darden is in the process of rolling out GS1 standards—globally accepted measurements that define information collected, recorded, and shared to ensure traceability—among its disparate trading partners. This will allow the restaurant chain to immediately identify product; capture and share information; communicate with suppliers, distributors, and restaurants; rapidly respond to a food safety crisis to ensure diner safety; and create better supply and demand data exchange.

Darden is also working with various food service operators around the world and the U.S. FDA to counsel and educate regulators about the benefits standards can bring to the industry.

"Sometimes this type of collaboration can be viewed suspiciously," Spies says. "But Darden wants to do what is right and what is best to keep its guests safe."

As altruistic as Darden may be, it also recognizes opportunities where it can leverage this visibility to execute business process improvements that ultimately reduce supply chain costs.

> "We can make better supply chain decisions when all partners have data available instantly."
>
> –**Jim Thomas,** vice president of supply chain, Darden Restaurants

"We can automate restaurant receiving practices, reduce labor expenses in our own restaurants, help expand unattended deliveries, and manage expenses," says Thomas. "The business case for the work we do in the restaurants easily translates upstream to the warehousing and manufacturing environments that support our operators. We can also enhance in-house restaurant inventory management, providing more accuracy in our replenishment processes."

Darden expects its growth to continue—in terms of guests, restaurants, geographic locations, and complexity. Thomas and others within the organization believe end-to-end supply chain visibility doesn't have to add complexity. Rather, it can simplify processes. GS1 standards lay the foundation for such improvement.

"We can make better supply chain decisions when all partners have data available instantly," says Thomas. "It's like walking into a room with the lights out. You can certainly make it across the room in the dark. But wouldn't it be better to turn on the lights, and let everybody see what's happening?"

DELIVERING SUPPLY CHAIN CACHET

Darden has a simple motivation for implementing supply chain best practices that ensure food safety and quality compliance: Failure costs too much. "With so many restaurants and so much volume, the risk of anything going wrong with its food can have a profound impact on its entire chain," says Spies.

When sanctioned, the FDA's Food Safety Modernization Act provisions will help fill in some quality and safety standard gaps that currently exist. The burden of risk and investment to comply with the new government regulations will hit small and medium-sized companies harder than most multinationals that already possess a high level of sophistication. Still, the perception that SMBs are the industry's weakest link is misplaced.

"Any size operator assumes risk," Spies says. "But, when product gets into a large company's supply chain, it can be anywhere. A small number of national producers supply an overwhelming majority. The multiplier effect with larger operators can be significant when something goes wrong."

As the local sourcing trend spreads, restaurants will have to manage compliance accordingly—whether they are dealing directly with growers or vetting co-ops and distributors that have their own standards and requirements. The exposure to risk and costly product recalls is too great for food service companies to gamble.

Bernitt has yet to see many national chains follow the local sourcing model. On the whiplash end of a recession, and with food prices expected to soar as a consequence of the recent U.S. drought, many consumers will be hesitant to pay more for produce coming from the neighborhood farm.

"No matter where product comes from, consumers have to feel they are getting a good value, or they won't be willing to pay," he notes. "Regional-based supply programs have driven some national food suppliers to offer more local or regional products, but the volume is still a small share of the total supply.

"If the supplier has an efficient supply chain that can deliver the product with enough shelf life and create an end product where consumers feel they are getting a good value, then that supplier will continue to receive the business," Bernitt adds.

It's no surprise that supply chain management is the means to enhancing quality and safety while reducing costs—two seemingly opposed ends. It's why food service companies have been fast adopters compared to other industries.

But what Spies finds unique is that some restaurant chains are leveraging the supply chain to attract customers, especially a younger generation more sensitive to sustainability issues. Chipotle touts its supply chain on in-store menus. McDonald's runs an ad campaign celebrating suppliers. These considerations leave an impression.

"Restaurants are leveraging supply chain as a marketing tool," Spies says. "They understand what customers are looking for."

They want it their way—and the supply chain makes sure that happens. ■

NAVIGATING PHARMA LOGISTICS

Temperature control, security, chain of custody, and regulatory compliance obstacles can stop pharmaceutical manufacturers at every turn. Strategic supply chain management helps provide a way out.

By Merrill Douglas

Pharmaceutical producers combine ingredients precisely, under specific conditions, while negotiating a maze of stringent regulations and quality controls.

Companies that move or store pharmaceutical products must meet similar demands. Many drugs are highly sensitive to temperature; some are extremely valuable; and all are subject to a complex array of government regulations. In the pharmaceutical supply chain, every detail counts.

Pharmaceutical logistics is such a specialized discipline that drug manufacturers have long been reluctant to outsource to third-party logistics (3PL) service providers, says Cathy Roberson, senior analyst at UK-based Transportation Intelligence Ltd., and author of *Global Pharmaceutical Logistics Report 2012*.

But some recent industry trends are making drug manufacturers rethink their strategies. One trend is that some popular drugs are coming off patent. Without blockbusters such as Lipitor and Plavix to bolster their bottom lines, manufacturers are trying to make up the difference by cutting costs. One way they do this is through outsourcing logistics operations.

A double dose of globalization also complicates matters. Today, drug makers in the United States and other industrialized nations are making more products in countries such as India, China, and Brazil. They're also selling into more overseas markets. "These factors create longer supply chains," Roberson says.

With these new challenges arising, drug makers are turning to 3PLs that understand international shipping, and operate divisions devoted to the pharmaceutical supply chain.

When Roberson conducted her research in late 2011, the market for pharmaceutical logistics services was valued at nearly $52.3 billion, and was expected to reach $57.1 billion by 2012.

Of course, many drug makers still manage some or all of their supply chains internally. Whichever strategy a company chooses, its supply chain team wrestles with some highly specific challenges. There's no magic pill for dealing with those issues, but the industry has developed some effective solutions.

Here's a look at the state of pharmaceutical logistics today.

Managing Global Headaches

In addition to requiring drug makers to ship their products across borders and over long distances, the pharmaceutical industry's global nature stymies manufacturers with a complicated array of regulations governing transporting drugs in different countries.

"Pharmaceutical industry service providers need to be aware of about 70 different sets of regulations," says Larry Sweeney, chief operating officer at DDN, a Menomonee Falls, Wis., firm that provides supply chain services to companies that make pharmaceuticals, biologicals, and medical devices.

As former director of logistics and distribution at Genzyme, Sweeney understands that challenge from the manufacturer's side, as well. In recent years, members of the International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH) have been trying to bring some unity to the rules.

Product and shipment tracking plays a vital role in securing the pharma supply chain.

Photo Courtesy of Exel

The industry is also seeking global standards for tracking drug pedigrees. Different countries and U.S. states have established their own requirements for serializing drugs. This typically involves attaching a two-dimensional bar code or other device that uniquely identifies a unit of the product so it can be tracked throughout the supply chain.

In some regions, serialization is designed mainly to monitor the chain of custody and keep counterfeit drugs off the market. Outside the United States, governments look to this technique largely to prevent reimbursement fraud.

Although the industry has experimented with radio frequency identification (RFID) tags for serialization, that technology has raised concerns, including fear that prolonged exposure to RF signals might harm certain biological products.

"Issues also have arisen with some

Coordinating Two Inbound Supply Chains

When manufacturers receive the ingredients used to make pharmaceutical products, they're actually dealing with two separate supply chains. One consists of active pharmaceutical ingredients (APIs), the substances that make a drug a drug. Like the finished products, these are generally perishable, temperature-sensitive, and expensive.

Some are also particularly attractive to thieves, as they may be key ingredients in street drugs as well as therapeutic drugs. "Criminals would like to get their hands on these items," notes Scott Szwast, director of healthcare markets, UPS.

The market for APIs is changing dramatically. Two decades ago, most of the materials used to manufacture pharmaceuticals were chemical products. Today, many drugs are biopharmaceuticals, derived from living cells and tissues.

"Those APIs become increasingly more challenging to move, handle, or distribute, because they're very sensitive," Szwast says.

The second set of materials that flows into drug manufacturing plants consists of excipients—inert ingredients such as binders and coatings that are used to put the drug into a pill or other format for consumption.

"It's a very different supply chain because, by definition, excipients tend to be more stable," Szwast says. Excipients are also far less valuable, and they don't involve controlled substances, making theft a less pressing concern.

Managing these streams of inbound ingredients requires careful coordination. "These two very different raw material supply chains have to come together precisely at a manufacturing facility to create a pharmaceutical," Szwast says.

products—such as liquids or packages with metal caps—reflecting energy and blocking the RF tag's reading," Sweeney says.

Taking Pains With Security

Keeping inauthentic product out of the supply chain is half the security challenge facing drug manufacturers. Shippers also deal with the opposite issue—keeping genuine product where it belongs.

Given the high value of many drugs, loss prevention is a vital concern. Tim Mitchell, president of Sentry BioPharma Services, cites the example of a large pharmaceutical company that lost $75 million worth of product when thieves arrived at a warehouse after business hours, cut a hole in the roof, and used a gantry to hoist out the product. "Those products immediately go offshore to other markets," he says.

To stay one step ahead of the criminals, Sentry continuously adjusts its security strategies. "For example, people monitor sensors 24/7 throughout our facility," Mitchell says. "If there's any unusual sound—even if it doesn't set off an alarm—management is called in."

Exel, an Ohio-based 3PL, applies any level of security that an individual customer requests, says Jim Saponaro, vice president of operations with the company's life sciences and healthcare sector. Among the tactics and technologies it uses are GPS tracking, biometric scanning, video analytics, motion detection, infrared detection, and roving security patrols.

"We also work with First Watch, a vendor that provides tracking devices, and screens drivers and equipment for outbound shipments," he says.

> "For many pharmaceuticals, a two-degree Celsius temperature variation is all that's needed to spoil the entire lot."
>
> –**Scott Szwast,** UPS

Controlling Temperatures

Keeping pharmaceuticals safe means not only keeping them out of the hands of thieves, but also maintaining them at the proper temperature. "For many pharmaceuticals, a two-degree Celsius temperature variation is all that's needed to spoil the entire lot," says Scott Szwast, director of healthcare markets for Atlanta-based UPS.

By 2014, seven out of 10 of the leading pharmaceutical products will require temperature-controlled transportation, estimate some industry observers.

Maintaining just the right temperature is a challenge for anyone who ships or stores pharmaceuticals, but it's an even larger obstacle for companies shipping from the warmer climates where many drugs are made today. "When you're moving product out of locations such as Hyderabad and Bangalore, a long X-ray screening process at the airport can create complications," says Richard Smith, managing director of FedEx life sciences, specialty services, global trade services in Memphis.

When temperatures slip, companies lose an average of $150,000 on a small package shipment. For large freight shipments, damages can run into the millions. To prevent these losses, shippers and their service providers have developed some sophisticated techniques for maintaining the cold chain.

They start with storage environments tailored to the needs of different products. Sentry, for example, recently added a room cooled to -45C to its Minneapolis facility. That building also offers rooms maintained at ambient (15C to 25C), refrigerated (2C to 8C), frozen (-15C to -25C), and ultra-low (-70C to -90C) temperatures.

To maintain consistent shipment temperature in transit, companies use equipment such as refrigerated trailers, insulated packaging, thermal blankets, and dry ice.

When a flight delay, Food and Drug Administration (FDA) inspection, or other contingency holds up a pharmaceutical shipment, FedEx Express might add more dry ice to a package, refreeze gel packs, or put items into temperature-controlled facilities. "We even have temperature-controlled trailers in our hub's international

Many pharmaceutical products must be stored in temperature-controlled facilities.

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DAVID LYONS,
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Whatever It Takes!

area," Smith says. "We place products facing clearance delays in the trailers to protect them."

Some companies have introduced active packaging, which comes with a power source to maintain the temperature inside, says Mark Wiesman, president of DDN. Active packaging allows shippers to regulate different drugs at different temperatures inside the same trailer or container.

Many companies also use sensor-based systems to document a product's temperature throughout its journey, and sometimes send an alert if the temperature veers too far. Exel, for example, uses a device called TempTale to monitor temperatures inside its customers' packaging. "The device maintains a temperature history and validates that the shipment was in compliance from pickup to delivery," says Saponaro.

Some sensor-based products monitor other environmental exposures as well. "Technologies now are able to determine whether a product was exposed to light—which would be bad news for a biologic product—or whether the product was subject to high vibration," Wiesman says.

Five Days, 106 Pallets

Temperature control was a major focus when Cadence Pharmaceuticals Inc., San Diego, worked with FedEx to move an unusually large load of its product OFIRMEV from Italy to the United States early in 2012. The drug, an injectable form of acetaminophen, must be maintained at controlled room temperature, between 20C and 25C, plus or minus 10C, says Dave Dezan, Cadence's director of supply chain operations.

Cadence usually transports OFIRMEV in temperature-controlled intermodal containers, which allow the product to stay in the same environment while moving from truck to ocean vessel and back to truck. But in this case, the company needed to move 106 pallets so quickly that marine transport was out of the question.

"We considered moving product via single pallets, using temperature-controlled containers on passenger airlines," says Dezan. But in the end, Cadence decided to charter an entire Boeing 777 aircraft.

Cadence and FedEx developed processes to keep the shipment in the required temperature range while it was in motion and during mode-to-mode transfers. Two FedEx temperature specialists flew to Italy to oversee the load through the entire trip, from the factory to Cadence's 3PL in Memphis.

The specialists arrived at the factory with the necessary number of trucks, plus one spare. At the airport, they supervised as pallets of product were prepared for air travel and wrapped in thermal blankets.

"They set temperature loggers inside the plane, and did spot checks on the loggers we had on our product," Dezan says. "And they were on the flight while the product was being flown from Italy to Memphis."

In Memphis, the specialists supervised as the shipment was unloaded, unwrapped, put onto trucks, and sent for security and Customs clearance. Cadence worked with FedEx to submit documents to the FDA in advance, to help speed the clearance process.

While waiting for the go-ahead to move the shipment to Cadence's 3PL, FedEx kept the product on temperature-controlled trailers. "They monitored the temperatures, as well as the fuel levels for the diesel-powered generators, to make sure the shipment stayed within the right temperature range," Dezan says.

The delivery went just as fast as Cadence had hoped. "Pickup started on Friday, and product arrived at our 3PL on Wednesday," Dezan says. "For that type of shipment, and requiring FDA clearance, it doesn't get better than that."

In some sectors of the pharmaceutical industry, getting product to market as fast as possible is essential. This is especially true for generic drugs.

To protect temperature-sensitive pharma shipments, FedEx uses tools such as thermal blankets (*above*) and SenseAware devices, which contain sensors that monitor temperature, light exposure, humidity, and other factors that might affect drugs in transit.

"Generics have a very short window of profitability," explains Saponaro. "Once the drug goes off patent, the first one to market wins. Manufacturers have a 30- to 60-day window to make huge profits, and then it starts to level out."

In some cases, the FDA gives one company the exclusive right to sell a generic for 180 days before other manufacturers can jump in. That makes it even more urgent to get the product to market.

GENCO ATC's reverse logistics operation handles returns for more than 80 pharmaceutical manufacturers.

"Every day a company loses sales is total lost value," says Wiesman. "When the market is opened to other generic manufacturers, prices drop dramatically." Competition will very quickly push the price down by as much as 80 percent.

While speed is of the essence, a manufacturer introducing a generic drug faces multiple hurdles that can slow the race to market. For one thing, the drug has to meet FDA requirements for release into the U.S. market.

The FDA might also require some changes to the labeling right before the launch. "Changing labeling rapidly would require great logistical efforts," Wiesman says.

Trial, But No Error

One logistics function unique to the pharmaceutical industry is the work that supports clinical trials. Rather than distribute large quantities of a drug for use in the market at large, manufacturers conducting trials move product to labs and hospitals and, often, directly to patients' homes.

The demand for shipments to clinical trial sites tends to ebb and flow, and each project is unique. "Various studies go on at the same time, and all have different requirements," Saponaro says. "It's a new learning process each time."

Depot services for clinical trials make up one of the fastest-growing business areas for Sentry BioPharma. The company helps clients move product from manufacturing facilities around the world to locations in a variety of countries.

Some destinations are growing increasingly important. "Our U.S. and Canadian clients need to get product to test sites in Central Europe, where it seems to be easier to find test subjects for these programs," says Mitchell.

To illustrate the complicated logistics of a clinical trial, Mitchell cites a London-based drug maker shipping product to trial sites in the United States and Canada. The manufacturer ships the pharmaceuticals and other materials to Sentry, then the 3PL prepares test kits for the trials.

"We label the nude vials," Mitchell says. "Then we randomize the kits, serialize as necessary, and put them together."

Sentry then stores the kits at the proper temperature until it receives instructions for sending them to trial sites. The shipments aren't large, but they require extreme care. "If one shipment goes out of temperature, it could put a patient, or the trial, in jeopardy," notes Mitchell.

Expired or Recalled

Reverse logistics represents an important aspect of supply chain management in many industries, but the pharmaceutical version features some special characteristics. A pharmacy can't dispose of prescription drugs that are nearing their expiration date the way a shoe store might dispose of summer sandals in September.

"You can't have a sidewalk sale for pharmaceutical products that are not selling," notes Larry Hruska, president of the pharmaceutical services division at Pittsburgh-based GENCO ATC.

Most major drug store chains contract with GENCO ATC to manage pharmaceutical returns, as do more than 80 pharmaceutical manufacturers. "Any product that gets returned from any pharmacy in the country to one of those manufacturers has to be returned to us," Hruska says.

When a pharmacy agrees to carry a particular drug, the manufacturer guarantees its sale by promising to credit the pharmacy for unsold product that reaches its expiration date, as long as the pharmacy meets certain guidelines. Those rules dictate how soon before the expiration date, or how long after, the pharmacy may return the product.

When GENCO ATC receives a shipment from a pharmacy, it first checks to ensure the customer has directed the product to the right manufacturer. It also determines that the product isn't counterfeit, and has arrived within the correct time window.

"Then we transmit that information through electronic data interchange to the manufacturer, so it knows what to credit the pharmacies," Hruska says. Once that process is complete, GENCO ATC incinerates the product.

A similar procedure applies when the FDA or a drug manufacturer must recall a product. GENCO ATC sends recall notices to all pharmacies, physicians, and hospitals that stock the drug. Those parties mail back cards indicating how much product they're returning. They then ship the product back to GENCO ATC.

"When the product comes back, we match it against what they said they were returning, to ensure that all product has been taken out of the supply chain," Hruska says. GENCO ATC holds the product until the FDA approves its release, then incinerates it.

Because GENCO ATC handles many high-value products that include controlled substances, security is a big concern during the reverse logistics process. "Our facility is locked down like Fort Knox," Hruska says. "All employees go through pre-employment background checks and drug screenings, and are subject to unannounced drug screenings at any time."

Because the lot number is usually the most precise identification attached to a pharmaceutical product, a recall may force a drug maker to destroy perfectly good product along with the bad. For example, DDN's Sweeney cites a major manufacturer that had to recall thousands of packages of a drug because some containers held an incorrect number of pills.

The problem occurred on only one or two of the company's 10 packaging lines. "But because the packages didn't have serialization, the company wasn't able to determine which packages came off the affected lines, and were the only ones that needed to be recalled," he says.

In the future, when every package carries a unique serial number, recalls will be much more precise.

What else will the future hold for the pharmaceutical supply chain? New security systems? Even better methods for maintaining and documenting temperatures? Pedigree management systems in the cloud? As manufacturers develop more and better drugs, logistics professionals and their partners will be right behind them, filling prescriptions to ensure the health of those critical shipments. ■

UTILITIES & SITE SELECTION

ENERGIZED FOR SUCCESS

The availability of low-cost and reliable energy creates super-charged opportunities for locating warehouses and distribution centers.

Imagine building your dream home, only to discover when the power bill arrives that you can't afford the energy to heat, cool, and light the house.

For many businesses selecting sites for new distribution centers and warehouses, ensuring adequate and affordable energy to power the facility presents a challenge. Smart companies enlist local resources to help explore utility costs in municipalities they are considering for new locations.

Ensuring the availability of reliable and low-cost power is an essential site selection consideration, so it is not surprising that the geographical regions positioned to offer the best utility deals are aggressively selling their advantages to manufacturers and third-party logistics providers seeking the power of, well, power.

Kentucky Comes Clean

When it comes to the price of power, Kentucky is one of the most economical states in the country. "Utilities in Kentucky cost 25 percent less than the national average," notes Erik Dunnigan, commissioner of the Department for Business Development for the Commonwealth of Kentucky. The department recruits companies to the area, and encourages job retention and creation by working with existing businesses and industry to enhance the overall viability of the state's economy.

Prominent among the factors contributing to Kentucky's competitive edge are the benefits of clean coal technologies. Coal-fired power plants produce more than 90 percent of Kentucky's electric power, with the balance generated by hydroelectric dams, fuel oil, and natural gas. Kentucky's large reserves of unmined coal ensure abundant supplies of electric power for the foreseeable future.

These benefits serve the companies that make up Kentucky's diverse manufacturing base. "The state is home to the automotive, food, pharmaceuticals, and plastics industries," Dunnigan says.

Over in Missouri and Illinois, Ameren Corporation works to promote energy efficiency for its 2.4 million electric and 900,000 natural gas customers through a variety of green initiatives offering incentives to help reduce costs.

"Ameren's commercial rates fall below the national average," says Cheryl Welge, business development executive in Ameren's economic development department. Her claim is validated by an Edison Electric Institute study showing that Ameren Illinois commercial customers pay 18 percent less than the national average, while Ameren Missouri commercial customers pay 33 percent less than the national average.

Commercial energy users can save even more by taking advantage of energy-efficiency incentives, particularly in refrigerated facilities. Illinois' deregulated environment provides commercial customers yet another incentive to locate there.

One common thread runs through the regions where utilities are at their most efficient and economical: the partnerships formed between government and the utilities. It helps, of course, if you happen to control the utility itself. That's the case in Nebraska, where the state's citizens own the Nebraska Public Power District (NPPD), the state's largest electric utility.

"Nebraska's status as the only public power state in the country provides a significant advantage to businesses that choose to locate here," says Rick Nelsen, NPPD economic development manager. "It means the primary goal of Nebraska's electric utilities is to provide low-cost power, rather than shareholder profits.

"Public power also means Nebraska's utilities are financed, in part, through issuing and selling tax-exempt revenue bonds, resulting in lower interest rates on borrowed money," he adds. "Maintaining a publicly elected board as our decision- and

During site selection for warehousing and distribution facilities, companies must ensure local utilities generate sufficient power to run their buildings efficiently.

rate-making body allows NPPD to move more quickly than other utilities on key issues."

NPPD's chartered territory includes all or parts of 91 of Nebraska's 93 counties. The utility's revenues are derived mainly from wholesale power supply agreements with 52 towns and 25 rural public power districts and rural cooperatives that rely totally or partially on NPPD's electrical system. NPPD also serves about 80 communities at the retail level. More than 5,000 miles of transmission lines make up the NPPD electrical grid system, which delivers power to about one million Nebraskans.

Partnering is also a key element in Kentucky, where the state's business development department functions as a power line to the utilities, beginning when a company first inquires about a possible location for a DC or warehouse.

"The Department for Business Development immediately engages with the utilities in that process," says Dunnigan. "In doing so, government creates an environment where businesses can be successful."

Kentucky businesses count on utilities such as Louisville Gas and Electric Company to provide affordable, reliable power.

Part of the Team

Development executives at Ameren see themselves as integral members of the site-selection team in the regions they serve. "Typically, we are part of the local and state team working with companies looking for sites in the region," Welge says. "We provide information the team needs to sell the location based on low-cost energy and long-term solutions. We provide support to local and state officials to help move projects along quickly and efficiently."

Ameren brings yet another form of power to the process: scale. Ameren Missouri ranks as the largest electric power provider in Missouri, and Ameren Illinois ranks as the third-largest natural gas distribution operation (in total number of customers) in Illinois.

With assets of $23 billion, Ameren is a holding company for Ameren Illinois, Ameren Missouri, and three other operating entities. It serves customers across 64,000 square miles in Illinois and Missouri.

In Missouri's Joplin region, companies seeking DC and warehouse space look first to the Joplin Regional Partnership, which provides site-selection assistance, incentive and business tax information, key contacts in business and local government, demographic and economic data, and other services.

"The Joplin Regional Partnership helps companies looking to expand or relocate to the region identify the best possible site," says Rob O'Brian, president, Joplin Area Chamber of Commerce. "Low-cost reliable utilities are just one of the many benefits employers find in our region."

The Empire District Electric Company, Missouri Gas Energy, American Water, and many other utility companies provide affordable, safe, and reliable utilities to the Joplin region.

In Kentucky, electric power is distributed by four investor-owned electric utilities, 30 municipal electric systems, the Tennessee Valley Authority, and 21 rural electric cooperatives, whose service areas can be obtained from the Kentucky Association of Electric Cooperatives. The investor-owned utilities, which account for nearly 50 percent of all sales in the state, are AEP Kentucky Power, Kentucky Utilities Company, Louisville Gas and Electric Company, and Duke Energy.

Kentucky's industrial electric power costs are the lowest in the eastern United States and fourth-lowest in the country.


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BEFORE EVEN THINKING ABOUT RELOCATING.

The state's industrial sector natural gas prices are also among the lowest in the country, and are ranked second-lowest in the eastern United States. Natural gas in Kentucky is available from 28 gas distribution companies, 49 intrastate pipeline gas companies, and 172 municipal, college, or housing authority providers.

Access and Hospitality

Site-selection considerations for DCs and warehouses must additionally focus on proximity to the markets they serve. You might say that the heart of it all is being at the heart of it all.

"You can reach about two-thirds of the U.S. population within one day's drive from Kentucky," says Dunnigan. "When you are delivering product, that location is conducive to success."

Nebraska also touts a beneficial location. "Geographically, Nebraska is center stage to both regional and national markets," Nelsen says. "I-80, the most traveled east-west transcontinental route of the interstate highway system, offers 482 miles of quick access to every market in the nation. Goods delivered by truck reach more than 25 percent of the U.S. population in just one day. Within two days, that percentage increases to more than 90 percent."

The nation's two largest rail companies—BNSF Railway Company and Union Pacific Railroad—provide service to many Nebraska communities. Ten freight railroads operate more than 3,200 miles of track throughout the state. As a result, no major city in the United States is more than five days by rail from Nebraska.

A hospitable work environment is another important plus. "Nebraska's workforce consists of productive, dependable, educated, and well-trained individuals," says Nelsen. "This contributes to low absenteeism and turnover rates.

"Nebraska maintains an unemployment rate of 3.8 percent—less than half the nationwide unemployment rate of 8.2 percent," he adds. "Unemployment insurance and worker's compensation insurance costs also are lower than the national average."

The Joplin region, meanwhile, lays claim to a location nearly equidistant between Los Angeles and New York, as well as the Mexico and Canada borders. Of particular importance to DCs and warehouses, three Class I and two regional shortline railroads serve the region, providing direct access to major ports on the Gulf of Mexico and Pacific Ocean.

"The opening of I-49 in late 2012 will create a north-south interstate complement to the existing I-44, and connect the Midwest to the Southwest," says O'Brian. "The Joplin Regional Airport provides commercial and airfreight service, and three other commercial airports are within driving distance of the region."

The Joplin region offers a productive workforce, reasonable operating costs, and a high quality of life. Fiber-optic backbones provide data access throughout the area and around the world.

Attention-Getter

The region served by the Hoosier Energy Power Network also receives considerable attention from businesses and site consultants looking for transportation, distribution, and logistics opportunities because of its proximity to important highway, rail, and water transportation routes, along with several population centers that offer highly trained workforces.

Based in Bloomington, Ind., Hoosier Energy provides electricity through a distribution system of member-owned cooperatives to developed sites and industrial parks along the I-70, I-65, I-64, and I-74 corridors, with significant workforces located in adjacent metropolitan areas such as Indianapolis, Louisville, Cincinnati, and Evansville. As a generation and transmission cooperative, Hoosier Energy operates coal, natural gas, and renewable energy power plants, and delivers power through a 1,500-mile transmission network.

"Shovel-ready sites served by Hoosier Energy stretch over a wide region," says Harold Gutzwiller, Hoosier Energy's manager of key accounts and economic development. "The area's eastern

LOW-COST ELECTRICITY: TOP 15 STATES

Utility rates are an important consideration in site selection decisions. Missouri, Kentucky, Nebraska, and Indiana offer some of the lowest electricity costs in the nation.

Rank/State	Average Electricity Rate for All Sectors (Cents per Kilowatthour)
1. Wyoming	5.88
2. Idaho	6.14
3. Utah	6.26
4. North Dakota	6.44
5. Missouri	6.46
6. West Virginia	6.62
7. Kentucky	6.63
8. Nebraska	6.67
9. Washington	6.98
10. Iowa	6.99
11. South Dakota	7.05
12. Montana	7.26
13. Indiana	7.62
14. Oklahoma	7.67
15. Oregon	7.70

SOURCE: U.S. Energy Information Administration boundary offers one-day delivery to the East Coast, while the western boundary is only a short drive from St. Louis. Our entire service area provides easy proximity to southeastern and south-central markets such as Nashville, Memphis, and Atlanta."

Interstate 65 runs through the heart of the Hoosier Energy service area. Interstates 75 and 57 run on the region's respective eastern and western borders, providing a variety of routes that connect with the southern United States.

"Interstate 69 will have 65 miles of new lanes open in 2012, with additional interstate completed within the next two years," adds Gutzwiller. "And Interstates 70 and 64 are convenient routes to East Coast ports and markets—and they provide access to the west. Both rail and Ohio River ports are available for transshipping as well."

Attracting Major Players

"The area's most recent distribution center success is a new one-million-square-foot facility being constructed for Amazon in Clark County, Ind., a Louisville suburb," says Gutzwiller. "Amazon considers the Indiana labor force and business environment so advantageous it is opening its fourth distribution center here."

"The I-65 corridor continues to be an important logistics thoroughfare for Indiana from Chicago to the Ohio River and points south, as shown by recent expansions and new facilities along this route," says Gutzwiller.

Growth is also a hallmark of the Gateway Commerce Center in St. Louis, served by Ameren. Tenants include Procter & Gamble, Hershey's, Unilever, and Walgreens.

"Walgreens opened a new DC and fulfillment center for its online operations," Welge says. "And it employs robotics."

Powered, of course, by reliable, low-cost energy sources.

For information on participating in an Economic Development Supplement, contact James O. Armstrong at 815-334-9945 or jim@inboundlogistics.com.

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Landoll LSC25/30

CAPACITY: 2,500 to 3,000 lbs.

MAXIMUM LIFT HEIGHT: 21′

TRAVEL SPEED: 6 mph loaded; 7 mph unloaded

APPLICATION: For use in a range of settings, including bulk storage, drive-in rack, and loading dock work.

The Landoll LSC25/30 is a back-to-basics stand-up ride, compact truck. This AC-powered truck can be used in stacking aisles as narrow as 9'6".

Bendi Series

CAPACITY: 3,000 to 5,500 lbs.

MAXIMUM LIFT HEIGHT: 39′

TRAVEL SPEED: 6 mph loaded; 6.5 mph unloaded

APPLICATION: Suitable for use inside or outdoors, and in bulk storage.

The Bendi family of very-narrow-aisle and narrow-aisle lift trucks stores loads in aisles as narrow as 72 inches. The trucks feature standard electric or LP gas power, and Durasteer front-wheel steering.

Landoll SLT30/35

CAPACITY: 3,000 to 3,500 lbs.

MAXIMUM LIFT HEIGHT: 26′

TRAVEL SPEED: 6 mph loaded; 7 mph unloaded

APPLICATION: Suitable for load handling in warehouses and distribution centers.

The Landoll SLT30/35 is a very-narrow-aisle forklift capable of operating in 56-inch aisles with 48-inch by 40-inch pallets. The truck features an AC traction/motor controller, 90-degree rotating mast, and 110-feet-per-minute lift speed. Wire guidance is available.

D.C. Solutions | by Marty Weil

Data Warehousing System Puts an End to Paperwork

Paper distributor and converter Roosevelt Paper wraps up manual information processes, and implements an automated data collection and management system to streamline operations.

Founded more than 75 years ago in a modest Philadelphia warehouse, Roosevelt Paper has grown into one of the nation's largest distributors and converters of fine printing papers. Today, the company serves a global network of customers from its headquarters in Mount Laurel, N.J., and three divisions in the Cincinnati, Chicago, and Philadelphia metropolitan areas. Each division provides a varied inventory and extensive in-house converting capabilities.

Faced with workflow inefficiencies, Roosevelt implemented a paperless data warehousing system that transformed its operations and positioned the company to better manage growth, respond to market variations, and maintain a leading position in its field.

"As a paper converter, we transform large rolls of paper into smaller rolls or sheets—whatever the customer needs," says John Gordon Jr., CIO at Roosevelt. "In our previous workflow, if there was a change order—and there are always change orders—the staff reprinted paperwork, then gave it to the appropriate personnel. We performed a constant paperwork shuffle—in the production office, shipping department, and on the plant floor – with the drivers and machine operators. Our processes were paperwork-driven, and not as efficient as they needed to be."

All the paperwork and manual transfer created a high risk for errors. Orders were incorrect when the latest change was not communicated to the driver or machine operator. Wrong paper was sometimes pulled for orders. Shipping destinations were changed at the last moment, and if not communicated quickly or efficiently, shipments moved to the wrong destination. "We were losing 4,000-pound rolls of paper," says Stan Kilian, project manager at Roosevelt. "We needed to improve our processes."

Building a Solution

Roosevelt called on Marlton, N.J.-based Acsis Inc., a systems integrator and supply chain solutions provider, to help solve the problem. "Roosevelt needed a system to automate all its processes, from materials receiving through shipping," says Larry Sawyer, Acsis' vice president, strategic accounts.

Acsis recommended Everett, Wash.-based Intermec Technologies for the hardware component of what would become the paperless data warehouse solution.

One major advantage of working with Intermec was that it could provide everything Roosevelt needed from a single source. "Intermec offered a total solution — mobile computing devices, printers, scanners, and the wireless infrastructure," Gordon says. "Instead of having to use several different vendors for the equipment, we were able to deal with one, which helped minimize issues."

Roosevelt uses Intermec's CV60 truck-mounted computers to receive and move product, SR61 scanners to read barcodes, and PX4i wireless printers to produce both permanent and in-process labeling. The technology tools identify and track goods anywhere within the Roosevelt supply chain.

"The SR61 scanners feature a proprietary scan engine, which delivers more accurate results than other models we have tried," says Kilian.

"We recently installed the wireless printers, even though the original ones we purchased from Intermec were still going strong after 17 years," adds Gordon. "Those workhorses were getting old, and it was time to upgrade."

All About Operations

Automating all warehouse and plant floor processes has given Roosevelt an operational advantage. "With the weak economy, it's helpful that the data warehousing system we've built gives us the ability to respond agilely to market changes," Gordon says.

The new system allows Roosevelt to do more with less. "Automating processes resulted in tremendous advantages for Roosevelt," says Sawyer. "Providing workers access to real-time information allowed the company to increase throughput while reducing labor."

Before the automated system, Roosevelt supervisors were encumbered by lag time and shuffling paper among departments. "The new system directs each worker to their next task," says Sawyer.

When an operator logs on at a workstation, the system displays orders in the correct handling sequence. The driver assigned to those workstations knows in exactly what order to pull the rolls. "Every process is prioritized," explains Gordon.

The system of scanning and checking each item helps prevent mistakes. If a worker tries to scan a roll out of order, the system will indicate an error.

"Checks and balances are in place

> "From the time we receive the paper to the time we ship it, and every step in between, we have complete operations visibility."
> — **John Gordon,** Chief Information Officer, Roosevelt Paper

Truck-mounted computers (*above*) collect and report inventory data for products received, stored, and shipped from Roosevelt Paper's warehouse, while wireless printers (*top*) print customized barcode labels on demand.

that weren't possible with a manual system," says Kilian.

The same principle holds for shipping. When supervisors prepare a shipment, they include details about which orders are part of that load. If the driver puts the wrong paper roll or skid on the load, the system identifies the mistake when workers scan the bay card that reports the item's location.

"If workers scan the wrong roll, the system notifies them of the mistake, and those goods can be removed from the truck," explains Kilian. "We aren't losing two-ton rolls anymore. Our inventory is accurately tracked."

Roosevelt also conducts numerous automated quality checks before shipments leave the facility. "If the system rejects an item for quality reasons, processes are in place to put the goods back into inventory or scrap them," Gordon says.

The Total Process

The process begins with electronic data interchange (EDI) transactions Roosevelt receives from its paper mill suppliers. EDI manifest transactions for the mill shipments are electronically sent to Roosevelt to help automate the receiving process.

When the goods arrive from the mill, workers scan their barcodes, which links them to the enterprise resource planning (ERP) system and confirms that the shipment matches the order. "Goods now enter inventory in real time; this used to be a manual process," says Gordon.

Before automation, the process—from loading dock to front office, with information manually keyed at each place—could result in one- to three-day delays in tracking inventory and providing visibility to sales staff. Now Roosevelt has real-time integration between the warehouse management system and back-end ERP system.

Full Functionality

"This is a complete system," says Gordon. "First we automated the receiving process, then the relocation process, then cycle counts; and the system is now a full data warehousing management system.

"The visibility it provides operations is significant," he adds. "From the time we receive the paper to the time we ship it and every step in between—from order entry to scheduling to manufacturing to shipping and service—we have complete operations visibility."

As an added benefit, the new system and equipment empower Roosevelt employees.

"One shipping worker had a job that entailed identifying and labeling all the goods coming from production, then allocating them to an order or sending them to stock," he recalls. "After we trained him on the new equipment, he said, 'We just did in two minutes what used to take me 40.'"

With efficiency gains that significant, Roosevelt Paper's warehousing operations are on a roll. ■

3PLs

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If you think Crowley offers just ocean freight services, think again. Sure, it provides liner shipping and cargo carrier services throughout Latin America, Puerto Rico, and the Caribbean Basin, employing the latest vessels, equipment, and communication technologies. But Crowley is also one of the most diversified transportation companies in the world, developing innovative supply chain solutions backed by deep relationships throughout the region, far-reaching resources, and an impeccable reputation worldwide. With its extensive shipping capacity, as well as thousands of containers, trailers, and other intermodal components, Crowley ensures the reliability of every link in your supply chain.

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GENCO ATC • www.genco.com

GENCO ATC provides third-party logistics for manufacturers, retailers, and U.S. government agencies. The company's supply chain solutions deliver initial and ongoing value by combining supply chain technology, industry-best experience, and lean Six Sigma philosophy into solutions that generate savings for clients.

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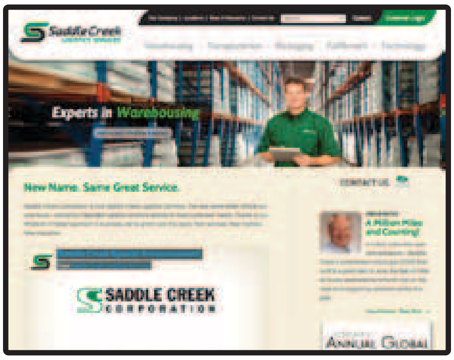

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Air/Expedited – Education

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Reliability is everything. At WSI, that has been our approach to integrated logistics and supply chain solutions for more than 40 years. Our promise of Condition, Count & Time ensures accurate, timely, and sound performance–every time. Recognized as one of the top 3PL companies in North America, WSI delivers custom solutions for warehousing/distribution, fulfillment, transportation, import/export, information technology, and customer support services. Depend on WSI for increased efficiency, reduced costs, and absolute reliability.

AIR/EXPEDITED

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DEDICATED CONTRACT CARRIAGE

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EDUCATION

University of Arkansas • gsb.uark.edu

The Sam M. Walton College of Business offers a top-ranked MBA with a supply chain concentration, as well as an undergraduate major and doctoral program. Our faculty are world-class experts in global logistics. Leveraging the resources of our Supply Chain Management Research Center, our students have access to the best minds working in the field today. For more information on the University of Arkansas' programs, visit our site today.

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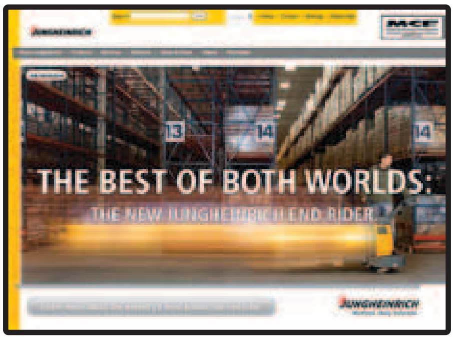


Jungheinrich • www.jungheinrich-lift.com

Jungheinrich is one of the world's leading providers of material handling equipment, specializing in warehousing and narrow aisle forklifts. Jungheinrich has more than 300 North American dealer locations, with product offerings that include electric counterbalanced forklifts, narrow aisle lift trucks, and walkie products with capacities ranging from 2,000 to 15,400 pounds. Learn more at www.jungheinrich-lift.com, or 1-877-JH-FORKS.

Landoll Corporation • www.landoll.com

Landoll's Bendi and SwingMast lift trucks can solve your materials handling challenges through increased productivity and flexibility. The Bendi lift trucks provide the world's first 180-degree front-wheel-steered design, giving you unmatched maneuverability in narrow-aisle storage. The SwingMast design offers a 90-degree rotating mast front or side loader that can stack loads in 56-inch aisles. To see how these two narrow aisle lift trucks can make your operation more productive, view the specification sheets on the Web site.

FREIGHT FORWARDERS/BROKERS

NFI • www.nfiindustries.com

Founded in 1932, NFI offers a variety of integrated supply chain services to help businesses manage, grow, and succeed in today's marketplace. The company is one of the largest privately held third-party logistics providers in North America. NFI divisions include Warehousing and Distribution, Logistics, Transportation, Intermodal, Canada, Real Estate, Contract Packaging, Transportation Brokerage, Trailer Leasing and Storage, Solar, Global, and Consulting services. NFI is an EPA Smartway Transport and WasteWise Partner.

REAL ESTATE

FINSA • www.finsa.net

FINSA is a leading industrial real estate developer in Mexico, with more than 40 million square feet of developed properties. In addition to real estate management supported by a team of widely experienced professionals, FINSA offers integrated solutions – infrastructure development, design and construction engineering, and market and feasibility research – to help expand your business.

IN THIS SECTION:

Reverse Logistics – Trucking

REVERSE LOGISTICS

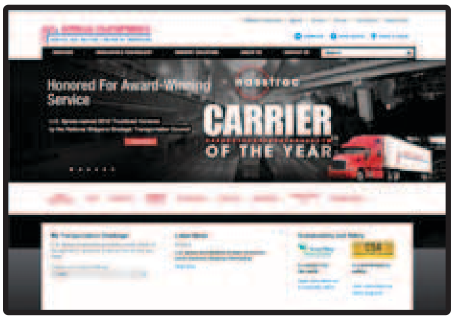
NFI • www.nfiindustries.com

Founded in 1932, NFI offers a variety of integrated supply chain services to help businesses manage, grow, and succeed in today's marketplace. The company is one of the largest privately held third-party logistics providers in North America. NFI divisions include Warehousing and Distribution, Logistics, Transportation, Intermodal, Canada, Real Estate, Contract Packaging, Transportation Brokerage, Trailer Leasing and Storage, Solar, Global, and Consulting services. NFI is an EPA Smartway Transport and WasteWise Partner.

TRUCKING

Old Dominion Freight Line • www.odfl.com

Old Dominion Freight Line is a less-than-truckload carrier providing complete nationwide service within the continental United States. Through its four product groups, OD-Domestic, OD-Expedited, OD-Global, and OD-Technology, the company offers an array of innovative products and services to, from, and between North America, Central America, South America, and the Far East. The company also offers a broad range of expedited and logistical services in both domestic and global markets.



U.S. Xpress Enterprises • www.usxpress.com

U.S. Xpress Enterprises is a service leader in the transportation industry, providing customized transportation and information services that position the company as a preferred provider to a diversified group of high-quality customers. Services include time-definite and regional truckload services, and expedited truckload service comparable to second-day and deferred airfreight services at much lower cost. Check out the Web site for freight tracking, load tendering, and electronic data exchange information.

TRUCKING-HEAVY SPECIALIZED

RLS International Transport • www.rlsint.com

For 20 years, RLS International Transport has been assisting logistics companies, freight brokers, and carriers in moving their customers' freight into and out of Mexico. Our client list includes major 3PLs, top tier brokers, and international freight forwarders. RLS offers value-added Mexico transportation for companies of all sizes.

White Paper Digest

Industry experts amass supply chain management best practices and skill sets, and invest in new research and evaluation tools. Now you can benefit. *Inbound Logistics* has selected this collection of whitepapers that will give you a jump on important supply chain issues. For more information on any of these whitepapers, visit the Web sites listed below.

Saddle Creek Logistics Services

TITLE: ***Top Business Drivers for Integrated Logistics Outsourcing***

LENGTH: *8 pages*

DOWNLOAD: *www.sclogistics.com/whitepaperregistration*

SUMMARY: Today, more and more companies are asking their logistics partners to provide services beyond transportation and warehousing. They're discovering that tapping a single provider for a variety of value-added services can help them control costs, accommodate business fluctuations, and streamline operations. Saddle Creek Logistics Services' new research-based report examines the broader role that 3PLs are being asked to play in today's marketplace.

Kane Is Able

TITLE: ***Strategies to Reduce Logistics Costs in the CPG Supply Chain***

LENGTH: *4 pages*

DOWNLOAD: *http://bit.ly/N53jRd*

SUMMARY: How is your CPG company responding to the pressure to minimize operational costs? With incremental improvements to existing distribution processes? Or are you exploring logistics strategies that alter current processes and the way you work with retail customers? A mix of both is optimal, with new strategies offering the best potential for breakthrough gains and cost savings. A new whitepaper from Kane Is Able suggests five strategies for CPG manufacturers to consider. Some new, some tried and true.

GENCO ATC

TITLE: ***Look Up, Down, and Across: Retailers' Supply Chains Can Thrive With a Product Lifecycle Logistics Approach***
LENGTH: *5 pages*
DOWNLOAD: *www.genco.com/perspectives/retail-wp.php?src=IL*
SUMMARY: Increasingly, vendors don't want store returns back, and are placing the burden on retailers. This trend is changing the way retailers manage the back end of their supply chains. Product Lifecycle Logistics is an approach that treats product movement as one continuous inventory stream designed to reduce supply chain costs an average of 10 to 20 percent.

RWI Transportation

TITLE: ***2012 Temperature-Controlled Transportation Report***
LENGTH: *16 pages*
DOWNLOAD: *http://rwitrans.com/resources/whitepapers.asp*
SUMMARY: This study, based on a survey of North American shippers, examines the top challenges faced in temperature-controlled transportation. It provides interesting insights and information about best practices, common challenges, and emerging trends in today's temperature-controlled market. The report is provided by RWI Transportation, an asset-based logistics company offering temperature-controlled transportation. RWI manages in excess of 100,000 shipments annually, including both temperature-controlled and dry freight.

TMW Systems

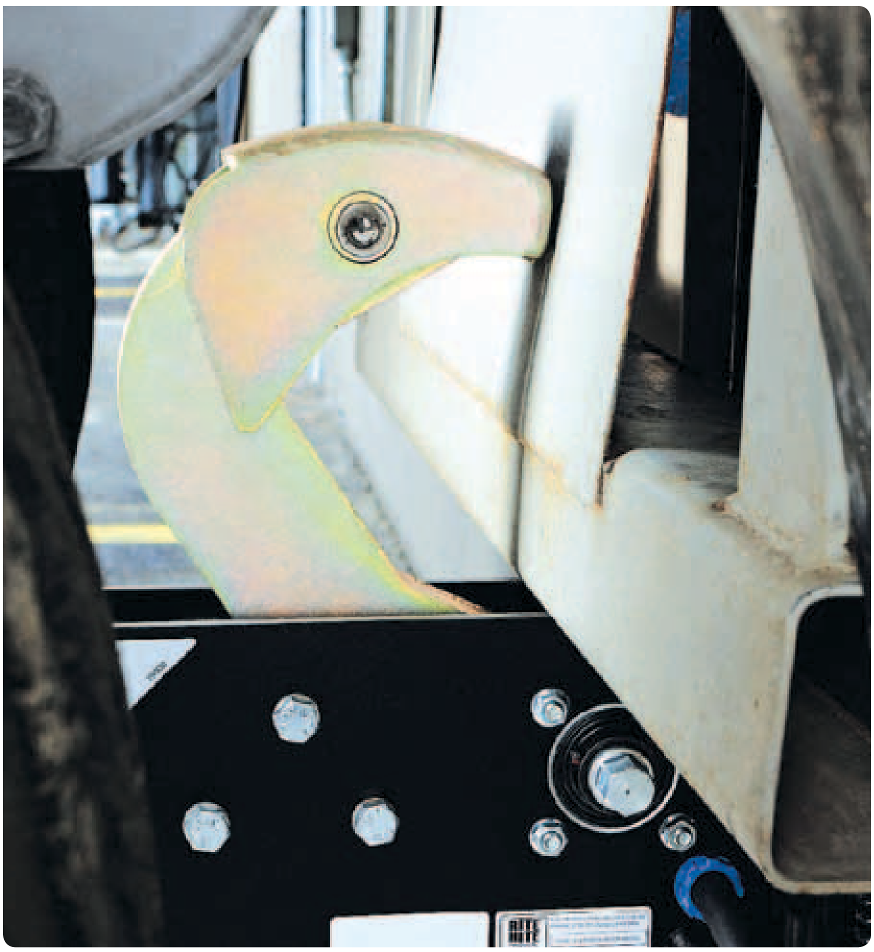
TITLE: ***Integrating Routing Software With Your Business Process Workflow***
LENGTH: *12 pages*
DOWNLOAD: *http://bit.ly/QRLVjH*
SUMMARY: Why are you really looking at routing software? Are you trying to reduce costs, cut the time it takes to create routes, or give better service to your customers? Are you growing and need help to handle the increased volume? Before you begin to look for a solution, make sure you have your business goals defined and agreement on them within your organization. TMW Systems has a solution that will help you integrate routing software into your workflow.

DRS Technologies

TITLE: ***Advanced Communications Technology in a Rugged Tablet***
LENGTH: *5 pages*
DOWNLOAD: *http://drsarmor.com/pdf/ARMOR_X10gx_White_Paper.pdf*
SUMMARY: Mobile computing has evolved from a specialty to a requirement for productive, task-oriented, and customer-focused employees. Rugged tablets like the ARMOR™ X10gx from DRS Technologies have changed how and where employees work, increasing their ability to connect and share information with colleagues and customers, and delivering the communications mobility needed to put the right person in the right place with the right information.

Share your whitepaper with *IL* readers!

WhitePaper Digest **is designed to bring readers up-to-date information on all aspects of supply chain management. We're building a database of SCM whitepapers, and you can help. E-mail us with whitepaper recommendations: editorial@inboundlogistics.com**



▲ **Loading Dock Equipment: Rite-Hite**

Rite-Hite's RHR-4000 Dok-Lok vehicle restraint is designed to work with intermodal container chassis, which often feature a plate or obstruction above the rear impact guard. The RHR-4000 helps prevent all types of trailer separation accidents, including early departure, landing gear collapse, trailer creep, pop up, upending, and tip over. The restraint's "shadow hook" adds an additional layer of safety to secure container chassis or rear impact guards with obstructions. All Rite-Hite restraints come standard with the Rite-Vu Light Communication System, including Corner Vu, which provides immediate Dok-Lok status-at-a-glance to the forklift driver before entering the trailer; and Leveler-Vu, which confirms Dok-Lok status to the forklift driver while inside the trailer.

www.ritehite.com 888-841-4283

MATERIALS HANDLING

Southworth Products Corp.

The Stack-n-Go fully powered compact stacker is built on short, stable wheelbases to maximize maneuverability, even in tight quarters. The multi-purpose machines are designed for transporting loads on pallets, and stacking loads up to 7.5 feet high and 2,500 pounds. They feature 62-inch-high masts and offset control handles to eliminate operator blind spots.

www.southworthproducts.com 207-878-0700

W&H Systems

A new high-speed, tilted-tray reliable sorting unit (RSU) enables unique system configurations that match specific application needs, while the simple design minimizes annual maintenance costs. The RSU tray sorter is designed to accurately and reliably deliver merchandise to shipping cartons or pack-out stations. The standard RSU handles up to 5,320 trays per hour, while the high-speed RSU processes up to 8,640 trays per hour.

www.whsystems.com 201-933-7840

9BLOC

Offering users the choice to rent, lease, or buy its heat-treated whitewood pallets, 9BLOC manufactures, ships, tracks, retrieves, repairs, and re-issues pallets through a nationwide network of more than 4,000 pallet manufacturers, recyclers, and brokers.

www.9bloc.com 866-287-7769

Swisslog

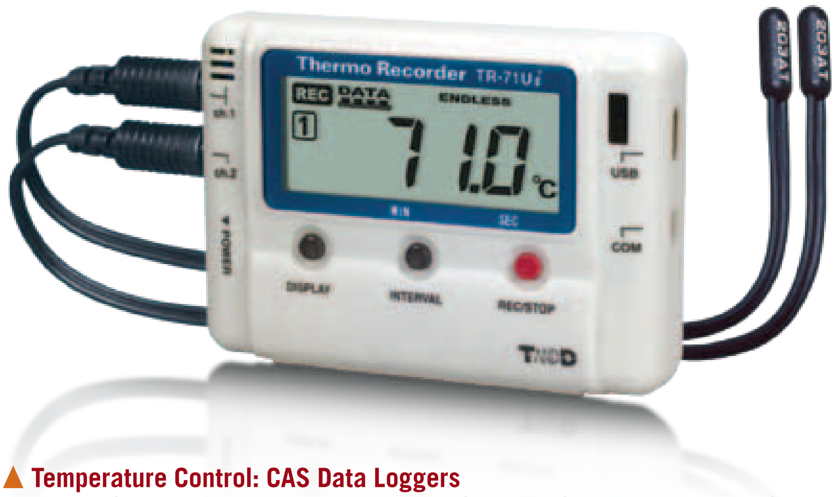
Designed for the e-commerce market, the Click&Pick order fulfillment solution facilitates high-speed picking and selecting, enabling up to 1,000 picks per selector per hour. Click&Pick also uses 60 percent less facility space than static bin shelving.

www.swisslog.com 757-820-3400

3PLs

Lynden International

Lynden enhanced its freight forwarding and logistics service offerings to Puerto Rico, adding two new domestic ocean service center points to its existing Nashville, Tenn., consolidation point, and



▲ Temperature Control: CAS Data Loggers

The TR-71Ui USB Temperature Data Logger provides real-time temperature readings across a range of -40 F to 230 F for shipments in transit, displaying data on a multifunction display placed in the truck's cab. The USB series data loggers, which store up to 256,000 readings, allow shippers to download recorded data by connecting directly to a PC or via an infrared communication function.

www.dataloggerinc.com 440-729-2570

beginning a twice-weekly truck route from Los Angeles to Nashville to catch the twice-weekly sailing to San Juan. Lynden's facility in Carolina, Puerto Rico, features a 35,000-square-foot warehouse with nine dock doors to receive freight.

www.lynden.com 800-926-5703

Bonded Logistics

A new facility in Concord, N.C., offers 127,000 square feet of distribution space with access to Interstates 85 and 77.

www.bondedlogistics.com 704-597-9638

TAGG Logistics

A new West Coast fulfillment center in Reno, Nev., provides inventory management, shipping services, reverse logistics, packaging, and distribution. The facility offers increased space for kitting and assembly projects such as point-of-purchase displays, club packs, variety packs, and pre-packaged kits.

www.tagglogistics.com 866-991-TAGG

WAREHOUSING

Tippman Group

Tippman Group's Interstate Warehousing division completed a 140,000-square-foot expansion to its Indianapolis, Ind., cold-storage facility, and added more than 100,000 square feet of freezer capacity to its Joliet, Ill., distribution center.

www.tippmanngroup.com 260-490-3000

EXPEDITED

DHL Express

A new direct flight improves transit times from the United States to major Australian metropolitan areas by at least one day. The twice-weekly flight operates between DHL Americas' Cincinnati hub and Sydney and Melbourne, with time-definite delivery services available. The flight returns to Cincinnati via Hong Kong, expanding capacity for customers shipping from Asia to the Americas.

www.dhl.com 800-CALL-DHL

TRUCKING

Old Dominion Freight Line

A new eight-door service center in Duluth, Minn., offers shippers in Minnesota and Wisconsin convenient access to railheads and major roadways, including Interstate 35 and U.S. Highways 2 and 53.

www.odfl.com 800-432-6335

M&W Transportation Company

A new location in Indianapolis, Ind., serves shippers in the Midwest region and greater Indianapolis area.

www.mwlginc.com 800-251-4209

SOFTWARE

C3 Solutions

The *C3 Reservations* Web-based dock scheduling system allows shippers to streamline the flow of goods into their facilities. The new version offers an audit feature that records issues identified at receiving, and gathers compliance information. The application's shift configuration tools ease door/area-based scheduling, and facilitate multi-site implementations.

www.c3solutions.com 514-932-3883

Paragon Software Systems

The new version of *Paragon* vehicle routing and scheduling software features automatic routing capabilities; ability to stop the automatic routing process and review the current result; mapping enhancements; and improved reporting capabilities.

www.paragonrouting.com 972-731-4308

PACKAGING

Storopack

Working at speeds up to 100 feet per minute, the PAPERplus Chevron system processes paper tubes into flexible paper padding and packing filler. The system fills more volume using less material, and features customizable settings that reduce paper consumption for applications requiring less cushioning.

www.storopack.us 513-874-0314

MOBILE DEVICES & APPS

CEVA Logistics

A new mobile app, CEVA Mobile, enables shippers to track the exact location of freight on an iPhone or iPad using only a shipment reference or house number. The app allows shippers to retrieve the status of airfreight, ocean freight, and customs brokerage shipments worldwide.

www.cevalogistics.com 218-618-3100

OCEAN

CaroTrans

A new direct less-than-containerload export service from Seattle provides 13-day transit to Tokyo; 14 days to Yokohama; and 18 days to Osaka, Nagoya, and Kobe. The weekly service offers fixed-day cutoffs.

www.carotrans.com	253-277-1898

CMA CGM

A fixed-day weekly service departs Manzanillo, Panama, and calls eight Brazilian ports, including Manaus, Suape, Santos, Paranagua, and Itajai. Eight dedicated 1,700-TEU vessels serve the route.

www.cma-cgm.com	757-961-2100

▶ Expedited: UPS

To accelerate package tracking data and improve package travel reliability, a hands-free ring imager allows UPS employees to quickly scan bar-code data and transmit it to the expedited carrier's facility network.

www.ups.com	800-PICK-UPS

CALENDAR

September 30-October 3, 2012, CSCMP Annual Conference, Atlanta, Ga. At the Council of Supply Chain Management Professionals' conference, learn ways to cut supply chain costs, boost efficiency, and improve your bottom line; network with colleagues; and discover new and innovative ideas that will keep you and your supply chain competitive.

630-574-0985
http://cscmpconference.org

October 2-4, 2012, International Air Cargo Forum and Exposition, Atlanta, Ga. Top international cargo and logistics decision-makers meet to interpret challenges, opportunities, and solutions at this event, sponsored by The International Air Cargo Association. Featured speakers include executives from Delta Airlines, the Air Forwarders Association, Lufthansa Cargo, and the Coca-Cola Company. Ray LaHood, U.S. Secretary of Transportation, delivers the keynote address.

786-265-7011
www.tiaca.org/tiaca/ACF.asp

October 2-4, 2012, Transportation and Distribution Planning and Management, Atlanta, Ga. This Georgia Tech Professional Education course focuses on understanding capacity development, freight consolidation, and network alignment. Attendees learn the principles, practices, and tools required to address major transportation issues, including key financial and performance indicators for transportation, and designing supply chains to minimize transportation and distribution costs.

855-812-5309
www.pe.gatech.edu

October 14-16, 2012, APICS International Conference & Expo, Denver, Colo. At the Association for Operations Management's annual conference, educational sessions focus on finding solutions to supply chain and operations management challenges. Topics include globalization opportunities, integrated supply chain management, and inventory optimization.

800-444-2742
www.apics.org

October 15-16, 2012, Tennessee State University Supply Chain Summit, Nashville, Tenn. This event gathers educators and industry leaders to learn best practices, address real-world challenges and solutions, and discuss the current and future state of supply chain risk management. Speakers include Frank Miller, Dell's vice president of public sales operations; Chris Styles, director of logistics at Nissan Americas; and William Teas, executive director of corporate risk management, Gaylord Entertainment.

615-242-8856
www.tsusupplychainsummit.com

October 21-25, 2012, American Association of Port Authorities 101st Annual Convention, Mobile, Ala. In committee meetings and business sessions, port professionals and others in the marine transportation industry explore the latest global economy trends and expectations, the need for infrastructure investment, and opportunities to green the cargo supply chain.

703-684-5700
www.aapa-ports.org

October 28-30, 2012, ASTL Annual Conference, Jacksonville, Fla. This American Society of Transportation and Logistics event brings together industry professionals and educators to discuss the unique aspects of the transportation and logistics sector. Topics include cold chain operations, risk management/recovery, and technology-based improvements.

202-580-7270
www.astl.org

November 11-13, 2012, IANA Intermodal Expo, Anaheim, Calif. The Intermodal Association of North America presents its 30th annual trade show, highlighting the latest products and services for freight transportation and distribution operations.

866-438-3976
www.intermodal.org

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WWW.FREIGHTEXPO.NET

The TransComp Exhibition is held in conjunction with NITL's 105th Annual Meeting

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Taking Supply Chains to the Next Level

A Shift to Integrative Thinking

hosted by Supply Chain Council

Madrid, Spain
21-23 October 2012
Hilton Madrid Airport

www.supplychainworld.org/europe

Join fellow supply chain professionals at Supply Chain World Europe 2012 in Madrid to learn, share, and network with this year's top notch speakers. Now firmly established as a strategic necessity, successful supply chain management requires a fully integrative approach: employees, processes, technology, functions, and even supply network partners need to be fully aligned and synchronized in order to build capability and thereby gain sustainable competitive advantage. This year's conference will address these issues, including practical case-based examples of SCOR® application.

Supply Chain World Europe is designed to provide an optimum mix of notable keynotes, concurrent sessions, and networking opportunities.

For a detailed agenda, session descriptions, and registration information, go to the Supply Chain World website: supplychainworld.org/europe

Keynote Speakers

Dr. Kurt Gruber
Infineon Technologies
Corporate Vice President Corporate Supply Chain

Dr. Steven A. Melynk
Michigan State University
Professor of Operations & Supply Chain Management

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Kane is Able	www.kaneisable.com	888-356-KANE	pg. 45
Kenco Logistic Services	www.kencogroup.com	800-758-3289	pg. 79
Landstar	www.landstar.com	877-696-4507	Cover 2
Lynden	www.lynden.com	888-596-3361	pg. 33
Port Jersey Logistics	www.portjersey.com	609-860-1010	pg. 27
Ruan	www.ruan.com	866-782-6669	pg. 41
Ryder Supply Chain Solutions	www.ryderscs.com	888-887-9337	pg. 5
Saddle Creek Logistics Services	www.sclogistics.com	888-878-1177	pg. 59
UniGroup Worldwide Logistics	unigrouplogistics.com/inbound	877-545-8080	pgs. 52–23
Weber Logistics	www.weberlogistics.com	855-GO-WEBER	pg. 49
Werner Enterprises	www.werner.com	800-228-2240	pg. 57
WSI (Warehouse Specialists, Inc.)	www.wsinc.com	920-731-3115	Cover 3

Air Cargo

Alaska Air Cargo	www.alaskacargo.com	800-225-2752	pg. 63

Career Development/Education

American Public University (APU)	www.studyatapu.com/il	877-777-9081	pg. 25

Events

International Air Cargo Forum & Exposition and CSCMP Annual Global Conference	www.tiaca.org	786-265-7011	pg. 76
Transcomp Exhibition & Intermodal Expo	www.freightexpo.net	703-524-5011	pg. 91

Expedited

Continental Expedited Services	www.shipces.com	855-SHIPCES	pg. 16
Panther Expedited Services	www.pantherexpedite.com	800-685-0657	pg. 3

Financial Services

Regions	www.regions.com/transportation	404-888-5111	pg. 51

Freight Payment Services

CT Logistics	www.ctlogistics.com	216-267-2000	pg. 64

Lift Trucks

Landoll Corporation	www.landoll.com/mhp	800-428-5655	pg. 75

Logistics IT

Magaya Logistics Software Solutions	www.magaya.com	786-845-9150	Cover 4

Materials Handling

Intelligrated	www.intelligrated.com	866-936-7300	pg. 15

INDEX

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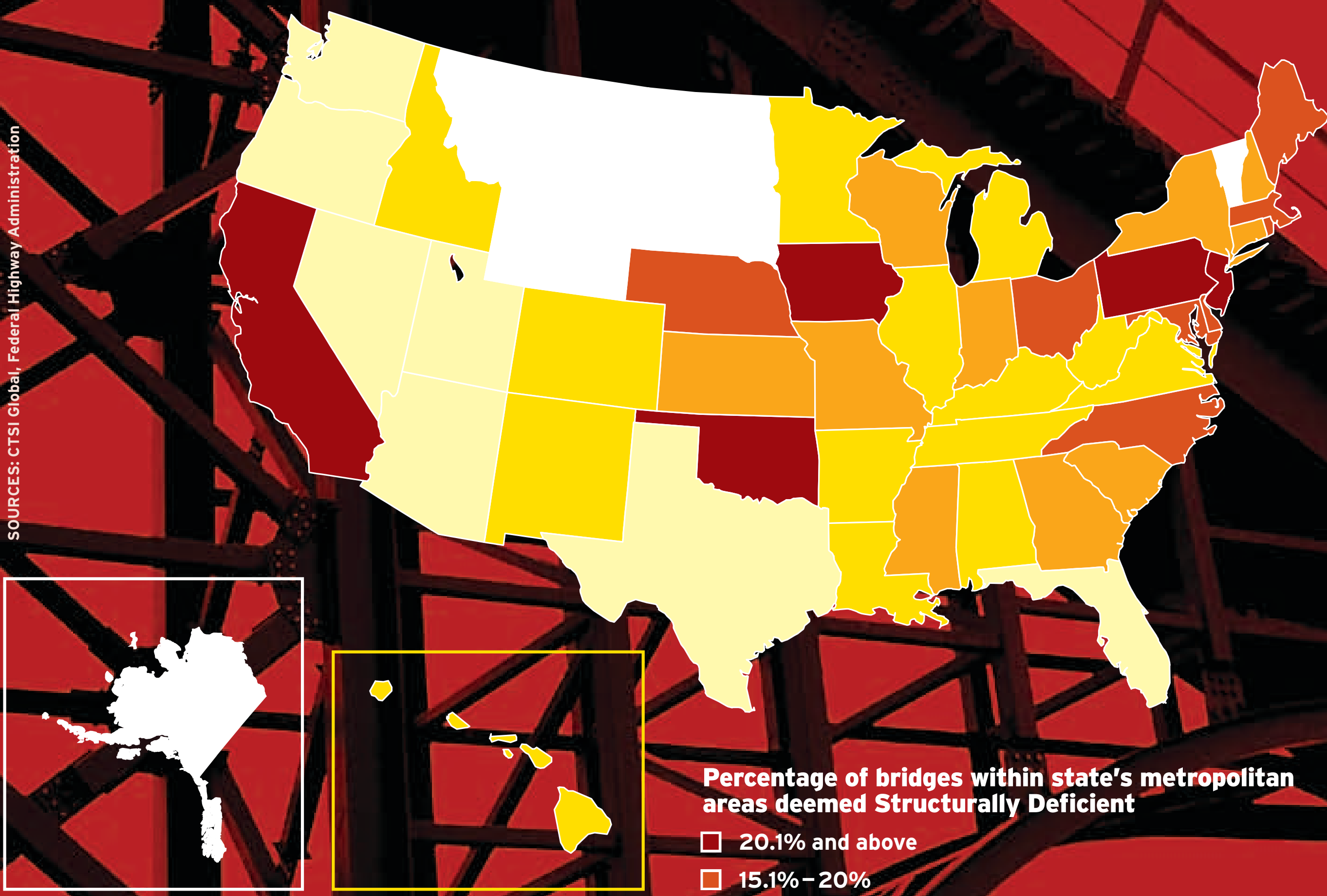
Broken Bridges

August 2012 marks the fifth anniversary of the Interstate 35 bridge collapse in Minnesota, yet the nation's transportation infrastructure improvement needs remain insufficiently funded. Each day, vehicles in the United States make 210 million trips across bridges the U.S. Department of Transportation deems "deficient." As part of the Federal Highway Administration's National Bridge Inventory, inspectors rate each bridge by evaluating factors such as roadway surface wear, cracking, and other deterioration; rate of use; and age. Here's a look at how each state's major metropolitan areas rank.



SOURCES: CTSI Global, Federal Highway Administration

Percentage of bridges within state's metropolitan areas deemed Structurally Deficient

- 20.1% and above
- 15.1%–20%
- 10.1%–15%
- 5.1%–10%
- 5% and below
- No metro areas from report are in this state

NOTE: Depicts highest percentage among all metro areas in state. Surveyed 102 largest U.S. metro areas by population.

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