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SUPPLYCHAIN MANAGEMENT REVIEW®

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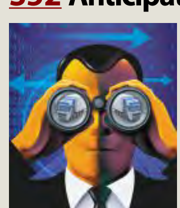
FEATURES

COMMENTARY



How Important is Trust to Your Supply Chain?

Think about the role that trust plays in our every day lives. We go to bed at night trusting that our house won't burn down. We leave for work in the morning trusting that we won't get in an accident on the way to the office. We trust that our families and friends will be there for us when we really need them.

Now, think about the cost we pay when that trust is broken: Friendships and relationships can be frayed beyond repair when someone we trust lets us down in a significant way.

The same can be said of business. Sure, we know things go wrong. But we place orders that are critical to our manufacturing, distribution, and retail practices, trusting that our suppliers will deliver what they promised, where they promised, and when they promised in order to keep us going. As suppliers and service providers, we negotiate with our customers in good faith.

But what happens when that trust is broken—when suppliers no longer trust that their customers are above board? What happens when supplier trust is lost? That's the thought-provoking question posed by John W. Henke, Jr., Thomas T. Stallkamp, and Sengun Yeniyurt in Lost Supplier Trust, Lost Profits. The authors analyzed 20 years of data from the automotive industry and concluded that automakers made the most profit per vehicle when they had the trust of their suppliers, and made the least when that trust was lost. Using publicly available reports, they calculate the cost in lost profits to Chrysler, over a 12 year period, at $24 billion. Their conclusion: "….if top management of any company does anything less than work to ensure that their firm has trusting supplier relations, they are mismanaging the company."

Bob Trebilcock, Editorial Director
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Trust is a prevalent theme in other articles this month. In our lead feature, Stephanie Grothe details how she and her colleagues turned around the S&OP process at Red Wing Shoes, the iconic manufacturer of work boots. After creating new roles for demand planners; streamlining the approval process for a forecast; and automating data collection, forecasting, and planning, it took several months before the company and its suppliers trusted the data. But now that everyone is on board, the company is reducing its inventory while increasing service levels and expanding into new product lines and new markets.

Meanwhile, research on supply chain innovation from MHI and Deloitte found that many ballyhooed innovations are low on the priority list for supply chain managers, including Big Data, sustainability, and 3D printing. Why? Because they don't trust that these innovations are ready to deliver on the promised results.

As you go through this month's issue, I trust that it will make a difference in how you manage your operation and supply chain.

Bob Trebilcock

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Photo/Illustration by Gary Waters

FEATURES

COMMENTARY

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InSIGHTS

BY LARRY LAPIDE

Navigating a Course with Planning and Forecasting

When it comes to S&OP, forecasters and planners need to work together to achieve financial performance targets.

Dr. Lapide is a lecturer at the University of Massachusetts, Boston and an MIT Research Affiliate. He has extensive experience in industry, consulting, business research, and academia as well as a broad range of forecasting, planning, and supply chain experiences. He is the recipient of the inaugural Lifetime Achievement in Business Forecasting & Planning Award from the IBF. He can be reached by email at llapide@mit.edu.

Over the years I have followed a variety of supply chain surveys. A question usually asked is: "What needs to be most improved?" Invariably demand forecasting is always among the top areas mentioned. This answer is wishful thinking on the part of respondents, as there will always be significant demand forecasting errors, as long as customers remain fickle, demand-side managers competitively shape demand, and businesses constantly pursue new business opportunities. Planners should recognize and deal with demand uncertainties using risk management techniques instead of griping about inaccurate forecasts. Indeed, poor financial performance might be the result of poor planning that does not consider uncertainties.

I surmise leaders and planners have always complained of bad forecasts being given to them to plan operations. In the spirit of the Carl Reiner and Mel Brooks comedy skit, "The 2000 Year Old Man," I could imagine the response of Julius Caesar 2,000 years ago when asked by the media of the time how he could have improved upon his successful military conquests. "Julie" would have said something like this:

> *"We could have been more successful if our forecasting of the enemy's manpower and resources were better. We could have conquered more peoples in a shorter amount of time, and with much fewer casualties. Of course, my good generals were smart enough to figure that the forecasting was not perfect, and they would take extra supplies of warriors and armaments to war, just to be safe. Meanwhile, my bad generals took the information provided at face value, and skimped on taking manpower and armaments. They experienced more losses and casualties despite taking fewer resources with them than the good generals. Bad generals constantly thought they could get away with blaming their losses on faulty forecasts. I do not accept those excuses knowing that the information provided was the best we could estimate. I constantly replace bad generals, sending them back home to struggle and lead the simple farming and fishing lives they deserve."*

I suspect that if I came back 2,000 years from now and asked managers what can be most improved, forecasting would still top the list. Demand forecasting will always be fraught with significant error.

S&OP Needs Credible Forecasts

A Sales and Operations Planning (S&OP) team is essentially responsible for charting the course of a business to achieve corporate financial targets. Whenever a team detects that the business is off course, it needs to alert the executive team and re-plan operations or reset targets to be more realistic. Because updated baseline demand forecasts are the starting points towards detecting whether or not plans are on course, the forecasts must be credible.

The acid test for a credible forecast is whether the team can consider it "innocent until proven guilty (i.e., wrong)," largely because it represents the best a company can generate. As such, an unbiased and professionally run forecasting organization is important. Forecasters must be able to defend forecasts against the subjective opinions of naysayers by clearly explaining the facts, figures, and assumptions used. For example, if the sales organization says that a forecast is wrong merely because it does not meet the demand numbers attached to its own plan, that opinion is not sufficient enough to declare a forecast wrong. A sales plan is not a forecast, and sales planners are not necessarily professional forecasters.

Forecasting Supports S&OP

While hearing about untold S&OP implementations, few have mentioned that a forecasting organization was established to support the S&OP team. So I have begun to recommend that all implementations include the installation of a forecast organization to feed the S&OP team with credible, unbiased, and timely baseline demand forecast updates.

Forecasters should provide estimates of forecast errors along with their forecasts. So, for example, if a demand forecast has an error range of 40 percent (not uncommon), and if the actual demand routinely falls within the range of error 100 percent of the time, planners are really getting the best information possible. While the forecast error rate may be considered high, at least they can be confident that demand will fall within the range. (Of course to remain credible, forecasters always need to consistently strive to keep forecast error rates as low as possible).

S&OP Should Use Forecasts

The worst practice an S&OP team can follow is ignoring forecasts and overriding them with budgetary numbers. For example, let's postulate that a team sees that after the first two months of the first quarter (Q1), the revenue forecast is showing that the company is running short of the Q1 budget number by $10 million. Accordingly, the team overrides the quarterly forecast by adding the shortfall to the quarter's last month. Then (as forecast) the Q1 revenue comes in under the budget by that amount. Then, say that the pattern continues for the next three quarters. Late in Q4, the forecast would now show that the company will have a shortfall of $40 million for the year. So the team finally admits to the problem that the budget revenue number was too optimistic. Unfortunately it is too late to do anything about it.

Basically this team did not do its job. It knew of the possible shortfall in Q1, yet decided not to do anything about it until it was too late. The company's annual expenses were higher than necessary because they were aligned to the optimistic budget number, and profitability targets were not met. Early on this team should have worked with sales and marketing to mediate the demand shortfall or realign expenses to the more realistic forecast.

Meanwhile, one of the most important best practices that S&OP teams should follow is to leverage risk management tactics that mitigate the risk associated with demand forecast errors. Teams should use the estimates of forecast errors to buffer against the uncertainties in future demand. I discussed some of these in my Insights column, "How Buffers Can Mitigate Risk," in April 2008. Other ways to mitigate demand uncertainties involve various segmentation schemes (such as by customer, product, and product forecastability) that place greater focus on critically important segments. I discussed these in my column, "Risk and the Planning Process," in October 2009.

Now that S&OP has progressed to the point where most companies have implemented the process, teams should not ignore demand forecasts just because they are inaccurate—that's just the nature of the beast.

The S&OP process was developed by Oliver Wight in the mid-1980s when he essentially recommended to his manufacturing clients that they get sales plans from their sales organizations to use as a basis for production planning. In the early days of S&OP the running joke was that the sales plan was often looked at, ignored, and thrown into the wastepaper can. I'm not surprised, because it is what the sales organization planned to sell and was not a forecast.

Now that S&OP has progressed to the point where most companies have implemented the process, teams should not ignore demand forecasts just because they are inaccurate—that's just the nature of the beast. Forecasts are certainly closer to the truth than wishful sales and unrealistic budgetary plans. In short, forecasters and planners need to work together to help navigate a course towards achieving financial performance targets.

GLOBAL LiNKS

BY PATRICK BURNSON

Financial Distress in Container Shipping Industry Rises for Third Straight Year

Continued sluggish demand, a growing mountain of debt, and a radically changing global marketplace has the ocean container shipping industry reeling, say financial analysts.

Patrick Burnson is the executive editor at *Supply Chain Management Review.* He welcomes comments on his columns at pburnson@peerlessmedia.com

Supply chain managers are justifiably concerned about the recent consolidation of ocean carrier services, but an even greater threat to their operations may be lurking ahead. According to a new AlixPartners study, many of the major international players face more financial distress—even possible bankruptcy.

Esben Christensen, director of the business advisory firm, says that listed companies have been troubled for the past three years.

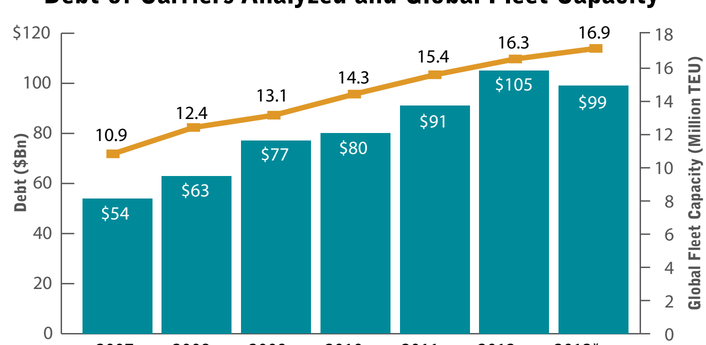
"Our analysis suggests that the number of parties controlling containerized transportation on critical trades is shrinking through operational alliances and—potentially in the future—through carriers exiting the business," he says.

Contributing mightily to this situation, says the study, is a so-so global economy that still hasn't bounced back from the downturn following the worldwide financial crisis of 2008-2009 the way other post-recession economies have in the past. However, the study also points to several structural issues also buffeting the industry. These include a drive to build "mega vessels," and fill key trade lanes with these new ships. This represents a trend that over the past decade has steadily increased leverage across the industry and has left it with an average EBITDA interest-coverage rate of just 4.9. This is less than half the rate it was in 2011 (10.8) and less than a third of what it was in 2010 (15.0).

The study notes, too, that while global fleet capacity in the industry has risen steadily in the past decade, to 16.9 million TEU (twenty-foot equivalent unit) for the 12-month period ending September 2013, up from 16.3 million TEU in 2012 and from 10.9 TEU in 2007, that capacity is a long way from being totally utilized. This has led to more alliances in the

EXHIBIT 1

Debt of Carriers Analyzed and Global Fleet Capacity



*2013 Figures are trailing 12 month to end of September 2013, all other figures are full year.
Source: Publicly available data and AlixPartners analysis

industry and will likely create an environment of haves and have-nots where smaller carriers will face some hard choices in the future.

Structural Changes

On top of all that, the study asserts that other structural changes that will challenge companies this year include changing trade routes in some parts of the world, with cost increasingly trumping transit time, and a newfound pressure on the part of some of the stronger lines to squeeze, or even totally bypass, non-vessel-operating common carriers (NVOCCs), giving those lines more advantage over the have-nots of the industry.

"The container shipping industry as a whole continues to face stiff challenges, and for many companies in the industry those challenges could be existential if not addressed," says Lisa Donahue, managing director and global head of Turnaround and Restructuring Services at AlixPartners. "These challenges also have, and will continue to have, a big effect on shippers and investors as well."

There's likely to be even more disruption in the ocean cargo carrier arena.

For shippers, the study recommends closely monitoring the financial health of the carrier base, not "over-consolidating" the carrier base (so as to have alternatives should markets brighten), considering index-linked contract options, and benchmarking rates and service levels via objective third-party resources. For investors, the study recommends paying close attention to the widening chasm between the leaders and the laggards, and working with experts to determine which companies have viability and which may not—while also keeping an eye out for attractive asset sales, as many lines may move to divest themselves of assets, especially non-core ones, in the future.

Meanwhile, for carriers themselves the study recommends divesting non-core assets, exiting unprofitable trades, adopting a laser-like focus on cost control, reassessing all value propositions, and partnering where partnering makes sense.

"For all the challenges facing all of the players in the container shipping industry today, there are also a lot of opportunities, including the promise of the much greater profitability that a streamlined, resilient industry might bring, as has been the case in many other industries," says Donahue. "But to make the most of those opportunities will take insightful analysis and then firm, decisive action. It's been done in other industries, and it can be done in this one as well."

Supply Chain Implications

In an exclusive interview, *Supply Chain Management Review (SCMR)* asked AlixPartner's Esben Christensen for a few more details on supply chain implications.

SCMR: Do you anticipate any sudden shift in rates?

Esben Christensen: AlixPartners' analysis suggests that the number of parties controlling containerized transportation on critical trades is shrinking through operational alliances and—potentially in the future—through carriers exiting the business. This would have a profound impact on the supply chain managers who rely on these services, in that the consolidation often brings with it less choice and higher prices. In the longer term, however, the change that's on the horizon could be largely positive for the carriers who survive with more efficient ships and greater pricing power. In the shorter term, though, shippers should probably expect rates to remain at low levels as the market sorts out all of these changes.

SCMR: How should supply chain managers mitigate risk?

Christensen: The report suggests that supply chain managers can mitigate the risks related to financial distress amongst the carriers by closely monitoring the health of their providers, contracting with groups of carriers representing diverse alliances (as opposed to over-consolidating their volume with just a few carriers or alliances), and keeping at least one non-vessel operating common carrier in their provider base. In the shorter term, these important steps should help allow supply chain managers to proactively direct their volume to healthy and stable partners, sustain a disruption without it reaching catastrophic scale, and tap extra capacity as need dictates to address contingencies. In the longer term, savvy supply chain managers should probably also consider the merits of index-linked contracts that could protect them against wild price movements.

SCMR: Finally, will the financial distress in the container shipping industry lead to greater reliance on air cargo, even though it's more expensive?

Christensen: Probably not in a structural sense. There may be some freight that moves to air to compensate for disruptions, but our study does not anticipate a reversal of the long-term trend of air cargo moving to slower, cheaper modes. Rather, in the longer term it is likely that more container capacity in fewer hands will lead to more reliable sailing schedules, which, in turn, could bite further into the air cargo volume.

INNOVATION STRATEGIES

Perseverance Pays in the Innovation Game

By Ashley Dorna and Jim Rice

Ashley Dorna is executive vice president, supply chain and IT at Niagara Bottling, LLC; and Jim Rice is deputy director at MIT Center for Transportation & Logistics (MIT CTL).

You are grappling with age-old questions: What should my supply chain look like in the future? What new innovation can I apply to lower costs, increase service levels, and disrupt competitors?

Then it hits you—that new technology you read about recently is the answer. Applied to your supply chain, it will not only reap millions in savings, but your supply chain team will immediately move out of the corporate basement it currently occupies and climb the management ladder of success. Adoring senior executives from across the organization will want to emulate you by applying the new technology to innovate within their function.

Snap out of it!

That story line works in Hollywood but not in the real world. The vast majority of initiatives that qualify as a supply chain innovation (SCI) will not come from "light bulb" revelations. Instead, most will come from a series of incremental changes and continuous improvement initiatives in response to competitive pressures and market dynamics.

This approach may not sound sexy—but it is very effective.

MIT CTL's research points to this. Successful SCIs take a lot of patience, hard work, adoptive creativity, and trial-and-error learning over an extended period of time. Exhibit A is Niagara Bottling LLC. The Ontario, Calif.-based private label bottled water company has been innovating for decades, since it started operating in 1963.

A String of Pearls

As one of the first companies in the bottled water business to vertically integrate, Niagara took a contrarian approach by bringing bottle and cap manufacturing inhouse. In the process it reaped the benefits of integrated operations that have enabled Niagara to deploy innovations such as changes to its product packaging.

Like a number of other bottled water companies, Niagara has put a lot of effort in over recent years to reduce the weight of its products and improve the supply chain's carbon footprint. Over the last 15 years the company has reduced the amount of plastic in its Eco-Air Bottle™ by over 60 percent. In the course of its continuous improvement, the manufacturer cut the PET content of its packaging by some 46 percent over a seven year period. These are industry leading accomplishments, the company believes.

Niagara recently completed a project to remove the corrugated cardboard tray from cases of bottled water using the company's new Eco-Air Package™ that reduces the amount of space required for each pallet. The project generated significant results—17 percent increased case density per pallet, an estimated 108 million pounds reduction of greenhouse gases, and a reduction of nearly 1 million gallons of fuel annually.

Importantly, a long, arduous renovation along the entire supply chain was key to the success of these SCIs.

How did they do it? The removal of a cardboard tray required Niagara to work with OEMs to engineer case packing and palletizing equipment to support the new configuration at previously established high speeds. The organization worked upstream with raw material suppliers to reconfigure flexible packaging to support the change. And it engaged customers to adjust shelving configurations. Another important factor in the success of the transition was extensive stability trials to ensure that the new configuration could handle all of the rigors of the supply chain.

The company discovered that the changes improved both pallet density and structural stability.

Also critical to the project's success is what might be called adaptive creativity—the ability to be creative through adaptation of existing processes and materials. By working across the entire system, and using trial-and-error to test small improvements on materials, packing configurations, and bottle design, Niagara turned a series of relatively modest improvements into a big improvement—the removal of the corrugated tray.

It took about 10 months to roll out the tray-free units. The CEO and an actively engaged management team gave their full support to the project. In addition, Niagara crafted a value arrangement such that every trading partner (except the cardboard supplier) gained in some way from the change, making it easier to sell the redesigned packaging format.

Niagara's vertically integrated operations also played an important role. Manufacturing bottles and caps internally gives the organization close control over the supply of these items. That, together with the company's in-house technical expertise, allowed it to tweak and refine the bottle and packaging design as an integrated system on a rapid cycle time. Rather than having to depend on external parties, Niagara was able to deploy their own production engineers who were able to make decisions on critical materials planning and manufacturing processes that were aligned with their supply chain.

Continuous Innovation

Niagara is already looking at further innovations. This time the manufacturer is focusing on streamlining the supply chain, an area it sees as offering huge potential for improvement. The company is committed to innovating both upstream and downstream within the supply chain, and is working closely with trading partners to uncover the next big win.

In addition, Niagara is introducing more automation. The goal is to streamline manufacturing and distribution facilities by minimizing the need for human operators on its plant or warehouse floors over the next three to five years. Innovations such as the introduction of laser-guided vehicles, automated storage and retrieval systems, and manufacturing execution systems, are all importance pieces of the puzzle.

The ROI of Persistence

As the Niagara experience underscores, supply chain innovation is usually a work in progress. And it takes a lot of effort. You are probably not going to bring a black box to the office, plug it in, and watch as a wave of innovation spreads across every node in the network.

The Niagara examples shows that supply chain teams can build innovation into their DNA. And they can systematically improve operational efficiency through regular application of continuous improvement and some adaptive creativity.

There is a lot to be said for this stepped approach. Rather than frantically searching for the Next Big Thing, the Niagara examples shows that supply chain teams can build innovation into their DNA. And they can systematically improve operational efficiency through regular application of continuous improvement and some adaptive creativity—what we refer to as Sustaining SCI.

There will be failures along the way, but the downside is minimal when the trial-and-error method is used. Moreover, organizations that take this incremental approach to SCI do not become overly committed to a single new idea.

Niagara's accomplishments also demonstrate an important, less tangible benefit of systematic SCIs. Projects such as the introduction of the remodeled palletized units that involve multiple trading partners have established Niagara as an expert in the bottled water category. These interactions have enhanced the organization's reputation across the industry, and this has paybacks on many fronts.

How They Did it: Red Wing Shoes' Journey to S&OP

By Stephanie Grothe

Who owns your Sales and Operations Planning process? Is it the supply chain? Is it sales and marketing? Is it manufacturing? Is it your executive team?

In 2008, those were questions that we struggled to answer at the Red Wing Shoe Company as we started our journey towards S&OP success. After speaking to consultants and to other companies like ours at conferences, we knew we were certainly not alone. Gartner, for instance, has reported that about 70 percent of global organizations are only in Stage 1 or Stage 2 of the four stage S&OP Maturity Model. Most organizations acknowledge the need for a step-change improvement to their S&OP process.

At the start of our journey, the S&OP process took six weeks to prepare. It was reactive, manual, and primarily a backward looking exercise; much of our planning was based on historical data that we updated by backing out our most recent sales figures from the total projection for the year. The remainder at the bottom of the column became the figure we expected to sell for the rest of the year. There was little collaboration with our suppliers or manufacturing team to understand their capacities and constraints compared to our forecasts. We relied on voluminous and complex spreadsheets and updating them was a manual, labor-intensive process that was prone to error. More importantly, nobody in the organization really owned the process or the results.

Over the next several years, we improved our process through a series of steps. In doing so, we tackled the three primary components of S&OP: people, process, and technology. Along the way, we brought in best practices to reform the way in which we created our forecast and how we finalized our plans. We created new roles for the people involved in

Stephanie Grothe is the process improvement manager at the Red Wing Shoe Company, Inc. She is APICS Certified in Production and Inventory Management (CPIM) and is a Certified Supply Chain Professional (CSCP). Prior to joining the company in 2008, she was an operational planning analyst at Hearth & Home Technologies, Inc. She led the team that redesigned Red Wing Shoes' S&OP process during its three year journey to S&OP excellence. She can be reached via LinkedIn. For more information, visit www.redwingshoes.com.

Excellence

Getting the most from Sales and Operations Planning is a combination of people, processes, and technology. The Red Wing Shoe Company details the steps it took to improve S&OP processes, slash its S&OP planning efforts by 50 percent, and align manufacturing with sales—all while growing its business.

demand forecasting and provided training to our team. Finally, we brought in new technology to automate forecasting and reporting, and to enable supplier collaboration.

There were trials and errors, successes and failures. Through it all, however, a process that once took six weeks is now completed in three weeks. Our forecasts and plans are shared collaboratively with our suppliers and manufacturing group. More importantly, each of our functional teams is involved in the creation of the plan, which is approved by our senior management and tweaked with input and adjustments from all of our functional areas. We know who owns the process.

The result is that since full implementation in 2012, we are able to accurately forecast for eight manufacturing plants around the world, and generate a forward-looking, 18-month rolling plan. We have reduced inventory while simultaneously improving customer fill rates, entering new markets, adding retail stores, and expanding our portfolio of products.

This is the story of the steps we took along the way to S&OP success.

Red Wing Shoes at a Glance

Founded: 1905

Sales: Privately held

Products: Footwear, apparel, Personal Protective Equipment (PPE), and accessories for work and outdoor activities

Brands: 6

Manufacturing: 14 locations in the U.S., China, Mexico, Pakistan, Dominican Republic, Vietnam, and Poland

Distribution: Warehouses in Red Wing, Minn., Salt Lake City, Houston, and Dubai, with 3PLs in Japan and the Netherlands

SKUs: 26,000 footwear SKUs and 72,000 garment SKUs

Increasing Complexity

At Red Wing Shoes, we have a saying: "Work is our work." The company was founded in Red Wing, Minn., around the turn of the 19th century by Charles Beckman, a local shoe merchant who saw a need for footwear that works—boots that were comfortable but could stand up to the harsh working conditions of demanding industries such as mining, logging, and farming. In 1905, Beckman and 14 investors opened Red Wing Shoes to manufacture and market his unique designs.

Hard work remains the cornerstone of our business; we produce boots for work in the original factory and use Puritan stitch machines that have been in service for more than 80 years. The styles in our Heritage collection are designed and manufactured just as they were years ago, using premium leather from our own tannery. We also manufactured domestically in Potosi, Mo.

Our markets, however, have expanded far beyond Minnesota. Our products protect workers in more than 150 countries across the world, from the Mideast oil fields to the Midwest cornfields. In countries like Japan, which value the American made label, the old work boot look is considered high fashion. We are expanding our warehouse in Dubai to keep pace with a fast-growing market in the Middle East. All told, we manage six brands, including Red Wing Work, Red Wing Heritage, Vasque hiking shoes, Irish Setter Hunt & Work, and the WORX line of boots and shoes. Currently, we forecast for 26,000 footwear SKUs and 72,000 garment and accessories SKUs.

Our supply chain is global and complex. It begins with hides prepared at our own tannery and extends to our company owned Red Wing Shoe retail stores as well as retail partners around the world. In addition to our domestic footwear operations, we manufacture footwear in China and uppers in the Dominican Republic. Garments and accessories are made in Mexico, Pakistan, Vietnam, China, and Poland. We operate distribution centers in Red Wing, Minn., Salt Lake City, Houston, and Dubai, and partner with 3PLs in the Netherlands and Japan. In addition, we direct ship from all of our factories.

We service a network of between 450 and 500 domestic retail locations, ranging from our own corporate owned stores to big box retailers to mom and pop shops; six Heritage stores in Europe and Asia, with more on the drawing board; 50 industrial trucks that deliver to job sites; and 47 B2B showrooms around the world.

The company continues to look at new markets and new products, such as shoes and apparel to address stricter safety regulations for the gas and oil industries in emerging markets. In 2010, we added fire protection gear to our portfolio. What's more, we are working to position our manufacturing and distribution points closer to the local market to better serve our customers. As we add more customers and products in areas like Africa and the Middle East, we are changing the processes in our warehouses. In some facilities, for instance, customers will pick up full containers of product and transport those to their distribution points. And, as with every other business, all of our customers want it yesterday.

Taken as a whole, we have more items to forecast; more factors that can influence a forecast than in the

past; and S&OP is more important than ever, especially as we try to do an effective job of managing inventory while improving our fill rates. It's still all about having the right product, in the right amount, in the right place, and at the right time.

Spreadsheets, Errors, and Meetings

In 2008 the author of this article was hired to lead a reimplementation of the S&OP process. At the time, there was a planning process in place, but it was less than optimal. A planner and a representative from product development created a yearly forecast broken out by month. The forecast was based on the prior year sales and what we thought might happen in the next year. It was updated once a month in a small meeting.

For example, if we originally forecast to sell 1,000 units of a style and moved 700 units through the first eight months of the year, we updated the plan to reflect projected sales of 300 units over the last four months. Changes to the forecast, or the reasons for changes, weren't tracked. A spike in demand for a certain style, for instance, might lead to a new increased forecast. However, we rarely investigated to determine whether the spike in demand was a sustainable surge in interest or a one-time fluke.

Execution of the plan was driven by our supply chain and not the sales department. If inventory was out of line with what was selling, or where it was selling, we often ended up storing the excess in trailers or containers in the yard until we freed up space in the warehouse. That practice resulted in high demurrage charges. At the end of the day, no one organization owned the process or was responsible for the outcomes.

We took the first steps towards changing that dynamic in 2009. One of those steps was to create a spreadsheet for each of the company's brands. We also created the initial framework for more inclusive S&OP meetings, with representatives from different functional areas within the company, including executives, supply chain, product development, and sales managers from our various brands. The participants included Mallery Dosdall, who was then part of the retail organization and is now the manager of demand planning. The meetings might include more than a dozen individuals and sometimes lasted for three hours.

These were important first steps along our journey. However, there were still a number of drawbacks that limited our effectiveness. For starts, forecasting remained in the hands of product development and planners. And, it was still reactive and manual. Moreover, it was time consuming. Gathering and inputting the data into the spreadsheets took two or more weeks.

The spreadsheets were complex, clunky, and voluminous; we needed over 450 pages to forecast across all brands and styles. If an executive had a question about a brand or style, it could take hours to ferret out the information. Given the number of brands, styles, and warehousing and manufacturing locations, it's no surprise that the process of manually inputting the data was prone to error. As an example, there was an instance where 20 new styles were added to one spreadsheet. Each of the new styles was available in 40 to 50 different sizes. While inputting the data we forgot to add the subtotal to the top of the spreadsheet. The net result was that planned capacity at the production lines based on the forecast was insufficient to meet actual demand.

The spreadsheets were complex, clunky, and voluminous; we needed over 450 pages to forecast across all brands and styles. If an executive had a question about a brand or style, it could take hours to ferret out the information.

In retrospect, the first S&OP meetings were also too large—and too long—to be effective. Like the forecast, the meetings were often a look back at what had just happened since the last meeting rather than a look ahead at what should happen. In all, the process of forecasting and approving a plan took 6 weeks. By the time a forecast was sent to suppliers and to manufacturing, it was already dated.

At the same time, there was little collaboration with suppliers and manufacturing teams. We rarely asked them if they had the capacity to produce what we needed and when we needed it. Nor were they provided with a forecast. We simply issued a PO for what they were expected to produce and the date for when it was due. Unless someone from manufacturing was communicating directly with the sales team, corporate didn't know whether the factories would meet their production requirements or their ship by dates.

The sense from the S&OP team was that there was still room for improvement.

A Step in the Right Direction

In late 2010, we took the next step in the right direction to improve the process. With the help of our IT department, we created a process to automatically pull data from our ERP system and populate a new spreadsheet. That meant that we no longer had to spend two weeks just keying in data. By automating some of the process, we reduced the number of errors—however, we still had to key in changes from the spreadsheet back into the ERP system, which was prone to mistakes.

Although they were still voluminous, the spreadsheets were easier to work with. In addition, the team began meeting with the head of sales and other representatives for each brand to get more accurate data about what was selling and why, including Dosdall who was then still with our work brand. The meetings were still long, but the team now had the ability to see year-over-year demand and had a more complete picture of data. This new approach, combined with more accurate spreadsheets, was a significant improvement.

Still, our business was growing, further complicating the task of forecasting. By early 2011, it was clear we needed to increase our visibility into our true demand and provide more reliable plans to suppliers and manufacturing if S&OP was going to effectively support the growth plans we had for the business. To learn more about best practices, Dosdall and Grothe attended an S&OP conference sponsored by the Institute of Business Forecasting & Planning (IBF) and led by the consulting firm Oliver Wight. The two attended other S&OP conferences as well, such as the Best of the Best S&OP conference put on by IBF and APICS.

Following these events, they developed ideas on ways to evolve from a backward-looking to a forward-looking organization. For instance, they wanted to create manufacturing capacity graphs and to provide suppliers with better forecasts. The idea was to take actual sales data and use that to forecast at the level of the production line. They would then work with manufacturing to ensure that forecasts aligned with capacity.

Dosdall and Grothe presented a proposal for a new approach to S&OP. To illustrate the challenges of forecasting, they recreated an exercise from one of the conferences. Participants were handed bags of M&Ms and asked to forecast how many M&Ms were in the bag and to predict the distribution by color. No one got it right, not even one clever executive who called the 1-800 number on the back of the pack to speak to the candy manufacturer. The point was made: If you think estimating the number of M&Ms in a pack by color is tough, try forecasting across tens of thousands of SKUs with limited visibility.

Two important changes came out of the proposal. The first was a commitment to redesign S&OP meetings from one large inclusive event into smaller meetings divided by functionality. The idea was to create a forecast based on consultations with each brand and then separately review and refine the plan with functional areas, such as manufacturing, distribution, and transportation. That forecast could then be massaged by the sales department based on the capacity constraints in the supply chain. If everything couldn't be manufactured, what was sales' priority? If there was too much capacity, could sales run a promotion to move more product? Did manufacturing need to add a second shift? Once that plan was

Three weeks from planning to execution

Streamlined processes enabled by technology allowed Red Wing Shoes to reduce its forecasting and planning time from six weeks to three weeks. Meetings are scheduled in advance, using an S&OP Calendar tool. Here are the steps they follow.

Build the forecast: During the first week of a fiscal month, demand planners and sales analysts hold conference calls with each of the regions to get feedback on current trends. The forecast is tuned within the demand planning tool.

General manager approval: On day three of the month, demand planners take their forecasts to the general managers of each brand for approval.

Executive approval: On day three or four of the month, the forecast numbers are reviewed by the President/CEO and CFO. If approved they are published to the organization. This is called S&OP1.

Supply chain handoff: By Friday of the first week, an email notification is sent from the Demand Planners to the Supply Chain Planners for review. Supply chain uses the data to create capacity plans by factory and by production line. Once the data has been analyzed, supply chain develops next steps and plans to bring back to sales. This is known as S&OP2.

Consensus meeting: On Thursday of the second week, sales and supply chain iron out any issues related to promotions, capacity, or distribution.

Planning and executive review: Planning continues through the process. Another executive review takes place on the first Tuesday of the third week. This meeting is a recap of prior S&OP meetings and is meant to address long term issues that need further discussion. Inventory projections for the next 12 months are also reviewed.

After this final review, the plan is put into action.

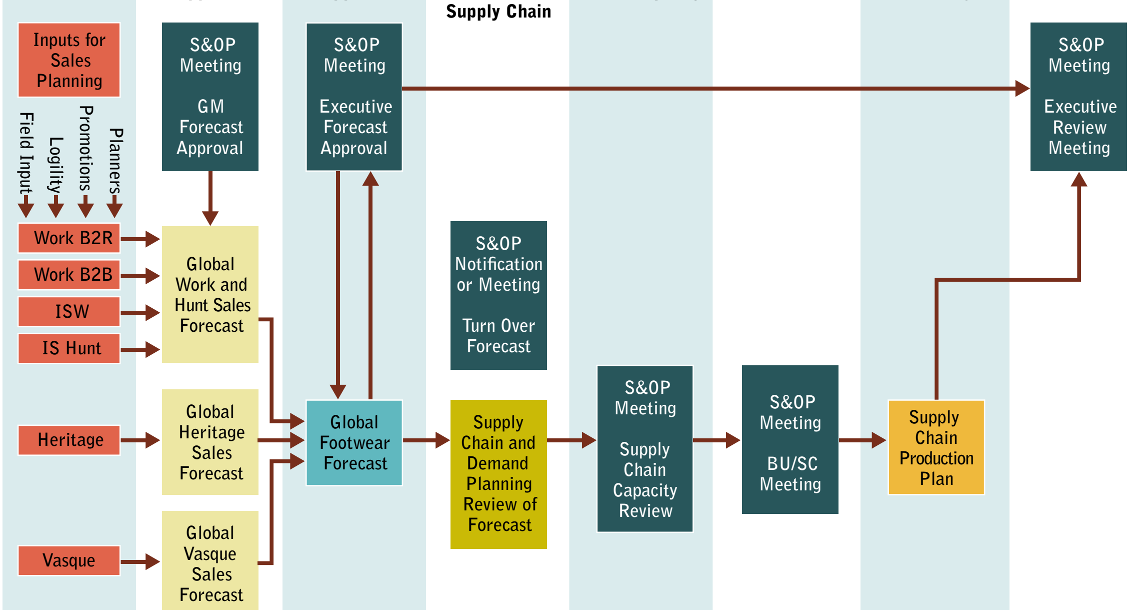
EXHIBIT 1

The Red Wing Shoe Company's S&OP Process

Financial Plan

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
Purpose	**Build the Forecast**	**GMs Approve**	**Executives Approve**	**Deliver Forecast to Supply Chain**	**Supply Chain Plans Capacity**	**S&OP**	**Production Planning**	**Executive Review**

Process



	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
Owners	Demand Planners Sales Analyst	Demand Planners	VP of Business Services	Demand Planners	Forecast Analyst	VP of Business Services and Director of Planning and Procurement	Director of Planning and Procurement	VP of Business Services and Director of Planning and Procurement
Involved (Titles)	Field Staff (Sales) Customers Product Development	Category GM Finance BP BU VP Business Services SVP Urdahl Organization	President CFO	Planners-Sourced Forecast Analyst Scheduling Manager	Finance BP Supply Chain SVP Supply Chain Director of Planning and Procurement VP of Product Development and Quality Supply Chain Planners Sourcing Manager Scheduling Manager Director of Manufacturing	Demand Planners Supply Planners Forecast Analyst Director of Planning and Procurement VP of Business Services	Supply Chain Manager	President CFO SVP Work/Hunt Organization VP Heritage SVP Supply Chain GM Vasque

Source: Red Wing Shoes

LESSONS LEARNED

Four key takeaways from Red Wing Shoes' S&OP Journey

Revamping an S&OP process doesn't happen overnight. After a several year journey, Stephanie Grothe, Red Wing Shoe Company's process improvement manager, offers the following lessons learned.

1. It starts at the top: "Your management team must be on board," says Grothe, who adds that initially, the process was driven by her boss, who was responsible for planning and procurement, and not the company president. Now, senior management signs off on the plan. "Initiatives like S&OP only work if your top executives want them to work and instill that to everyone."

2. Patience is a virtue: There's an old saying: Just because you throw nine women at the problem doesn't mean you can give birth in a month. "It's important to remember that some things will take time," Grothe advises. "You'll find that some new ideas work but some won't and you'll have to start over."

3. Celebrate successes: Because there will be some trial and error along the way, Grothe believes it's important to celebrate successes as they occur. It will boost morale.

4. Be accountable: It's important that stakeholders take their responsibilities seriously. "We use technologies to plan meetings around everyone's calendars well in advance," Grothe says. "You want to make sure that everyone who needs to be part of the process is at the meetings and accountable for their functional area."

complete, it was reviewed by the executive team. (See *Red Wing Shoes' S&OP Process*.)

A second outcome was to evaluate the people involved in S&OP. For instance, we created a new demand planning position—this was an individual who would work directly with each brand to analyze data, input information from the sales groups, and formulate a better process. That role was initially filled by Dosdall. She began holding conference calls with domestic and international sales regions. During those calls, for instance, she might learn that the Northeast had been really wet and that waterproof products might be in more demand. That information became part of the statistical forecast. Since then, we have added additional members to the team and now have five demand planners, including Dosdall who manages the team.

We had been holding weekly conference calls with suppliers and manufacturers as part of a lean manufacturing and warehousing initiative since 2009. Now, we could provide better sales and forecast data during those conference calls; we also got a better understanding of how each of these areas was producing and their constraints. By collaborating with our partners, they too became part of the S&OP process and shared in the forecast.

Demand Planning Made Easy

At the end of the day, S&OP is a process and not a technology. However, demand planning is made easy by technology. Although we were refining our processes and redefining the roles of our people, we were still working with spreadsheets. To take the initiative to the next step, Grothe attended an APICS conference in Toronto to learn about software forecasting tools designed to streamline the S&OP process.

After a vetting process, Red Wing Shoes settled on a software application from Logility. The implementation process began in late 2011; the demand planning module went live March 2012, and was followed by inventory management and replenishment two months later in May.

As we were preparing to work with the new technology, we realized we were making significant changes to our organization. To prepare our staff, we sent a key group of stakeholders to a course on planning and forecasting tools offered through APICS. This group not only learned how the new software tool was going to work, the members also learned how a change in one of the parameters, such as safety stock or bumping up a forecast, had an effect on manufacturing and distribution. We felt this type of change management and training was essential if our people were going to make the best use of the software and the new process.

During the implementation, we populated the software solution with three years of demand history. Once the tool went live, the old clunky spreadsheets were replaced with streamlined, dynamic views of the business, including global visibility by brand and company. It took about three months for our organization, our suppliers, and our manufacturers to trust the data, but soon they became convinced that the data was solid.

Since then, we have realized a number of benefits:

- The S&OP process itself has been cut in half, from six weeks to three weeks.
- By populating the software solution with three years of demand, planners can take a deeper dive into the history of a style or SKU and apply statistical methods to forecasting.
- When we were using spreadsheets, it could take days to answer a question for senior management, like

the sales demand for waterproof styles from a specific factory. Now, reports are available in minutes.

• The system allows planners to manage by exceptions. While every style is reviewed at least once a quarter, the system is set up with alerts that let a planner know in between reviews if they're missing their forecast or if we are selling more than our forecast.

• And, suppliers and internal stakeholders trust the data. Our suppliers tell us it's the best information they've ever received.

The most important outcome of the new approach to forecasting and planning may be that we were able to finally answer the question of who owns the process: Supply chain owns the tool and prepares the forecasts; the brands own the sales; sales owns the inventory; and so on. It was all geared towards making certain that manufacturing had accurate sales forecasts that were also in line with their capacity and ability to ship the right product to the right stores at the right time.

After working with the system for the last two years, inventory has been reduced by 27 percent while customer fill rates have been improved by 8 percent to 10 percent. Those pesky demurrage charges have been decreased by 50 percent—all while growing the business.

The impact on the company was summed up by one senior executive shortly before the system went live: "This will be a game changer for us." Indeed, we could not have added the number of new products or entered the number of new markets we have taken on with our old spreadsheets and old S&OP process.

The most important outcome of the new approach to forecasting and planning may be that we were able to finally answer the question of who owns the process: Supply chain owns the tool and prepares the forecasts; the brands own the sales; sales owns the inventory; and so on.

New Perspectives on the Value of Demand Sensing

By David Swanson and Dawn Russell

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Demand sensing tools are easing inventory burdens in many industries. Recent research points to which types of companies have been investing in those tools and when, and what kinds of results they have been seeing.

Last holiday season, many retailers and their suppliers were shocked by 11th hour shifts in demand, with much of the surprise coming from a surge in e-commerce orders.

As recently as a decade ago, it wasn't unusual for businesses to be hit with much larger or smaller orders than they had been expecting—and for those orders to arrive earlier or later than anticipated. But since then, the discipline of forecasting has improved markedly, with mathematically tractable models providing more useful predictions of demand. So why, in the first decade of the 21st century, are businesses still surprised—and hobbled—by sharp shifts in demand?

The truth is that lack of accuracy still plagues forecasting efforts. A precision forecast of demand is essential for the successful utilization of advanced planning tools. Until recently, demand forecasting primarily involved analyzing historical information using quantitative and qualitative methods. But in categories such as e-commerce, the historical data is too thin to be truly useful.

Today, as the shape of consumer demand continues to change dramatically, what's needed is a far broader look at all of the factors that influence demand—in other words, a picture of "true demand." The pursuit of true demand supports financial goals as well as supply chain goals. In fact, "understanding true demand" was the first of "5 Lessons for Supply Chains from the Financial Crisis," published in *Supply Chain Management Review* last October.

What is Demand Sensing and Why Does it Matter in Supply Chain Planning?

With the rush of so-called "big data"—notably the escalation of real-time data—now available for demand forecasting, new toolsets are required to drive advanced inventory planning. Such tools are now available: They synthesize massive amounts of data—much of it real-time—such as multiple customer point-of-sale (POS) data streams, variables related to weather conditions, economic indicators, sales

A Refresher on True Demand

The term "true demand" refers to the demand for the products and services that consumers truly want. For retailers, true demand can be hidden by stock-outs or by sales of substitute items. True demand is more elusive for companies upstream in the supply chain because they must estimate true demand from orders received from retailers or wholesalers.

of competing products, social media hype, and a host of additional indicators. The *Journal of Business Forecasting* notes that demand sensing sorts out the flood of data in a structured way to recognize complex patterns and to separate actionable demand signals from a sea of "noise."

Demand sensing technology has already been adopted by companies that are recognized as having the most progressively managed supply chains. Indeed, investments in demand sensing solutions are growing more rapidly than supply chain spending in general. According to a recent IDC Marketscape assessment of sensing and planning vendors published in September 2013, demand sensing initiatives accounted for 8.5 percent of supply chain spending in 2013, and are expected to reach 8.7 percent in 2015.

In the balance of this article, we describe a demand sensing study we conducted at the University of North Florida (UNF), share observations regarding the role of demand sensing in supply chain planning, and summarize the impact of demand sensing on supply chain management. This study includes four key observations regarding demand sensing that are important to supply chain managers: (1) demand sensing can support inventory reduction and profit generation; (2) it is pursued in organizations where inventory is important; (3) demand sensing is possibly a response to low inventory turns; and (4) supply chain leaders have adopted demand sensing early.

A Study of Demand Sensing

In 2012, we began to collect publicly available information about companies that started adopting demand sensing solutions as early as 1999, together with data on software and solutions vendors that have entered the demand-sensing market in the last decade. In analyzing this market data, and combining the information with publicly available financial data on the adopting companies, we were able to better understand what demand sensing means for supply chain managers. In general, these managers acknowledge that there are many invaluable real-time variables not found in the historical records that drive current time-series forecasting analyses. Adding these real-time inputs to the prediction process brings companies closer to understanding real customer requirements based on actual customer circumstances and business priorities –in other words, closer to true demand.

Specifically, we were curious about when and why leading supply chain practitioners adopted demand sensing. What was the situation that compelled them to investigate and adopt demand sensing? We thought that by tracking the investments in demand sensing made by supply chain leaders, we would learn more about what compelled adoption of the technology.

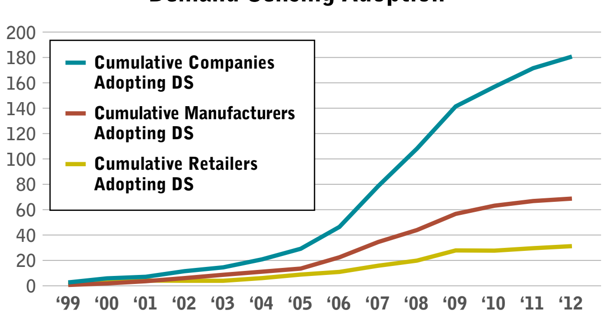
This UNF study investigates the exponential increase in adoption of demand sensing software in the past decade. Exhibit 1 illustrates the growth of adoption of demand sensing applications in that period. The study also indicates that the dollar volume of inventory managed by demand sensing tools is on the rise, from less than $1 billion in 1999 to potentially more than $25 billion in 2012.

The data shows that in the early years, demand sensing was a fairly novel concept, and related applications were largely prototypes. But market momentum for the adoption of applications began to increase in 2005 and 2006 and reached a peak in 2008.

So what types of companies have been making these investments? Our research discussions centered on topics such as: industries using the software; differences between large and small adopting companies; and corporate characteristics. Information on adoptions of demand sensing from 1999 to 2012 came from two sources: press announcements found through Lexus/Nexus, and customer announcements on the Web sites of demand sensing solutions vendors.

EXHIBIT 1

Demand Sensing Adoption*



*Data determined from press announcements, financial reports, and websites

Source: David Swanson and Dawn Russell

This study is based on observations of 237 companies that have adopted demand sensing during the period discussed. Of the 237 public announcements, 141 were public companies, and 109 of those public companies identified the year and quarter of adoption. We then narrowed our study to 80 of these companies, which could unambiguously be linked to financial data from Compustat. The mean size of those companies was just under $22 billion in annual revenue, with roughly $2.4 billion in inventory on hand.

The number of software companies that publicize the sales of their demand sensing solutions has multiplied from three in 2000 to more than 25 in 2012, affirming the potential effectiveness of the toolset. It is interesting to see that the list of software vendors includes several time-tested supply chain technology companies such as JDA and SAP as well as new specialized players such as Terra Technologies and alqemyiQ.

From 1999 to 2012, 26 vendors supplied the market, which appears to be dominated by eight companies that have announced 10 or more demand sensing offerings each. Looking at which industries are the most prominent adopters, manufacturing led the field, followed by retail. (See Exhibit 1.) Consumer packaged goods (CPG) and retail companies were the most frequent early adopters, and industries such as healthcare and food services were late to do so. The first adoptions from these laggard industries in our dataset were announced in 2008, nine years after the first sales of the software.

Further, almost half of the adoptions of demand sensing in our database of public companies have been from companies associated with the food industry. This includes farmers, food manufacturers, food retailers, and restaurant chains. Given the industry's famously slim margins, coupled with the importance of logistics in getting its products to market, demand sensing appears to be a tool to which the food industry has migrated.

Four Key Observations Relevant to Supply Chain Managers

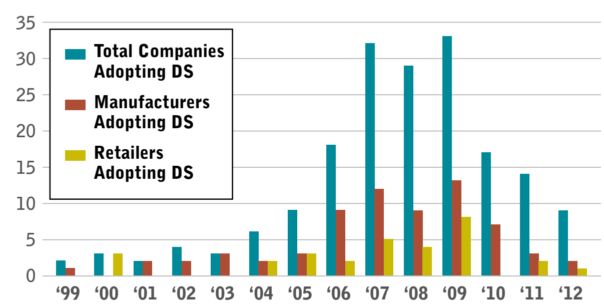
As our UNF team more closely examined the market environment and statistics surrounding the adoption of demand sensing applications, other interesting insights began to emerge, along with a picture of some of the specific characteristics of the adopters. Following are four of the most important insights.

1. Demand sensing can support inventory reduction and profit generation, even during economic downturn.

The popular press has documented multiple stories about companies mired in excess inventory when customers' orders screeched to a halt during the recession. Yet growth of demand sensing remained positive throughout the recent economic downturn in the United States. The three years with the highest number of adoptions of demand sensing software were 2007 through 2009. (See Exhibit 2.)

EXHIBIT 2

Companies Adopting Demand Sensing*



*Data determined from press announcements and websites

Source: David Swanson and Dawn Russell

From this we draw two possible insights. First, companies struggling to remain profitable through the downturn had to turn to new and promising ways to optimize their supply chains; their managers were motivated to adopt changes that may have been postponed until the need was paramount. Second, it could be assumed that the relative expenditure for demand sensing solutions was inconsequential compared to the potential payback, so as companies grasped the usefulness of the tools, they adopted them because the return on investment (ROI) was attractive, even during tough economic times. Business norms would indicate that when companies are pressed to maintain profit margins in such times, they start looking at how to improve returns on their most important investments—inventory included.

For the companies in the UNF study, inventory is one of their largest investments. Demand sensing helps improve the understanding of true demand, so it is very likely to have been deemed valuable during the downturn.

There is further confirmation of demand sensing's contribution to ROI in "Estimating Benefits of Demand Sensing for Consumer Goods Organizations," a 2012 article in *Database Marketing and Customer Strategy Management*. The article profiles Unilever, Del Monte, and Procter & Gamble—all CPG companies for which demand planning and inventory management are critical elements of business performance.

Although the cases do not reveal the specific products on which demand sensing techniques were used, they do report a trial period in 2006 for the Unilever case that shows a 25 percent decrease in forecast error. They also report that one year after implementation in 2009, the benefits of demand sensing included "seven day demand forecast improved by 40 percent on average and …a 16 percent improvement in the 28 day forecast across all brands." The Unilever case also reports "the impact was a reduction in finished goods safety stock of three days, which also led to reduced freight costs because of less stock movement and lower inventory in the system."

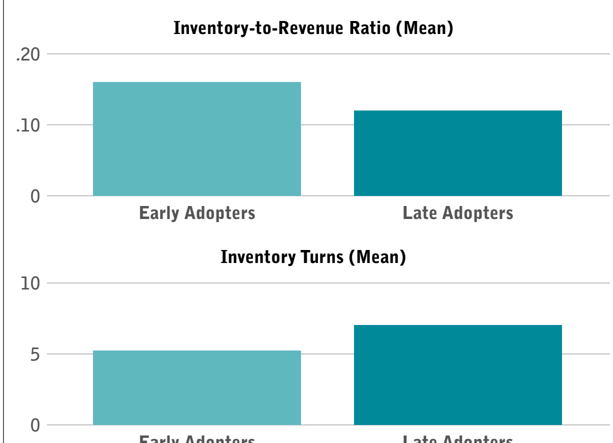
2. Demand sensing is pursued when inventory is important.

To determine which companies would adopt demand sensing software, an expert would seek to understand which companies need it most. For this purpose we use relative inventory, defined as the inventory-to-revenue ratio. Our data indicates that the companies that adopted the applications early do in fact have higher inventory-to-revenue ratios. (See Exhibit 3.) These metrics would suggest that the companies to which inventory is most important were among the first to adopt these new tools.

In what ways would inventory be more important?

EXHIBIT 3

Inventory Information About Companies that Adopt Demand Sensing*



*Information from the public companies in our database. "Early adopters" are defined as the first 40 companies to adopt demand sensing; late adopters are the last in the UNF sample to do so.

Source: David Swanson and Dawn Russell

We see two possibilities. First, a higher inventory-to-revenue ratio indicates that the company spends more of its resources on inventory, relatively speaking. For example, between a shoe retailer and a stockbroker producing equal annual revenues, the former would have a higher relative inventory. A second explanation for high ratios among adopters of the tools may be that companies with too much inventory relative to sales believe that they are relatively inefficient, so they are adopting the tools to improve their inventory management performance.

The available literature and inventory theory suggest that CPG companies, which are heavily represented in this study, and others with high inventory and demand volatility, would obtain the most benefit from demand management tools such as demand sensing and therefore would aggressively adopt demand sensing toolsets. We see evidence in our dataset that CPG companies are indeed aggressively adopting demand sensing. Furthermore, in 2012, the *Journal of Business Forecasting* reported that one-third of North American CPG companies were already using demand sensing tools. The journal further noted that demand sensing is useful in many business situations, including new product introductions, forecasting high and low volume items, seasonality, promotions, etc.

3. *Demand sensing could be a response to low inventory turns.*

We examined financial performance numbers for further insights that could explain the adoption of demand sensing. By all accounts, mean inventory turns were unimpressive for both early and late adopters, but the early adopters had lower turns than the companies that adopted later. (See Exhibit 3.) The early adopters' lower inventory turns could indicate inventory management challenges and earlier steps to address them with demand sensing solutions.

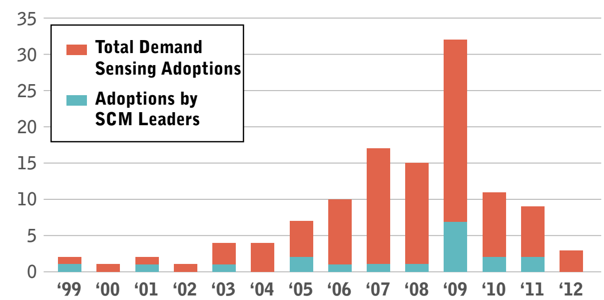
In case studies by other researchers, there were several indications that demand sensing drives improved inventory turns. Examining inventory turns provides another metric in addition to absolute inventory levels. Companies that can cycle inventory more rapidly demonstrate superior operational responsiveness and typically display stronger financial performance. The Del Monte case highlighted in the *Database Marketing and Customer Strategy Management* article noted improvements in return on invested capital, increased sales and profits, and lower operating expenses after beginning demand sensing initiatives in 2006. The P&G case highlighted forecast error reduction, safety stock reduction, and increased cash flow. These are all indicators that inventory velocity and turns are improving. This may also indicate that the companies that manage inventory most efficiently are those that are quick to adopt promising technologies such as demand sensing.

4. *Supply chain leaders were early adopters of demand sensing.*

Referencing the companies listed in the Gartner "Supply Chain Leaders" report, we found that the high-ranking companies in that report were early buyers of demand sensing solutions. We have been able to identify the year and the quarter in which 181 companies adopted those applications. Of those companies, a quarter rank high on the Gartner list. (See Exhibit 4.)

EXHIBIT 4

Demand Sensing Adoptions*



*Data determined from press announcements and websites

Source: David Swanson and Dawn Russell

Our research points to a clear connection between uptake of demand sensing solutions and companies noted for their progressive supply chain operations. The study highlights particular benefits of the solutions, such as their positive impact on inventory turns. The leading companies use demand sensing as a supplement to other demand forecasting tools, which collectively are used to estimate future demand as part of their advanced inventory planning solutions.

The commitments made by the leading companies testify to the importance of demand sensing applications for use in supply chain management and the capability of companies to use the tools to impact profit. Demand sensing is a tool that will enable more and more companies to capitalize on the prevalence of big data. It is a tool for our complex, dynamic times and there is clear evidence that it can help companies in many industries glean more meaningful business insights—by gaining a clearer picture of true demand.

Lost supplier trust,

…how Chrysler missed out on $24 billion in profits over the past 12 years

By John W. Henke, Jr., Thomas T. Stallkamp, and Sengun Yeniyurt

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By any measure, Chrysler is on a roll. Sales are strong with double-digit improvements over previous years. Following the merger with Fiat, the automaker is making money, contributing substantially to Fiat's overall profits, and enabling the improvement and expansion of Chrysler's manufacturing plants in the United States. Talented Chrysler personnel are working well under the leadership of Sergio Marchionne, chairman and CEO of the new Fiat Chrysler Automobiles N.V. Together they have developed a comprehensive plan for Chrysler's long-term success.

Marchionne has publicly stated that Chrysler's future success now comes down to the execution of their well-developed plans. Chrysler's history, however, suggests that Chrysler's plans should not be considered complete. Conspicuously absent is any mention of Chrysler's suppliers and how they will be viewed going forward.

That could be a mistake. With Chrysler suppliers providing goods and services valued at approximately 70 percent of revenue, the time may be right for the automaker's leadership to review Chrysler's 20 year checkered history of supplier working relations. If they do, they will find strong evidence that the more trusting the supplier working relations, the greater the suppliers' contribution to Chrysler's profitability.

Why is this important? Because both our studies

lost profits

Most companies are missing out on an important opportunity for improved profitability simply because they are unaware of the profit contribution their suppliers can bring.

Thomas Barwick

and others have proved quite conclusively that companies with the most trusting supplier working relations are the least adversarial and reap the greatest benefits from their suppliers. For instance, in a 2009 *Marketing Letters* article and a 2010 *Sloan Management Review* article we and our co-authors, respectively, discuss research that shows supplier price concessions and supplier-related non-price benefits, such as suppliers' willingness to share new process and product innovation ideas, increase as trusting working relations with the customer increase.

We base those conclusions on 20 years of ongoing studies we have conducted on the working relations between the six major U.S. automotive manufacturers and their hundreds of Tier 1 suppliers (See sidebar "Our Research" for details on our methodology). These studies enabled the comparison of the automakers' supplier relations in relation to one another, and across commodity areas and other groups within each automaker. Our results are not unique. Over the past several decades a multitude of studies, including many published in *Supply Chain Management Review* going back to 2005, have tied trusting supplier relations to a plethora of customer-related benefits.

The one thing missing in these studies is the impact of supplier trust on customer profitability. After several years of research we have determined how to calculate the economic impact of supplier trust on a customer's profitability. The impact on the bottom line is staggering. Using Chrysler as an example, we calculate that poor—or low trust—supplier relations have cost Chrysler $688 of profit on every light vehicle they have manufactured and sold in the U.S. since 2001. This translates into $24 billion in lost operating profit (EBIT and extra-ordinary expenses) over the last 12 years.

The methodologies we have developed enable us to determine the financial impact of supplier relations for virtually any company. For this article, however, we are focusing on Chrysler to show how supplier trust of a customer is related to the customer's profit.

There are two reasons for selecting Chrysler. First, Chrysler's supplier relations and profitability have been the most volatile of all the North American major automotive manufacturers over the past 20 years. In addition, co-author Thomas Stallkamp is a former vice president

Our Research

Since 1992 we have conducted Annual Studies of Tier 1 production suppliers to the six major North American automotive original equipment manufacturers (OEM): Chrysler, Ford, General Motors, Honda, Nissan, and Toyota. The objective of the surveys is to understand the suppliers' perception of working with each of the OEMs.

Suppliers answer the survey questions as they relate to supplying specific goods, e.g., braking systems, wiper blades, audio systems, tires, and castings, to a specific OEM. As a result, we have obtained information from hundreds of suppliers on thousands of specific buying situations, spread across the six OEMs for 1992–2012.

In 2001-2012 the survey results included supplier provided financial data on the price reduction demands of each OEM and the subsequent supplier price concessions provided each OEM at the buying situation level.

The working relations data and price concession data from these surveys were complemented with 1992-2012 financial performance information from OEM-related annual reports, 10-K reports and other publicly available financial reports. Financial data were also made available to us directly from the various owners of Chrysler. This extensive array of data, as it applies to Chrysler, is the basis of our study. Profitability is standardized to operating profit (EBIT and extra-ordinary expenses)/vehicle to enable comparison across years and among OEMs without concern for unit production and sales differences.

The initial research activities focused on determining which Working Relations Characteristics and OEM Financial Performance are most closely related. The 1997-2012 time period was used because public financial data relating to the North American operations of the three foreign domestic OEMs, Honda, Nissan, and Toyota, as well as Chrysler, as part of the DaimlerChrysler organization, were not available prior to 1997. The OEM data was corrected to include revenue for only domestic produced and sold vehicles (Ward's Automotive Group, Southfield, Mich. provided the production and sales data), because several OEMs imported vehicles for sale in the domestic market and also included non-sales automotive-related revenue in their revenue figures.

Using these data we were able to estimate a series of standardized econometric models for the overall industry and for each of the OEMs. As a result, we were able to identify a statistically significant relationship between supplier trust and financial performance, specifically Operating Income (EBIT and extra-ordinary expenses)/Vehicle. Additionally, using these estimates, we were able to calculate the annual supplier financial contribution for each OEM, which when coupled with the price concession data from our Annual Studies, enabled the determination of the supplier price concession contribution to OEM profitability and supplier non-price benefits contribution to OEM profitability.

of procurement, and former president and member of Chrysler's board of management. In addition, he became vice chairman of DaimlerChrysler Corporation in 1999. Under his leadership, Chrysler developed the Extended Enterprise concept and introduced the Supplier Cost Reduction Effort (SCORE) we discuss below. During his tenure, Chrysler achieved the highest profit per unit of any major automobile manufacturer. We contend that this success was a direct result of supplier trust.

Chrysler's experience, which mirrors what we have found at Ford, General Motors, Honda, Nissan, and Toyota, provides a strong lesson for every company. Building trusting supplier relations is more than a company feel good exercise. It is a prudent company activity that can contribute substantially to a company's profits. To prove this point the article presents an overview of 20 years of Chrysler's supplier working relations and related profitability. Chrysler's history provides direct evidence of two incredibly important managerial lessons. One is that a company's actions toward its suppliers substantially affects the suppliers' contribution to the company's profitability. The other is that it is folly for a company to take an adversarial approach when pressuring suppliers for price concessions.

These findings are compelling evidence that justify why CEOs, CFOs, and heads of purchasing in every industry should give far greater attention to their firm's supplier relations. In fact, we believe that readers will conclude, as we have, that if top management of any company does anything less than work to ensure that their firm has trusting supplier relations, they are mismanaging the company.

But first, some background on Chrysler's recent history of supplier relations.

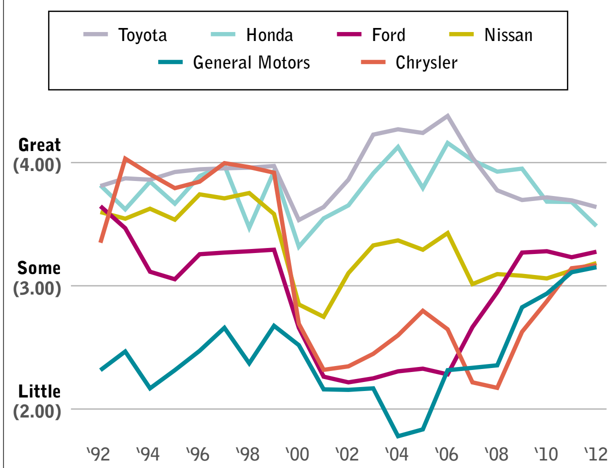
Chrysler: Lost Trust = Lost Profits

Despite the company's strong performance since the recession, Chrysler's road to profitability hasn't always been smooth. From 1992 until 2012 Chrysler experienced considerable volatility in supplier trust and profit per vehicle as it underwent a succession of owners. According to our research, this volatility was unmatched by any other North American automotive original equipment manufacturer (OEM) (Exhibit 1).

During the 1990s, an independent publicly-owned Chrysler Corporation developed and implemented a unique approach to supplier relations that produced significant advantages for the firm. Known as the Chrysler Extended Enterprise™, the strategy was based on the belief that more collaborative supplier relationships would reduce costs and improve supplier working relations. The Extended Enterprise™ program emphasized strong, coordinated collaboration between Chrysler and the companies that comprised its vast supply chain. Every production goods supplier, regardless of size, was treated as an equal member of the Chrysler team.

EXHIBIT 1

Supplier Trust of Automotive OEMs



Source: John W. Henke, Jr., Thomas T. Stallkamp, and Sengun Yeniyurt

The Extended Enterprise™ program focused simultaneously on strengthening supplier working relations as measured by supplier trust of Chrysler, while achieving greater supplier price reductions. This was contrary to the common domestic automotive industry belief that increasing supplier trust and getting greater supplier price reductions were mutually exclusive activities. (This belief, which persists today, is typical in most manufacturing industries.) While the other automotive OEMs were constantly changing their policies toward suppliers, the various Chrysler supplier interfacing functions (primarily procurement and supply, engineering, and manufacturing) treated suppliers in a consistent and predictable manner that established and maintained an environment of mutual trust.

The Extended Enterprise™ program created an environment in which Chrysler and supplier behaviors consistently matched the expectations of the other party. The result was an atmosphere in which common goals and mutual effort brought Chrysler and its suppliers closer together than ever before. This trusting environment enabled Chrysler to develop its highly regarded Supplier Cost Reduction Effort (SCORE) program. As described by our co-author Stallkamp in his book, *SCORE! A Better Way to Do Busine$$: Moving from Conflict to Collaboration*, SCORE followed the collaborative philosophy of the Extended Enterprise™ program by encouraging suppliers to submit suggestions that would reduce their cost of doing business with Chrysler, whether these cost reduction opportunities were to be found at the suppliers' facilities or within Chrysler. Most importantly, Chrysler structured the SCORE initiative so that suppliers kept a portion of any realized savings for themselves to improve their own profit margins. This was contrary to the usual industry practice of the OEM taking all of the savings from supplier cost reduction ideas. As a result, Chrysler and its suppliers both benefited significantly under these conditions.

Concurrently, the other domestic OEMs began implementing cost reduction programs, but in an extremely adversarial way. For example, under the direction of the infamous J. Ignacio Lopez de Arriortua, General Motors purchasing announced in October 1992 that it would break any contract it considered unfavorable to GM with only a 30 day notice. This ignited a fire storm of negative industry press, causing GM's senior management to eventually "clarify" that contracts would be canceled only over quality concerns. Such behavior toward suppliers, even after Lopez left GM, caused supplier trust of GM during the 1990s to be by far the worst of all OEMs (Exhibit 1).

The combination of the unusually equitable SCORE program and the lower supplier trust of GM and Ford resulted in Chrysler increasingly becoming the OEM to whom suppliers would bring cost-saving ideas and new innovation for both products and processes.

The combination of the unusually equitable SCORE program and the lower supplier trust of GM and Ford resulted in Chrysler increasingly becoming the OEM to whom suppliers would bring cost-saving ideas and new innovation for both products and processes. By sharing the savings with suppliers, the SCORE program became self-sustaining with greater contributions to Chrysler's bottom line occurring in each succeeding year. As publicly reported, SCORE produced in excess of $5 billion in material and operating cost savings for Chrysler from 1991 until the 1998 merger with Daimler-Benz.

By following a coordinated strategy that involved defining the goals suppliers were expected to achieve, measuring the achievement of those goals at both the individual supplier level and the supply base in total, and through the public recognition of individual supplier achievements, Chrysler divorced itself from the decades-old adversarial approach to supplier relations. Most importantly, Chrysler's behavior created a level of supplier trust that was rivaled only by Toyota and Honda during the mid-1990s (Exhibit 1). In fact, in his book, *The Toyota Way*, Jeff Liker reported that Toyota, which had the most trusting supplier relations of all OEMs at the time, was quite concerned that Chrysler would ". . . soon become the world's most profitable car company in terms of profit per vehicle—not the biggest, but the most profitable per vehicle... Up to that point, no U.S. company had shown signs of getting it right and developing a culture that could compete with Toyota."

Toyota's concern was justified. During 1997-1999, the only comparable years during the Chrysler Extended Enterprise period for which Toyota financial data is publicly available, both Chrysler and Toyota experienced equivalent trust of their suppliers (Exhibit 1), with Chrysler realizing, on average, $2,456 operating income (EBIT and extra-ordinary expenses) per vehicle, while Toyota realized $1,784 operating income (EBIT and extra-ordinary expenses) per vehicle.[1] This was all to change at the close of the decade when difficulties with the Daimler merger peaked.

At the time of the 1998 merger, Chairman Jürgen Schrempp publicly stated that one of the reasons Daimler-Benz approached Chrysler with the merger proposal was to gain access to Chrysler's organizational and supplier relations philosophies. Unfortunately, Schrempp's attitude toward Chrysler's capabilities was never taken to heart within the Daimler-Benz organization. Chrysler's collaborative approach to suppliers was truly foreign to the Mercedes purchasing and engineering personnel, who had long followed a command and control approach to managing the Mercedes supply base. As a result, Mercedes personnel involved in the day-to-day activities with suppliers showed little regard for Chrysler's supplier relations philosophy.

In the end, the stronger Daimler culture overwhelmed that of Chrysler. By 2000, many of the senior Chrysler leaders who had led the transformation of the firm during the previous decade had left DaimlerChrysler, either voluntarily or through outright firings, and had been replaced by Mercedes personnel. This new Chrysler management team began implementing Mercedes' adversarial policies and procedures, which rapidly obliterated the successful Extended Enterprise™ model. Subsequently, supplier trust of DaimlerChrysler showed the greatest single year drop ever measured in the industry, falling from an average rating of 3.7 in 1999 to 2.6 in 2000 (Exhibit 1).

The worst was yet to come. Facing a dismal economic future, Chrysler's Mercedes-bred management brought in outside consultants from Germany to review the company's purchasing practices. Failing to understand the value of the Extended Enterprise™ program, the consultants concluded that Chrysler, on the basis of piece price alone, was paying too much for its production parts. Influenced by the studies, the management team approved a new Material Cost Management (MCM) program.

On December 7, 2000, the MCM program was announced to a disbelieving supply base. The two-phase program began with all suppliers being given three weeks notice that their prices and purchase orders were being arbitrarily reduced by 5 percent on January 1, 2001. Suppliers were told that cashing the first Chrysler check that reflected the price reduction would indicate their tacit approval of the price reduction. Phase 2 involved Chrysler procurement and engineering personnel collaboratively working with suppliers to reduce Chrysler's total purchasing costs by an additional 10 percent by the end of 2001. An unfortunate, but predictable, result of these events was the continued drop of supplier trust of Chrysler to an average rating of 2.3 in 2001. In 2003, Chrysler procurement began to slowly improve its supplier relations and, subsequently, its profit as the company attempted to work more closely and in a more trusting manner with selected strategic suppliers. But another change was about to hit.

In 2007, Daimler sold its interests in Chrysler to the private equity firm Cerberus Capital. The sale, which resulted in a several billion dollar loss for Daimler, seemed a natural outcome of the 2000-2006 years of Daimler management of Chrysler, during which time Chrysler realized an average operating income (EBIT and extra-ordinary expenses) per vehicle of only $110. This is in comparison to the average operating income (EBIT and extra-ordinary expenses) per vehicle of $2738 during the 1993-1999 Chrysler Extended Enterprise years.

To rapidly improve profitability, Cerberus management focused on cost cutting, including a particularly adversarial approach to reducing supplier costs. This chapter of Chrysler's history, which included the lowest levels of supplier trust and profitability since 1992, was short lived. In January 2009, Cerberus was forced to obtain Federal government assistance for Chrysler to avoid certain bankruptcy.

The terms of government assistance required the replacement of the Cerberus-appointed management, which included replacing head of purchasing with a Chrysler manufacturing veteran who had worked closely with suppliers. Even in the depths of the Great Recession, the collaborative approach resulted in improved supplier relations and increased profitability (Exhibit 2).

Chrysler weathered the 2008–2009 industry downturn with the help of government loans and Fiat investment, a bankruptcy to clean-up its books, extensive restructuring to be a more efficient manufacturer, a return to its roots of collaborative trusting supplier relations, and a subsequent merger with Fiat. As a result, Chrysler returned to profitability, realizing $528 operating income (EBIT and extra-ordinary expenses) per vehicle in 2010, $1086 in 2011, and $1336 in 2012 as suppliers' trust continued to increase (Exhibit 2). But supplier trust of Chrysler was still among the lowest of the six major North American OEMs (Exhibit 1).

Suppliers' Contribution to Chrysler's Profits

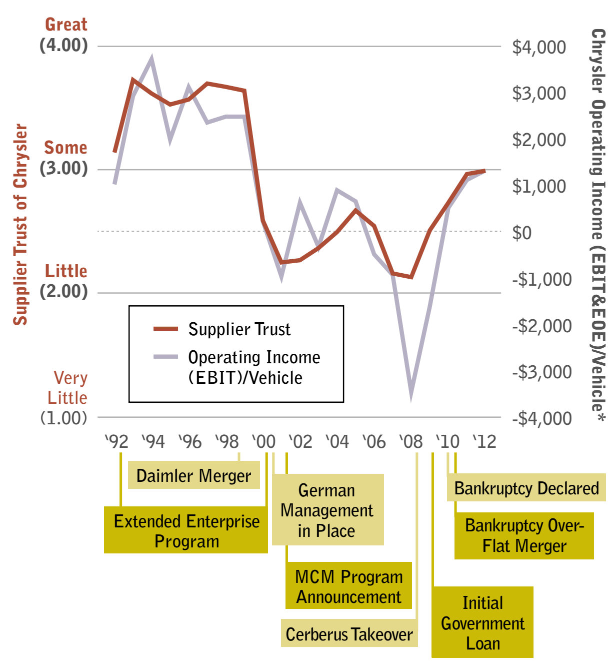
The two decade story of supplier trust and Chrysler's profits (Exhibit 2) indicates a strong correlation between the two. While correlation does not imply causation, our 20 years of annual supplier relations data, the availability of annual OEM financial data, and annual N.A. automotive production and sales data, coupled with numerous governmental annual econometric data, enabled us to go where other researchers could not to show how supplier trust affects customer profit (see "Our Research" sidebar on page 26).

We initially found that OEM profitability results from two sources: managerial capabilities and suppliers. Critically, our 20 years of data enabled us to determine the annual percent contribution managerial capabilities and suppliers make to the profits of each OEM.

Managerial capabilities of an OEM are comprised of such diverse characteristics and activities as management

EXHIBIT 2

Chrysler Profit and Supplier Trust



* Financial data corrected for inflation relative to 2012

Source: John W. Henke, Jr., Thomas T. Stallkamp, and Sengun Yeniyurt skills and talents, manufacturing capabilities, workforce skills and dedication, labor productivity, product quality, marketplace acceptance of its vehicles, and sales incentives, to name a few.

Suppliers contribute to the profits of their customers in two areas. The most obvious is supplier piece price reductions, while the second area is related to non-price benefits that suppliers provide, on their own volition, to customers. These latter "soft" benefits include the level of assistance a supplier may choose to provide a customer, supplier sharing new product and process innovation, supplier providing support beyond contractual obligations, and supplier providing "A Team" rather than "B Team" support when support is needed. Each of these soft benefits contributes to the efficiencies and effectiveness of the customer's operations, causing the customer to reduce its costs of operation.

Overall supplier financial contribution. At this point in the research we had three of the four variables needed to fully understand the annual supplier contribution to profits for each OEM. As shown in Exhibit 2 for Chrysler, publicly available data enabled the determination of the annual operating profit (EBIT and extra-ordinary expenses) per vehicle. The research we subsequently conducted resulted in the determination of the percent of annual operating profit that could be attributed to suppliers for each OEM.

Finally, the relations and price concession data from our Annual North American Automotive OEM–Tier 1 Working Relations Index® Study enabled the determination of the third variable, the annual supplier price concession contribution to the profits of each of the six major North American OEMs for 2001-2012. The fourth variable, the supplier non-price benefits contribution to annual profits, could now be calculated. By multiplying the supplier profit contribution percentage times the annual profit per vehicle we had the total annual supplier contribution to operating profits per vehicle for each OEM. We then subtracted the annual supplier price concession contribution from our Annual Study to get the annual supplier non-price benefits contribution for each OEM.

Exhibit 3 shows the results of these calculations for 2001-2012 for Chrysler. The results are limited to 2001-2012, because these are the years for which we have price concession data. As seen with total operating profit (Exhibit 2), suppliers' financial contributions to Chrysler profits are strongly correlated with the level of supplier trust and, most importantly, are quite substantial. In fact, if it were not for the annual supplier contributions (Exhibit 3), Chrysler's annual operating income (EBIT and extra-ordinary expenses) would have suffered even greater losses (Exhibit 2).

During the Daimler years of 2001-2005 supplier trust was low, but slowly increasing year over year. Concurrently, supplier contributions to profits also generally increased. In 2006-2009, the waning and increasingly adversarial years of Daimler and Cerberus ownership, supplier trust dropped precipitously, as did suppliers' annual total profit contribution. The supplier benefit contribution for 2009 is not included because it is negative, which we believe is indicative of the highly unusual Cerberus financial machinations that took place leading up to and during 2009, and preceded U.S. government intervention and bankruptcy.

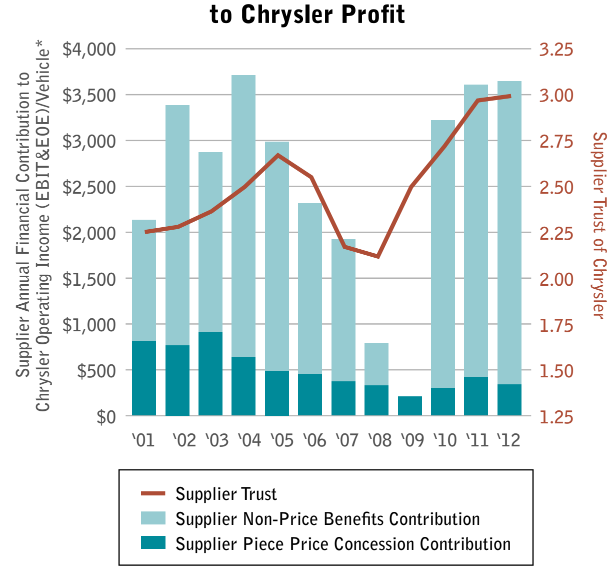
Also, the steep increase in supplier trust in 2009 and Chrysler's lowest supplier price concession over the 2001-2012 time period is reflective of our Annual Study timing. The increased 2009 trust number is indicative of the "legacy" trust suppliers had of the new "old Chrysler" management that was in the process of taking over from Cerberus, while the profit data is the result of the Cerberus management prior to declaring bankruptcy.

The years 2009-2012 began with the federal government showing the door to Cerberus and its management team. Fiat was then brought in and "old Chrysler" personnel moved back into key management positions. The combination of these events resulted in supplier trust increasing in 2011 to its highest level in a decade from its lowest level in 2008. The suppliers' contribution to Chrysler's profit shows a concomitant increase in 2010-2012.

Supplier price concessions. The most obvious OEM benefit of supplier price concessions is the immediate

EXHIBIT 3

Supplier Trust and Supplier Contribution to Chrysler Profit



* Financial data corrected for inflation relative to 2012
Source: John W. Henke, Jr., Thomas T. Stallkamp, and Sengun Yeniyurt

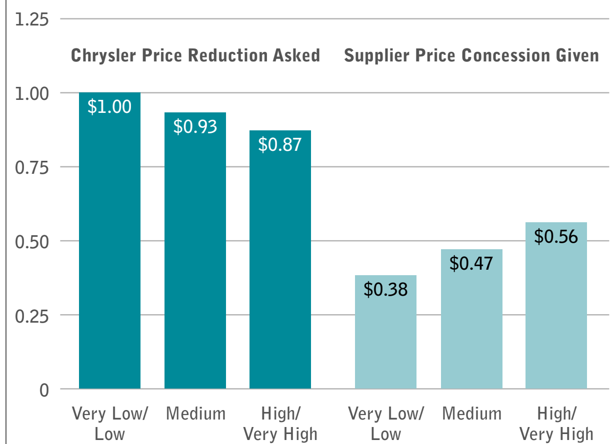
reduction of the cost of goods. This results in a corresponding direct and immediate increase in operating profit.

This rationale is used by companies in search of more profit to justify the use of an adversarial approach to getting price reductions from suppliers, as was the case with the Daimler and Cerberus management teams. In reality, the adversarial price concession approach results in lower supplier trust, which in turn reduces supplier price concessions—the opposite of what management expects and needs in challenging times (Exhibit 4).

These contrary results occurred at Chrysler. The data show that as supplier trust of Chrysler increased in the 2001-2005 and 2009-2012 time periods, suppliers were more likely to give Chrysler greater price concessions. And when supplier trust decreased, 2006-2009, supplier price concessions also decreased. In fact, the lowest supplier price concessions occurred in 2008 and 2009, when suppliers were confronted with the adversarial behavior of the Cerberus purchasing head. As a result of their naive actions, Cerberus purchasing management's adversarial behavior caused suppliers to give Chrysler their lowest price concessions at a time when Cerberus was in need of its suppliers' greatest financial support.

EXHIBIT 4

Supplier Trust of Chrysler



Source: John W. Henke, Jr., Thomas T. Stallkamp, and Sengun Yeniyurt

Supplier non-price benefits contributions. An equivalent relation occurs between supplier trust and the soft benefits suppliers provide their customers. The more a supplier trusts a customer, the greater is the supplier's willingness to support the customer. Our annual automotive studies and other client supplier studies have consistently found that, regardless of industry, companies most trusted by their suppliers realize the greatest benefits. These benefits, which can contribute significantly to the efficiency and effectiveness of a company's operations, include:

- increased supplier willingness to share new product and process innovation ideas with the customer;
- increased supplier willingness to invest in customer specific new product and process innovation in anticipation of future customer needs;
- greater supplier willingness to allocate greater resources and the most qualified personnel to support the customer; and
- more open and honest supplier communication with the customer.

Unlike supplier price concessions, the financial contribution of the increased managerial efficiencies and effectiveness that results from these non-price benefits is buried among the various line items of the customer's income statement. It is the challenge of quantifying this financial contribution that has eluded academics and practitioners. However, as previously discussed, the publicly available OEM financial data and industry production and sales data, coupled with the price concession data from our Annual Studies enabled us to determine the annual financial contribution of the suppliers' non-price benefits to each OEM's profit/vehicle.

When applying this methodology to Chrysler we found that the financial contribution of the soft benefits suppliers provide Chrysler are, like supplier price concessions, highly correlated with supplier trust. In addition, the value of these non-price contributions greatly and consistently exceeds the monetary value of the suppliers' price concessions. For example, in 2010, 2011, and 2012, as suppliers became increasingly convinced that Chrysler was moving back to more collaborative ways of working with them, the suppliers' increased non-price benefits to Chrysler. The increased supplier non-price benefits contributed to more efficient and effective operations within Chrysler that resulted in lower operational costs. These, in turn, resulted in supplier-related profit contributions of up to eight times the price concessions suppliers' gave Chrysler. Even in 2008, during Cerberus' most adversarial relations, suppliers provided benefit related financial contributions that were slightly more than the monetary value of their price concessions.

These outcomes suggest that companies that pressure suppliers in an adversarial manner to obtain greater price concessions to improve their bottom line are, in fact, doing themselves a great disservice. They are, instead, consigning their firms to be second class customers who will be treated in an adversarial manner by their suppliers.

What Lessons Have Been Learned?

Today, Chrysler's improved supplier relations have resulted, once again, in suppliers providing substantial financial contributions to Chrysler's profitability. So, why the concern about what Chrysler should do next? Because history often repeats itself.

Even with the recent improvement, Chrysler's current supplier trust is substantially below the trust levels of the 1990s that are associated with Chrysler's highest levels of profit-per-vehicle in the past two decades (Exhibit 2). Also of concern is the flat-lining of trust improvement seen in the last year. The lack of trust improvement suggests that Chrysler's top management, like the majority of CEOs, CFOs, and heads of purchasing, are grossly underestimating the importance of allocating the resources and supporting the effort needed to create and maintain a working environment that will increase suppliers' trust and the subsequent supplier contribution to their company's profits.

In fact, if the 2012 level of suppliers' trust of Chrysler had been present since 2001, our calculations estimate that Chrysler would have gained an additional $688 of profit on every light vehicle manufactured since 2001. This additional profit/vehicle would have resulted in Chrysler realizing a total gain of almost $24 billion in additional operating income (EBIT and extra-ordinary expenses) over the 2001-2012 time period.

This estimate, coupled with Chrysler's supplier and related financial experiences of the past two decades, provides two convincing lessons for every company. First, working to build and maintain trusting supplier working relations is a prudent, financially responsible activity for every company to undertake. Second, by working to build and maintain trusting supplier working relations, the opportunity for purchasing to achieve meaningful and substantial supplier price concessions and other supplier-provided benefits is maximized.

It takes a lot of effort and resources to be an adversarial customer. Hopefully, this story of 20 years of Chrysler's supplier relations and profitability is a convincing argument as to why every company would be much better off applying its effort and resources toward building and maintaining trusting supplier relations.

End Notes

1 All automotive OEM profit data discussed in the article is operating income (EBIT and extra-ordinary expenses) per vehicle, corrected for inflation relative to 2012, for light vehicles (automobiles, pick-up trucks, and SUVs) produced and sold by the OEM to car dealers and fleet owners in North America.

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Can Your Supply Chain Support a

No one wants a corporate turnaround. But when a turnaround is unavoidable, supply chains can play an important role in righting the ship.

By William B. Lee

For what are you looking?

When it comes to corporate turnarounds, that's a good question.

Are you looking for a smooth handover of company control to a new CEO? Is turnaround simply another term for the motivations behind mergers and acquisitions? Or is it just a good excuse for financial reengineering?

Whatever the answer at your company, turnarounds are a fact of corporate life. Practically every week we see articles on the subject in the *Wall Street Journal, Fortune, The Economist*, and other news sources. Some of these are referenced below.

Why are corporate turnarounds important? And, what can we learn from them and about them? Simply put, many poorly performing companies need rebirth, recovery, reformation, regeneration, reinvention, rejuvenation, renewal, renovation, reorganization, restoration, restructuring, and revitalization. You can add as many of these "re" terms as you like to describe the phenomenon. These terms fill a need: They provide a vision for a situation that needs changing.

At the same time, turnarounds are often easier said than done. Many companies lose substantial market value in the

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Corporate Turnaround?

Martin Barraud

transition from one leader to another. HP lost more than half of its market value during the transition from Mark Hurd to Leo Apotheker and finally to Meg Whitman. Only now does the company seem to be finding its footing and recovering value.

Unfortunately, this is commonplace. Given the difficulties of making a turnaround work, you may wonder why we do it at all. What's more, as supply chain managers, you might ask: What role can supply chains play in a corporate turnaround? Or, you might ask the related question: What was the role of supply chains in establishing the need for a turnaround in the first place?

In this article, we look at some of the reasons behind corporate turnarounds, and how supply chains can facilitate successful turnarounds.

Why a Turnaround in the First Place

Whether they are big or small, notable turnarounds make for interesting stories. Two of the most notable involve AT&T and General Motors. Both are recounted in *American Turnaround: Reinventing AT&T and GM and the Way We Do Business in the USA,* by Ed Whitacre, the executive who steered both companies through their turnarounds. Recalling his first few days as chairman of GM, Whitacre wrote: "One executive told me—with a completely straight face—that the only reason GM went broke was because 'we didn't sell enough cars and we ran out of money.' I thought he was kidding. He wasn't."

Clearly, this was a company that was overdue for a turnaround. U.S. politicians put about $50 billion of our taxpayers' money into the company, and, according to reports, we only got $10.5 billion out many months later. Politicians told us this was a good deal, but they were using OPM (other people's money)—not their own. The people whose money it was (our money) did not necessarily agree with that assessment. Even after the bailout, Chevrolet faces problems in Europe, the company is struggling in Asia and, more recently, made the news because of a very large recall over faulty ignition switches. Apparently, GM had known about the ignition switch problem for over 10 years. Further, in late March 2014, GM recalled an additional 1.5 million vehicles to fix steering system problems.

Companies need turnarounds for all sorts of reasons, and not just a lack of sales or running out of cash. One of the most often cited reasons is the deterioration of general business conditions such as, say, recessions or other economic situations that cause a decline from optimal business circumstances. The recent so-called Great Recession was a worldwide phenomenon that pushed many companies and financial institutions into turnaround mode.

Downturns in demand for the goods and services **of particular companies also drive the need for turnarounds. These can be unrelated to general business conditions but are specific to one organization or industry.**

Clearly, recessions can cause companies to get into difficulty; in many cases, this is through no fault of their own. However, we're also realistic enough to understand that "general business conditions" often serve as a convenient scapegoat for poor management: Whitacre's book cites multiple instances in which GM executives blamed the company's problems on some variation of the "poor business conditions" rationale.

Downturns in demand for the goods and services of particular companies also drive the need for turnarounds. These can be unrelated to general business conditions but are specific to one organization or industry. One obvious example is the pay phone. Once a staple of gas stations, restaurants, airports, and city street corners, pay phones are a rarity today. We all know what happened: cell phones. Through no fault of their own, pay phone makers were forced to adjust to a rapid and dramatic decline in demand for their products, although one might ask why pay phone makers didn't come out with cell phones. This is the same classic question as: Why didn't the buggy manufacturers put an engine on their products and invent the automobile in the late 19th and early 20th centuries?

What about poor management? In the opinion of this author, this is perhaps the most common reason for why companies need turnarounds. Many people have attributed General Motors' plight to poor management, particularly in light of the quote from Whitacre's book. I believe this is a fair assessment of GM. Although I never worked for GM, I once spent over a year consulting for the automaker. I became very familiar with its operations in the United States and several places around the world. We consultants joked that a bomb could be set off in the white collar areas of the company at 5:05 p.m. and nobody would be hurt. There was nobody there; they had all gone home.

Alas, it's not just poor management. Any number of companies have been saddled with egregious amounts of debt after takeovers by buyout firms. Still others have been hobbled by shoddy accounting practices. Barnes & Noble, for example, had to restate earnings for fiscal 2011 and fiscal 2012, according to reports in the *Wall Street Journal*, because of improper allocation of "certain information technology expenses" between its Nook and eBooks business, and its consumer bookstore group. Following these restatements, Barnes & Noble's stock fell by 12 percent in just one day of trading.

Finally, companies may find themselves in need of a turnaround because of legislative and regulatory actions. Three federal agencies that come to mind are the Internal Revenue Service (IRS), the National Labor Relations Board (NLRB), and the Environmental Protection Agency (EPA)—all of which have the power to make significant dents in companies' operations. One hears frequent examples of companies being crippled by these agencies. For example, it was widely reported that the NLRB did all it could to stop Boeing from opening a plant in "right-to-work" South Carolina instead of "union friendly" Washington State. Fortunately this did not force Boeing into a turnaround; nevertheless, it cost the company a great deal of money.

Leaky Supply Chains

The above examples, familiar to all of us, are focused on the executive suite. But shoddy supply chain practices also can contribute to the need for corporate turnarounds. Think of these as leaky supply chains: When the right controls and practices aren't in place, value leaks out of the supply chains like water through the holes in a pipeline.

One of the quickest, easiest, and simplest examples is that inventories can get out of whack with sales. Under normal conditions, inventories should be growing at about the same pace as sales, or more likely a little more slowly. However, if a retail chain's Christmas holiday sales get off to a slow start, the inventory strategy that was put into place earlier will turn out to be too high. The stores easily could be overstocked with abundant merchandise, and the incoming supply chain also could be overflowing.

J.C. Penney needed a turnaround in 2011. We then saw massive inventory problems occur after they hired Ron Johnson. A high profile CEO, Johnson had been head of Apple's wildly profitable retail operations. As was chronicled this past April in *Fortune*, Johnson's attempt to reinvent Penney's business model was roundly rejected by its customers. The retailer lost $1 billion in Johnson's first full year as CEO, and was leaking massive amounts of cash. Johnson was out after just 16 months. As far as we can tell from various accounts of the story, Johnson did just about everything wrong. The author of the *Fortune* article wrote, "… there were no plans. His mandate could be reduced to a single word: change. What that entailed could be figured out later. … With nary a whisper of opposition, the 109-year-old retailer had decided to abandon not only its strategy of many decades but arguably its fundamental way of doing business."

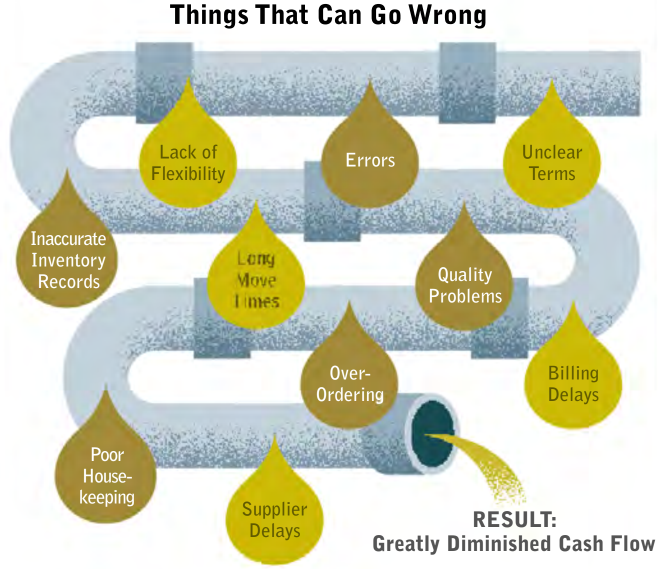
Of course, it's very easy for a company to have too much of the wrong stuff that's not selling and not enough of the right stuff that is selling. Management has to constantly balance the risks of either too many or too few goods in stock all along the supply chain. We all know this—it's intuitively obvious to even the casual observer of supply chains.

Supply chains also can be sources of significant leakages of cash. As shown in Exhibit 1, there are many sources of leakages along the inventory pipeline: unclear terms, inaccurate inventory records, lack of flexibility, and many others. The result likely is greatly diminished cash flow.

There have been numerous case studies of companies that failed to focus on their procurement functions and, as a result, missed opportunities to significantly reduce the costs of components and material. Your author consulted with one company that had not paid much attention to its procurement process for years, with the inevitable result that it was completely unmanaged. The only "procurement person" was merely a "buyer" with absolutely no education or training in procurement. He worked very hard, he was honest, and he took his job seriously. But he was in over his head. When he received a purchase request from someone in the organization, he would check to see if he had purchased the item in the past and from whom. He would then call and order the same thing again without paying attention to proper sourcing techniques. If it was a new item, he would check the Internet to see who was selling the item and then place the order. The result was that procurement was really just a clerical function that added very little value to the company. In fact, it subtracted value. I made numerous requests to send him off to an APICS or ISM course on the basics of procurement; despite my best efforts, management did not appreciate the potential value that can be added from improved procurement practices. Needless to say, I quickly got myself out of that engagement. There simply was no way that I could be successful, so I fired the client.

EXHIBIT 1

Leaks in the Cash Flow Pipeline: Things That Can Go Wrong



Source: William B. Lee

While supply chains, and procurement, can leak cash and profits, there are also opportunities for significant enhancement of profit. Procurement, for instance, can be a competitive weapon that distinguishes successful, highly profitable companies. It's not unusual for a company's procurement to represent 60 percent to 70 percent of its cost of goods sold. Reductions in procurement spend represent what has become known as "straight-to-the-bottom-line" actions, meaning that a $1 reduction in the cost of an item directly adds $1 to profit. It's

An unknown risk could have been the Great Recession of 2007-2009. Some people claimed to have seen it coming, and perhaps they did, but the impact it had on specific companies might have been an unknown risk.

no wonder that successful turnarounds frequently begin with a hard look at the company's procurement processes.

And, finally, supply chains also can leak growth opportunities. Another client of your author had been selling individual capital equipment products on a "one-off" basis in response to requests for proposal (RFPs). They dutifully responded to the RFPs but made no effort to sell more than was requested. They were subsequently surprised when one of their smaller competitors took away a major portion of their business by working out a deal to sell and service all similar products. Fortunately, this was not a fatal blow to the company; nevertheless, it made a considerable dent in their total business.

Risky Business

Let's consider a maxim: *It's better to avoid the need for a turnaround than to perform a turnaround well.*

Indeed, the best turnaround is no turnaround at all. Given the uneven results of many turnarounds, like war and taxes, they should be avoided whenever possible. In fact, many companies are able to anticipate and respond effectively to turbulence and have prospered as a result. Others, not so much. They have either caused or ignored conditions such as we have discussed and have found themselves unable to adjust to the most obvious needs for changes, often resulting in a turnaround situation being the only available course of action. When a turnaround can't be avoided, what happens next?

A good place to start considering this maxim is to look at formal risk management. That's because any action in a turnaround has an impact on someone, somewhere, sometime. One of the core questions in any turnaround is: How have we performed versus how should we have performed? The answers to these types of questions depend greatly on the constituencies' points of view. Constituencies include shareholders of the corporation and investors in general, employees, customers, suppliers, communities in which the company operates, and so forth. Each of these constituencies is at risk in a turnaround.

Your author was neither a consultant to nor an employee of J.C. Penney. However, you don't have to be an insider to argue that a major contributor to that retailer's tumbling sales was a failure to assess the impact the new sales model would have on the retailer's most loyal customers. Johnson eliminated almost all of its price promotions and made large scale changes to its product mix—all without testing the ideas with the customers. The outgoing CEO also remarked that Johnson had not asked a single question about how the business was currently running, and in fact, apparently had let it be known that he did not want to hear skepticism about his plans. Some risk management would have been useful.

Risk management has its origins in the uncertainty that is present in all supply chain and corporate activities. There are known risks, which have been identified, analyzed, and quantified and for which plans can be developed. Your author lives on the Gulf Coast of Texas and has seen more than one hurricane hit this area. One has to ask, then, why do people and companies seem surprised when a hurricane causes significant damage? These are known risks.

There also are unknown risks that cannot be identified and analyzed, but for which some general contingency planning can be accomplished. An unknown risk could have been the Great Recession of 2007-2009. Some people claimed to have seen it coming, and perhaps they did, but the impact it had on specific companies might have been an unknown risk.

A number of years ago during the height of the U.S. space program, I did a good deal of consulting with NASA on planning processes for the Space Shuttle.

Although the process was not called supply chain, it nevertheless had a lot of similarity. While spending time at the Johnson Space Center, just south of Houston, I was introduced to a term that was new to me: unk-unks—or unknown-unknowns. Unk-unks were the unknown risks, about which NASA did not know enough to even know that they were risks. I suspect that many companies have lots of unk-unks today that potentially could be causes of the need for turnarounds. These unknown-unknowns make it all the more imperative that risk planning be an integral part of a company's key initiatives for avoiding potential needs for turnarounds. Simply put, formal risk management has its focus on uncertainties in business endeavors. This is an important component of avoiding the need for turnarounds. We highly recommend formal risk management in almost all of our consulting engagements if the client does not already have it.

To ensure adequate risk management, the board of directors and senior management need to understand the types of specific risks that face their company and its constituencies, including the need to ensure that processes are in place to deal with the risks. This implies a certain amount of risk planning, risk identification, and risk analysis. Further, it also implies a certain amount of risk monitoring and risk response planning.

In earlier years, many supply chain and corporate executives began to think about formal risk management programs. Today, risk management typically is part of the strategic planning process and is based on comprehensive analyses, including:

- What can go wrong in our company?
- What is likely to go wrong?
- How can we avoid these things?
- What can we do about them if they do go wrong?

Risk management is arduous, data-centric, and analytical—but necessary. Many of the company's risks that can give rise to the need for turnarounds also are supply chain risks and can include all sorts of things: natural events (hurricanes, tornados, floods, etc.), political crises, terrorism, data security, raw material supply shortfalls, strikes, merger and acquisition stumbles, financial failures, and many others that can occur anywhere in the world.

Different Approaches to Turnarounds

Replacing previous management is an often used (maybe the most often used) turnaround approach. Your author is a member of the National Association of Corporate Directors (NACD), attends most of the local chapter meetings, and has gotten to know many fellow directors. Inevitably, there is some discussion during coffee breaks about directors and management who are not living up to the company's needs. It's surprising to me how many

The Board's Responsibilities

Avoidance of the need for a turnaround usually starts with the Board of Directors and specifically with two issues: the Board's fiduciary duties and its risk management duties. Both of these are primary business principles that are affected by the tone set at the top of the organization.

Consider the words of the prophet Ezekiel:

"Woe to you shepherds of Israel who only take care of yourselves! Should not shepherds take care of the flock?"

He easily could have been speaking about some of today's business leaders. Ask yourself: "If I am a senior executive or a Board Member, what tone am I helping to set at the top of the organization?" That question is important because the tone will be reflected downward to and by your subordinates. The wrong tone easily can lead to the need for turnarounds.

That's what we mean when we say: "It's better to avoid the need for a turnaround than to perform a turnaround well." So, what are the Board's and management's responsibilities before, during, and after a crisis?

Fiduciary Duties. There have been many words written and discussions held that define the fiduciary duties of corporate directors. These usually fall into two broad categories: a duty of care and a duty of loyalty. Both are germane for our purposes.

Directors and management must operate pursuant to their fiduciary duties as defined under law. One way to think about this is as a stewardship responsibility. Ask yourself, what am I doing every day that will leave the world better off than it was before? If our leaders acted in these ways, we likely would have the need for far fewer turnarounds.

Risk Management Duties. The very need for a turnaround implies some form of turbulent times for the company. Many companies are able to anticipate and respond effectively to turbulence and have prospered as a result. Others not so much. They have either caused or ignored conditions such as we have discussed here and have found themselves unable to adjust to the most obvious needs for changes, often resulting in a turnaround situation being the only available course of action.

Ultimately, the board's responsibility is easy to define: ***Avoid the need for a turnaround.***

directors believe that some of their fellow directors and some of the management personnel in their companies at least border on the incompetent. It seems like a crisis is needed before they are replaced.

There has been an unfolding saga over the past few months about Microsoft's Steve Ballmer and his tenure as CEO of the company. If one is to believe the reports in the media, the Board of Directors simply got tired of waiting for him to make changes that they believe are in the company's best interests. While we are all familiar with Microsoft's strong position in software, it appears the Board wanted Ballmer to shake up the management structure and refocus on mobile devices and online services.

I consider these decisions to be related to supply chain issues of how Microsoft goes to market. After all, to reinvent its business under new management, Microsoft will have to reinvent supply chains to support new directions. This underscores the point that while a leaky supply chain can contribute to the need for a turnaround, a well-managed supply chain can contribute to avoiding the need for a turnaround at all.

There are a number of different roles a supply chain can play in implementing a turnaround. (Exhibit 2) Perhaps the most common is to reduce or cut back supply chains, business units, operations, products, and so forth.

One example is Sears Holdings. I think it's fair to say that Sears seems to have been in a perpetual turnaround situation for the past number of years. They even allude to that on their Web site that states, "we continued to proactively transform our business … transitioning from a business that has historically focused on running a store network into a business that provides and delivers value … whether in store, in home, or through digital devices." (These basically are Sears' different outgoing supply chains.) Sears also has used spinoffs since 2011 with Orchard Supply Hardware, Hometown & Outlet Stores Inc., Sears Canada, and lately, Lands' End. All of these were supply chain-centric transactions.

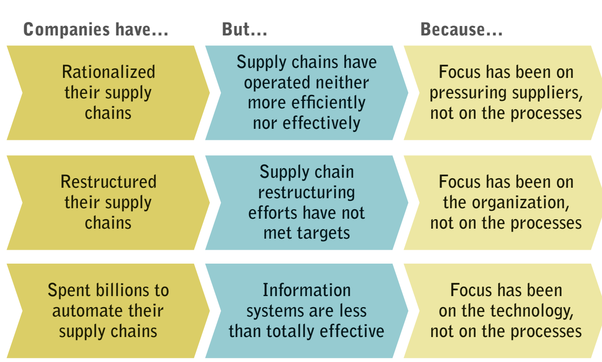
While supply chain reductions are common, by plugging the leaks we identified earlier, supply chain functions also can be used as strategic tools to facilitate a turnaround. Take the example of inventory that has gotten out of alignment with sales. While excess inventory can lead to the need for a turnaround, innovative sourcing and replenishment practices can be turned into a competitive advantage. That's one reason why a global retail giant such as ZARA has been so successful with its fast restocking capability and its focus on innovation and flexibility. ZARA was profiled in a Harvard case study. While many, if not most, of Zara's competitors outsource manufacturing to low-cost Southeast Asia, ZARA manufactures many of its products in its own factories (many of which are in Spain)—thus enabling fast restocking. Sure, it gives up some potential cost advantages by not outsourcing, but it believes proximity to the customer and efficient supply chains offset any higher manufacturing costs. Now, that's not to say that ZARA will not run into difficulty down the road and need a turnaround; as of this writing, however, it looks as if this capability is a winning strategy that should help mitigate future supply chain problems.

Supply chains also can play a crucial role in an essential risk management assessment. While we normally think of negative risk—something negative happening unexpectedly—we also can have positive risk—the risk that something unexpectedly good happens. For supply chains, positive risk could be an unexpected move by a supplier that significantly improves that supplier's performance. A formal risk management program should seek to increase the probability and impact of positive events and to decrease the probability and impact of negative events.

We all know that the sourcing component of procurement can be used as a competitive weapon that distinguishes supply chains in successful, highly profitable companies. In their book, *Designing and Managing the Supply Chain*, authors David Simchi-Levy, Philip Kaminsky, and Edith Simchi-Levy, underscored this point by looking at GM's missed opportunities: "In 2001, General Motors' revenue was $177.3 billion, annual spending on parts was $143.8 billion, and net profit margin was 0.3 percent. A 0.5 percent reduction in annual spending would have increased profit by $0.72 billion. To achieve the same

EXHIBIT 2

Supply Chain Impacts on Corporate Turnarounds



Source: William B. Lee

increase in profit through higher sales, General Motors would have had to increase revenue by a startling $240 billion, clearly an impossible challenge." It's no wonder that successful turnarounds frequently begin with a hard look at the company's procurement processes.

Entrepreneurial Turnarounds

Finally, a turnaround creates an opportunity to think differently about the role of the supply chains in an organization. In 2012, your author published *Creating Entrepreneurial Supply Chains: A Guide for Innovation and Growth*, which illustrates another supply chain approach to implementing a turnaround. As I say many times in that book, I am all in favor of an entrepreneurial approach to business. Let's explore a few examples.

Companies typically stick close to their core business when looking to turn themselves around from tough times. They may look to augment market share through changing their pricing and their product mix, introducing new variants of their products, making incremental customer-facing improvements, expanding into new geographical areas, and many others. Below are four examples.

1. ***Pay attention to what you have now.*** One company renovated some of their existing plants and upgraded some of their products after falling into difficulties. Another company significantly expanded their customer service, in particular geographical areas.

2. ***Innovate.*** One person stated that her company was investing in innovation, upgrading its product lines, and experimenting with new marketing approaches in an effort to turn around the business. The company paid for that spending by delayed infrastructure investments.

3. ***Pay attention to the customer.*** The first step in moving from cost cutting to growth is to talk to your customers about their needs, which may have changed. One of the best approaches for any new management is to take a tour of the customers to find out what they are thinking. Your author typically asks the CEOs of new consulting clients about how long it has been since he/she has made a customer tour. Merely by my asking the question it usually spurs them to at least consider such a tour. You'd think this would be, as we say, a "no-brainer" move on the CEO's part—but you'd be surprised about how frequently the CEO is embarrassed by the response they have to give.

4. ***Consider mergers or acquisitions.*** Acquisitions can be small or large, strategic or tactical, like a technology or a product, customer, or geographic segment. The CFO of one client stated that any acquisitions for them are likely to be horizontal (such as other similar businesses), but not vertical (such as a supplier, technology provider, or distributor). They felt that horizontal acquisitions are easier to pull off successfully.

As this shows, many potential avenues exist to create entrepreneurial supply chains by observing what others have done and then adapting their ideas to one's own situation.

Supply chains also can play a crucial role in an essential risk management assessment. While we normally think of negative risk—something negative happening unexpectedly—we also can have positive risk—the risk that something unexpectedly good happens.

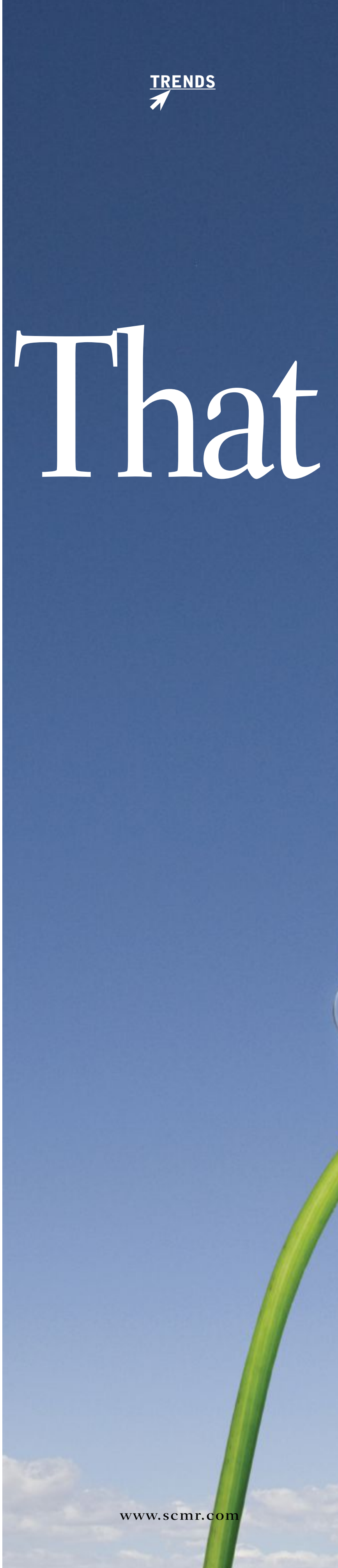
Final Thoughts

As this author thinks back on the evolution of business performance expectations and the associated changes over his career, a few things are unchanging. Among them is a constant increase in the speed of improvement; but just any improvements are no longer sufficient. We need the best improvements.

This explains the need for many of today's turnarounds. Simply put, the pace of change and improvement makes catching up nearly impossible if a company allows itself to fall too far behind its competitors. Private enterprise competition with profit motivation has delivered on these expectations with amazing improvements—but not by doing things the same way as they had always been done. It takes intelligent and integrated improvements, linked with motivation. Well-designed and well-executed turnarounds that use the best supply chain processes frequently are necessary for successful competition.

But remember our maxim: *It's better to avoid the need for a turnaround than to perform a turnaround well.*

Innovations That



By George Prest and Scott Sopher

Supply chain executives understand the need to capitalize on powerful new technologies and business innovations that can help address and manage the increasing complexity of today's global supply chains. In the past, companies tackled supply chain challenges primarily by focusing on internal cost reduction and improved operational efficiency. However, those traditional approaches are losing their effectiveness as supply chains become longer and more intricate, with more inter-connecting links, higher stakeholder expectations, and more sources of risk. This increasing complexity is forcing companies to rethink their approach to supply chain improvement.

In late 2013, MHI and Deloitte conducted their first MHI Annual Industry Report survey. The topic of this survey was "Innovations that Drive Supply Chains." The goal was to provide an up-to-date perspective on emerging supply chain trends. The survey included more than 450 respondents from large and small companies across a wide range of sectors, including: retail and wholesale, consumer packaged goods, automotive, consulting, life sciences and healthcare, transportation and warehousing, materials handling and supply chain equipment and related services. The vast majority of respondents were senior executives, with more than half being C-level executives, managing directors, senior vice presidents, vice presidents, or directors.

According to our survey, the top two strategic priorities for supply chain executives are supply chain analytics and multichannel fulfillment.

- **Supply chain analytics.** Analytics tools and techniques harness data from a wide range of internal and external sources to produce breakthrough insights that can help supply chains reduce costs and risk while improving operational agility and service quality. At many companies, the supply chain function is a step or two behind the commercial side of the business when it comes to capitalizing on the power of analytics.
- **Multi-channel fulfillment.** Today's consumers want to shop for what they want, where they want, when they want—and then have all of their purchases delivered quickly and consistently, whether

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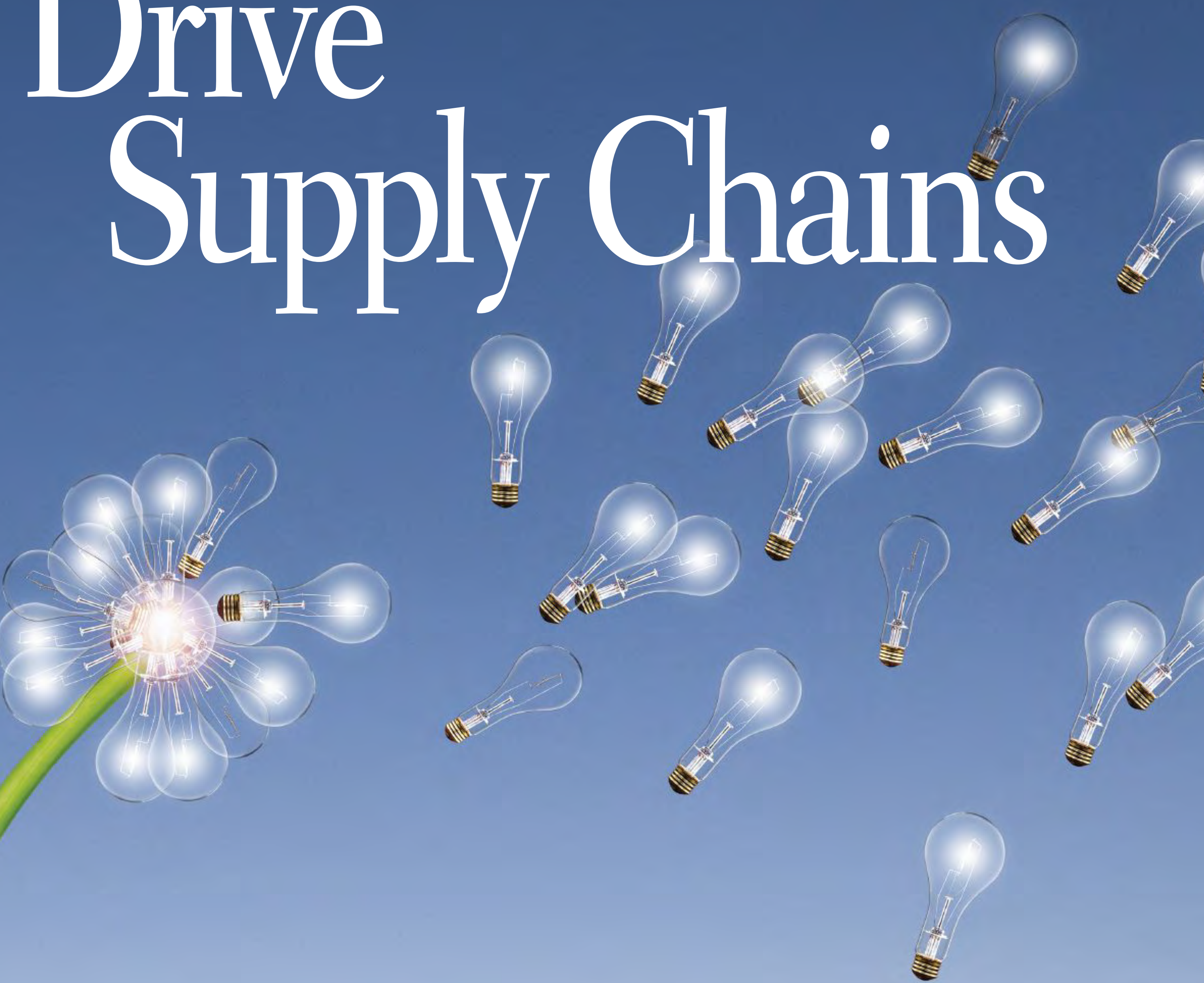
In its first annual industry report, MHI and Deloitte share what executives think about emerging innovations that could dramatically affect tomorrow's supply chains, and the barriers to adoption.

Drive Supply Chains



John Lund

their timeline is next day or even same day. Although many retailers now do a decent job on the front end handling orders through their various channels—retail, wholesale, and online—many are still struggling to adapt their back end fulfillment processes.

The survey also revealed two major barriers to development and adoption of supply chain innovations.

• **Talent shortage.** To capitalize on the latest innovations, companies need supply chain talent with the right skills, experience, and mindset: people with deep business and supply chain knowledge who are also willing and able to apply new tools and methods. Unfortunately, finding qualified workers is already at a crisis point with baby boomers starting to retire and a scarcity of younger workers to replace them. And with the supply chain field expected to add 1.4 million new jobs by 2018, the issue will likely only increase in intensity.

• **Continued focus on cost reduction.** Over 70 percent of respondents say that controlling costs is a top priority, making it the No.1 focus area for supply chain executives. However, this singular focus might now be working against them, choking off investment in essential innovations that are the key to long-term growth, performance, and efficiency. Although most respondents expect to increase their supply chain investments over the next three years, in many cases it will be just enough to get by and not nearly enough to drive disruptive innovation and competitive advantage.

Three emerging innovation areas are not yet top of mind for executives—but may be soon.

• **Sustainability.** Four out of five respondents say supply chain sustainability is at least moderately important. However, over 60 percent of respondents admit to significant capability gaps that may be preventing them from implementing and fully benefitting from sustainability initiatives. Leading companies are adopting a holistic approach as they start to recognize that sustainability is as much about increasing the value of their overall brand as it is about the ROI of individual projects.

• **Mobile and machine-to-machine (M2M) technologies.** Companies of all shapes and sizes are beginning to apply these technologies to their supply chains—but at this early stage the large majority (70 percent) report significant capability gaps. Looking ahead though, 73 percent of companies plan to continue investing in this area, and nearly half expect their investments to increase over the next three years.

• **3D Printing.** Additive Manufacturing—popularly known as "3D Printing"—is getting a lot of attention as a technology that could transform supply chains by localizing production and enabling just-in-time manufacturing. However, there is a big gap between future vision and current reality. According to our survey, only 17 percent of respondents view 3D Printing as a strategic priority, while 70 percent say they are not sure about its future impact. That being said, the technology has clear potential and companies should follow it closely and be prepared to invest quickly as the technology matures and additional applications become available.

Let's takes a closer look at each these strategic priorities, major barriers, and emerging innovation areas, and explore data-driven insights on how they are shaping supply chains of the future.

Strategic Priorities

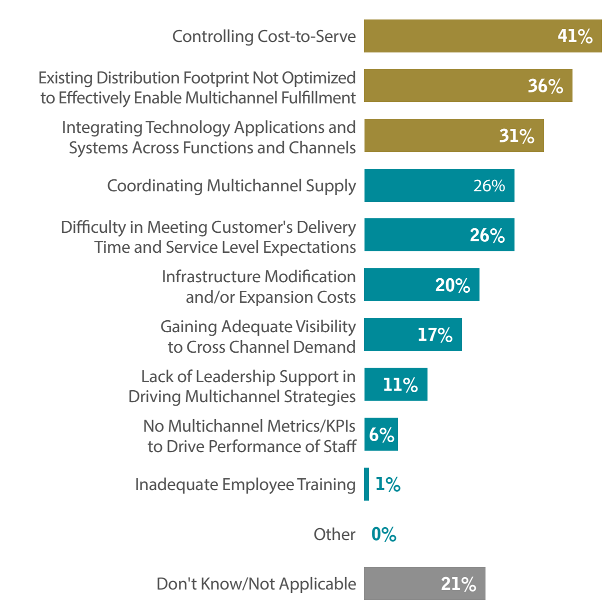
"A retail client I know is currently working on merging their e-commerce and retail distribution operations and moving toward one pool of inventory. Their biggest challenge is legacy systems. They have separate platforms for e-commerce and traditional retail and this limits what they can do in terms of one pool of inventory. I suspect that this is a concern for many other retailers, especially store-based retailers making the move to multi-channel." Britt Dayton, Director, Logistics and Distribution, Deloitte Consulting LLP

Strategic priority: Multi-channel fulfillment

Online fulfillment is the fastest growing segment in retail. In fact, some traditional retailers are actually

EXHIBIT 1

Multichannel Fulfillment Related Challenges



Source: MHI/Deloitte

seeing same-store sales decline while their online business is exploding. Many retailers now do a decent job on the front end handling orders through all of their various channels, but many have been slow to adapt their back-end fulfillment processes.

Trying to serve individual consumers with existing distribution networks that were designed for high-volume store replenishment is far from optimal. Likewise, trying to fill online orders using store inventory is also less than ideal, because many retailers run into practical issues such as having busy store associates struggle to locate items because they lack accurate visibility into store inventory.

The vast majority of retailers we surveyed (over 90 percent) plan to continue investing in multi-channel capabilities to serve both these needs, and 74 percent expect their investments to increase over the next three years. To support this growth, companies that provide the materials handling equipment and software to execute in a multi-channel environment expect a similar increase in their own investments.

Of course, even with adequate funding and investment, achieving the vision of multi-channel fulfillment is no easy task. According to the executives we surveyed, the top three challenges are:

1. controlling the cost-to-serve;
2. optimizing the distribution network footprint; and
3. integrating technology solutions and systems across functions and channels.

Emerging solutions range from distributed order management systems that allow fulfillment from multiple locations, to robotics in distribution, to fully integrated, highly automated fulfillment centers that can pick both brick-and-mortar store orders and individual consumer orders.

For many retailers, the ultimate goal is not just multi-channel fulfillment, but omni-channel fulfillment in which all channels are fully integrated and operate as a single unit. Such a shift will require flexible and agile supply chains that use innovative material handling equipment and processes such as wearable technology, driverless vehicles, and sensor gear. This type of equipment and technology could easily be adopted in the back room of stores—not just in distribution centers—which would have a dramatic impact on the traditional retail environment.

Distribution operations should move beyond flows that receive product and then slowly route it through various processes—from reserve to active to packing and shipping. In today's fast-paced retail environment, products must be able to flow freely from receiving to shipping at high velocity. Traditional wave picking may soon be replaced by wave-less operations that more closely resemble tidal waves in terms of volume and velocity.

A shift to omni-channel will likely not only require operational changes to the supply chain network, but also changes to how performance is measured and rewarded—with a shift away from individual store and channel metrics to a more enterprise-wide perspective.

Strategic Priority: Supply Chain Analytics

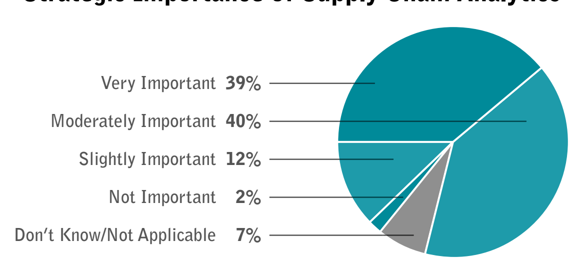
Possibly no other business area is changing faster than analytics. From big data and visualization to predictive modeling, analytics encompasses a rapidly evolving world of technologies and tools that are changing the face of supply chain management. Using the latest analytics tools and techniques, supply chains can harness data from a wide range of internal and external sources to produce breakthrough insights that help reduce costs and risk while improving operational agility and service quality.

The executives we surveyed view analytics as the top strategic priority for supply chains, with nearly 80 percent rating it as very important or moderately important. (See Exhibit 2.) Most also plan to increase their investments in this area. That's a good thing because our experience shows that at many companies the supply chain side of the house is a step or two behind the commercial side when it comes to tapping the full power of analytics. It is also important as supply chains become more expansive and complex. Analytics can help companies tame the complexity and unearth hidden value for the business.

For example, using visualization technologies, companies can now create "control towers" that provide proactive visibility into global events along the supply chain by portraying vast amounts of data visually to reveal insights into shipping patterns. This provides better insight into material flow, and enables trade lane

EXHIBIT 2

Strategic Importance of Supply Chain Analytics



Source: MHI/Deloitte

Finding qualified workers is already at a crisis point with Baby Boomers retiring and a dearth of younger workers to replace them. And with the supply chain field expected to add 1.4 million new jobs by 2018, the issue will only intensify.

managers to respond more quickly and holistically to unplanned events.

A convergence of forces is helping to expand the possibilities for supply chain analytics:

1. Data proliferation. The amount of data available for analysis—especially supply chain data—is growing quickly.

2. Cheaper data storage. From 2000 to 2008, storing a MB of data became 100 times less expensive.

3. Faster processing power. Processing speed has increased 256 times since 2000.

4. Anywhere, anytime connectivity. Mobile data is now available almost everywhere.

5. Better tools. Innovative tools make sophisticated analysis simpler and more cost effective.

6. Advanced visualization. New tools and techniques help show patterns in huge volumes of data.

Despite the advances in tools, companies should start by focusing on desired outcomes— specific supply chain areas that can dramatically benefit from analytics—and then work backwards to figure out what tools and data are needed to support those outcomes.

In our experience, logistics and S&OP are two of the leading places to begin because they can both benefit from the forward looking capabilities of analytics, as well as from the broader perspective provided by external data such as demographic trends and consumer buying patterns. Risk management is another prime opportunity area, for similar reasons. Analytics can also be a useful tool for reducing costs and improving efficiency—not simply to generate short-term savings, but also to support strategic decisions that can make a supply chain network more cost-efficient and agile over the long term.

Barriers to Innovation and Adoption

"Multiple factors are contributing to the talent shortage, including an aging workforce and the negative perception of manufacturing and supply chain jobs among the younger demographic. However, the biggest factor is the changing skill set required for today's supply chain jobs." George Prest, CEO of MHI

Barriers to Innovation and Adoption:

The Talent Shortage

The biggest single barrier to harnessing the value of supply chain innovations is a shortage of talent. In order to implement and capitalize on the latest supply chain innovations, companies need talent with the right skills, experience, and mindset: people with deep business and supply chain knowledge who are also willing and able to apply the latest tools and methods.

Unfortunately, the right kind of supply chain talent is extremely difficult to come by these days as companies look to fill jobs in traditional areas such as material handlings and logistics, while also looking for people with new skill sets such as contemporary information, technology, and systems. Finding qualified workers is already at a crisis point with Baby Boomers retiring and a dearth of younger workers to replace them. And with the supply chain field expected to add 1.4 million new jobs by 2018, the issue will only intensify.

For individual companies, the first step to addressing short- and long-term talent challenges is to develop comprehensive talent strategies. Companies should assess their current workforce and predict what the organization will need to look like in three to five years based on the pace of innovation and expected attrition. After that, they should identify the right kinds of talent to recruit or develop—taking into account the specific skills required to fill each gap area—and then identify the leading sources for that kind of talent.

A number of leading companies have begun to conduct formal skills assessments that combine quantitative skills testing with qualitative feedback—not to weed out weak performers, but to better understand the organization's gaps and future needs.

Other solutions include training older workers on the latest tools and innovations, as well as providing younger workers with mentoring and rotation programs to help them build experience more quickly. There may also be opportunities to shift older resources into new innovation areas that can benefit from their experience.

In highly specialized areas such as analytics, a team approach to talent is proving to be more practical than holding out for individuals with the full mix of leading-edge technical knowledge and deep business experience. According to a recent Deloitte report, "Analytics Trends 2014," more and more companies are "mixing and matching professionals to deliver a balanced response to business analytics questions."

Recruiting and developing the right kind of talent will likely require an incremental investment, which is something many companies are reluctant to do given the constant pressure to cut costs. However, the investment will likely pay for itself many times over by enabling a company to capitalize on innovations that can take its supply chain performance to the next level.

Barriers to Innovation and Adoption: Cost Reduction

Our study showed that cost reduction is still the No. 1 concern for many supply chain executives. Over 70 percent of respondents across industries say that controlling costs is a top priority. However, that singular focus might now be working against them, limiting investment in essential innovations that are key to long-term growth, performance, and efficiency.

At the same time, companies appear to be undervaluing the strategic importance of investing in new technology areas such as supply chain analytics—and critical capabilities such as supply chain agility and multi-channel fulfillment could be getting lost in the shuffle. If a focus on cost reduction prevents a company from adequately investing time, money, and effort in other critical areas, it may soon find itself in a downward spiral of declining performance and competitiveness relative to other companies in its industry.

Over two-thirds of the companies surveyed expect their supply chain investments to increase over the next three years; however, in many cases those investments will be just enough to get by and not nearly enough to drive disruptive innovation and competitive advantage.

Commitment to supply chain investments seems to be highest among retail and wholesale and transportation and warehousing companies, with close to 75 percent of companies from these sectors expecting to increase their supply chain investments, and almost 95 percent expecting to at least maintain their current levels of investment.

Emerging Innovation

"A focus on cost without an appreciation for environmental impact, resource availability, and social factors exposes supply chains and brands to increased risk. Best-in-class supply chains and major brands have made measuring green efforts one of their top priorities. And they're seeing significant positive environmental and bottom line impacts." George Prest, CEO of MHI

Emerging Innovation: Sustainability

In our survey, four out of five respondents say sustainability is at least a moderately important supply chain initiative. Transportation and warehousing, consumer products, and retail industry respondents are leading the way, and are more likely to have company-wide programs to reduce environmental impacts. Also, they are more likely to use alternative sources of energy, track the impact of their programs, and have a clear ownership and governance process.

Manufacturers and retailers are looking to reduce supply chain waste through more fuel-efficient vehicles, optimized packaging, and greater use of renewable energy sources. Materials handling companies are designing equipment to meet these needs.

However, over 60 percent of respondents admit that significant capability gaps exist at their companies, customers, and clients that may be preventing them from implementing and fully benefitting from sustainability initiatives.

According to our survey, the two top barriers to implementing supply chain sustainability initiatives center around cost. The first barrier is the traditional and continued focus on cost reduction, which diverts time, attention, and resources away from sustainability. The second barrier is the actual cost of implementing sustainability initiatives.

Over two-thirds of the companies surveyed expect their supply chain investments to increase over the next three years; however, in many cases those investments will be just enough to get by and not nearly enough to drive disruptive innovation and competitive advantage.

A third major barrier for the companies we surveyed is the inability to measure benefits of sustainability initiatives. And while it's true that many of the benefits associated with sustainability can be difficult to quantify, in our experience the tangible cost savings and operational efficiencies resulting from sustainability initiatives are in and of themselves generally more than sufficient to justify the investment—meaning that the important intangible benefits are essentially a free bonus. Sustainability initiatives and the resulting benefits typically have a very direct tie to cost savings. Also, it's relatively easy to do the math and calculate the savings associated with reducing greenhouse gas emissions savings.

Our experience shows that companies on the leading edge of supply chain sustainability actually think about the issue differently today than they did several years ago. Before the global recession, sustainability was an emerging hot topic as companies began to realize that pursuing efficiencies in supply chain could also produce environmental benefits; however, the focus back then tended to be on sustainability initiatives as individual projects.

Now, leading companies are starting to recognize that sustainability is as much about increasing the value of their overall brand as it is about the ROI of an individual project. These organizations are finding that capturing and maintaining customer and consumer loyalty through sustainability initiatives can help improve performance on the top line as well as the bottom line. At the same time, a growing number of large, sustainability-conscious companies are asking their logistics providers to report data on fuel use and GHG emissions, which can also have a positive ripple effect on sustainability.

A well-defined business case that shows the positive trade-off between short-term profitability and long-term brand and shareholder value can go a long way in motivating companies to make their supply chains more sustainable.

Emerging Innovation: Mobility and Machine-to-Machine Technology

Mobility and machine-to-machine technology (M2M) are emerging as key supply chain enablers. Mobility and M2M can improve responsiveness and customer service by providing supply chain workforces with the information they need—whenever and wherever they need it.

Some of the associated technologies have been around for a while (e.g., bar coding, image scanning, voice data collection, and RFID). However, until recently their use was often limited to companies at the leading edge of supply chain innovation. Now, our study shows that M2M and mobile supply chain applications are becoming increasingly common at companies of every shape and size. What's more, as the ecosystems mature, implementing the technologies and their associated applications will likely become more cost effective—further driving adoption.

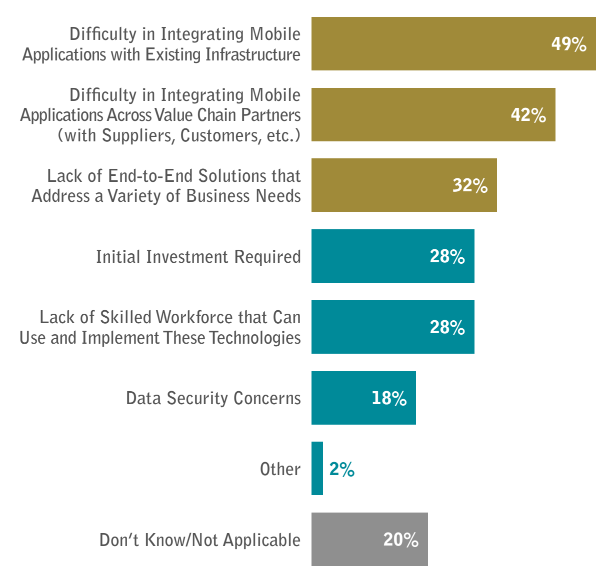
Many companies are starting to view this as a strategic issue, with over half of our respondents rating supply chain mobility and adoption of M2M technologies as very important or moderately important. Primary focus areas include warehouse operations, inventory management, and transportation.

Because mobile and M2M technologies are still in the early stages of supply chain adoption, it's not surprising that roughly 70 percent of respondents currently suffer from significant capability gaps that are preventing them from fully capturing the benefits of this innovation. However, 73 percent of companies plan to continue investing in this area, and nearly half expect their investments to increase over the next three years.

Companies are also investing in related talent. Many respondents say they plan to implement mobile and M2M training programs for their supply chain workforce. And in the retail and wholesale, transportation and warehousing, and CPG sectors, nearly 20 percent of companies plan to supplement their training initiatives

EXHIBIT 3

Challenges in Implementing Mobile Capabilities and M2M Technologies



Source: MHI/Deloitte

with external hiring to bring more mobile savvy talent into the organization.

According to our survey, the biggest challenges are integrating mobile applications with existing infrastructure and across value chain partners. (See Exhibit 3.) Many existing applications were developed for specific uses and do not provide integrated end-to-end solutions that would help drive adoption. However, integration is a common challenge for emerging technologies and is likely to be addressed over time as the ecosystem matures and application providers improve their offerings. Looking ahead, it is likely mobile and M2M technologies will produce their greatest value when combined with business analytics. This powerful combination has the potential to enable real-time decision making and deliver major breakthroughs that could make supply chains far more dynamic and efficient.

Emerging Innovation: 3D Printing

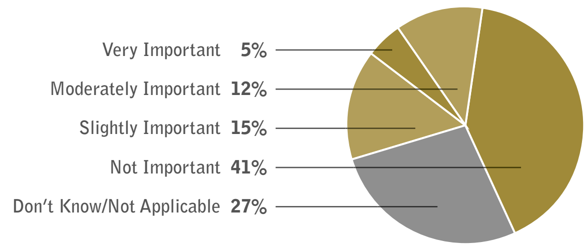
Additive Manufacturing—popularly known as "3D Printing"—is getting a lot of attention as an innovative technology that could revolutionize production processes and have far reaching future implications for product supply chains. It involves manufacturing or "printing" a three-dimensional object using a computer-controlled laser that melts plastics or alloys according to a digital blueprint.

Many industry watchers are already talking about a future where 3D Printing could localize production and improve supply chain efficiencies by reducing waste and enabling just-in-time manufacturing. However, there is a big gap between the future vision and how executives in our study view the immediate potential for this innovation. According to the survey results, only 17 percent of respondents view 3D Printing as a strategic priority, while 70 percent say it is not a key consideration and they are unsure about its future impact. (See Exhibit 4)

Many experts and analysts are excited about the future of 3D printing. However, most business executives in our survey are not yet convinced it will have a significant impact on supply chains in the near to medium term. That being said, companies should keep a close eye on this rapidly evolving technology and prepare to invest quickly when the technology matures and additional practical applications become available.

EXHIBIT 4

Strategic Importance of 3D Printing



Source: MHI/Deloitte

Overcoming Challenges

The strategic priorities, barriers, and emerging innovations highlighted by our survey are the forces shaping supply chains of the future, and they have significant implications for how companies design and manage their supply chains. The executives we surveyed clearly recognize the strategic importance of supply chain innovation, yet they also acknowledge the challenges in getting these innovations approved and adopted within their organizations.

Overcoming these challenges will not be easy. Companies will need to develop comprehensive talent strategies that not only assess the current workforce, but anticipate what the organization's needs will be in three to five years given the rapid pace of innovation.

Moreover, they will need to develop a holistic approach to supply chain innovations, treating them as integral parts of a comprehensive program, rather than focusing on the ROI of individual initiatives. This is truly a case where the whole is greater than the sum of its parts.

Most important, supply chain executives should find ways to communicate the value and impact of innovation on financial performance. Companies that fail to invest in and harness supply chain innovation could find themselves struggling to compete in an increasingly demanding marketplace.

The Road to Contract Manufacturing Success

The chasm between outsourcing expectations and results can be wide. A new study sheds light on how manufacturers can close that gap.

By Patrick Van den Bossche, Rajeev Prabhakar, Kevin Phillippi, and Joe Blount

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"Make vs. Buy" continues to be one of the most strategic decisions manufacturing companies can make in this day and age. Whether the motivations to outsource manufacturing are bottom-line focused, capital driven, or intended to improve the top-line, discussions with many companies across a range of industries indicate that manufacturing outsourcing is often falling short of expectations. A recent A.T. Kearney survey sheds some light on why there is still a sizeable gap between strategic intent and operational execution and how that gap can be closed.

Outsourcing Manufacturing

Companies have been outsourcing their manufacturing operations for a variety of reasons and across the ebb and flow of the economy. In bad economic times, reasons quoted are often lowering costs, shifting from fixed costs to variable costs, or transitioning products that are end-of-life away from prime internal assets.

When the economic tide is turning, reduced capital investment needed to alleviate capacity constraints, less working capital needed, and increased flexibility are the main drivers for outsourcing. And when times are good and growth is on the strategic agenda, companies often turn to contract manufacturing to provide them with faster speed-to-market, quick access to new markets, and improved customer responsiveness. Increasingly, we even see companies leveraging their contract manufacturers' design and development capabilities as well as their expertise in specialized manufacturing processes to jointly pursue process and even product innovation.

But as companies increase their use of contract manufacturers, they also become more dependent on these third parties to achieve strong supply chain performance, improve their cost position, and drive innovation. So the selection, contracting, and, especially, the ongoing management of the supplier relationship is becoming increasingly important. Our survey indicates that companies typically focus more on the up front aspects of outsourcing their manufacturing operations (for example, developing the strategic decision framework for evaluating the outsourcing option and for selecting the right suppliers).

The execution aspects of managing outsourcing, such as managing supplier relationships and developing the right organizational structure to manage the contract manufacturing base, are not as strong an area of focus. However, to maintain strong performance in supply chains with significant third-party involvement, it is imperative that companies turn managing contract manufacturers effectively and efficiently into a core competency.

What We're Doing Right

The A.T. Kearney survey shows that companies get many things right. They spend a lot of effort setting up their outsourcing strategy: 69 percent of respondents reported a well defined strategic approach to outsourcing that was followed consistently. An even greater majority (77 percent) reported that, over the years, they have developed deep insights into the supply market for relevant manufacturing processes. Most companies also focus greatly on managing the most obvious pitfalls of contract manufacturing: More than three-quarters of respondents claim to have strong practices to manage product quality and protect their intellectual property.

On the opportunity side, our survey and client experiences indicate that most companies do not segment their contract manufacturing base effectively and do not distinguish how they manage relationships across their supplier spectrum. If supplier segmentation is practiced, it's usually done based on the size of the spend or triggered by a recent history of issues, as opposed to being based on short and long-term strategic value of contract manufacturers. Along the same lines, the approaches to performance management also don't differentiate between suppliers and focus primarily on the basics—cost, quality, and service. The degree of focus on performance of suppliers is also usually a function of size of spend and history of performance issues.

The operating model is not sufficiently distinguished by the criticality of the products or processes that are outsourced and the capabilities of the contract manufacturers, thus likely sub-optimizing the use of resources that are involved with managing the contract manufacturing base. Other areas that indicated some weaknesses were the lack of solid processes for transition to and integration of the contract manufacturers and the overall maturity of the part of the organization that handled contract manufacturing, with roughly half of the respondents rating themselves at the "emerging practice" stage. And even though a majority of companies in our survey (53 percent) indicated that they were open to supplier-driven innovation, they usually lacked a formalized process to integrate the innovation with their own R&D-driven efforts.

Leveraging Supplier Relationship Management

Those gaps indicate that Supplier Relationship Management (SRM), a concept that is increasingly applied by procurement departments of companies across industries, is under-leveraged when it comes to contract manufacturing suppliers. The key to successful management of supplier relationships is to understand the value each supplier brings to the short- and long-term success of the company. Suppliers are segmented based on that value and each segment is managed differently.

Supplier performance is managed, not just on the basics, but using additional metrics to monitor progress on all aspects of value that the supplier relationship is expected to generate. Leading companies don't just expect the contract manufacturers in their most strategic segments to meet their needs. They work collaboratively and transparently to ensure that they are equipped to handle demand variations, have supply continuity plans in place, and are actively engaged in continuous improvement efforts and even in joint innovation initiatives. They create strong relationships with their strategic suppliers, for example, by having peer-to-peer relationships at multiple levels, sharing their overall strategic plans with those suppliers (to the extent it pertains to them), and expecting them to develop their own plans that align with those strategic plans.

Leading companies also use contracts to align the strategic contract manufacturers with the company's objectives, push them to bring new ideas, and hold them accountable for results by using options such as fee-at-risk and incentive-based pricing models. They put the onus on contract manufacturers to be innovative and make sure that their suppliers have the freedom to do so by not overprescribing the requirements.

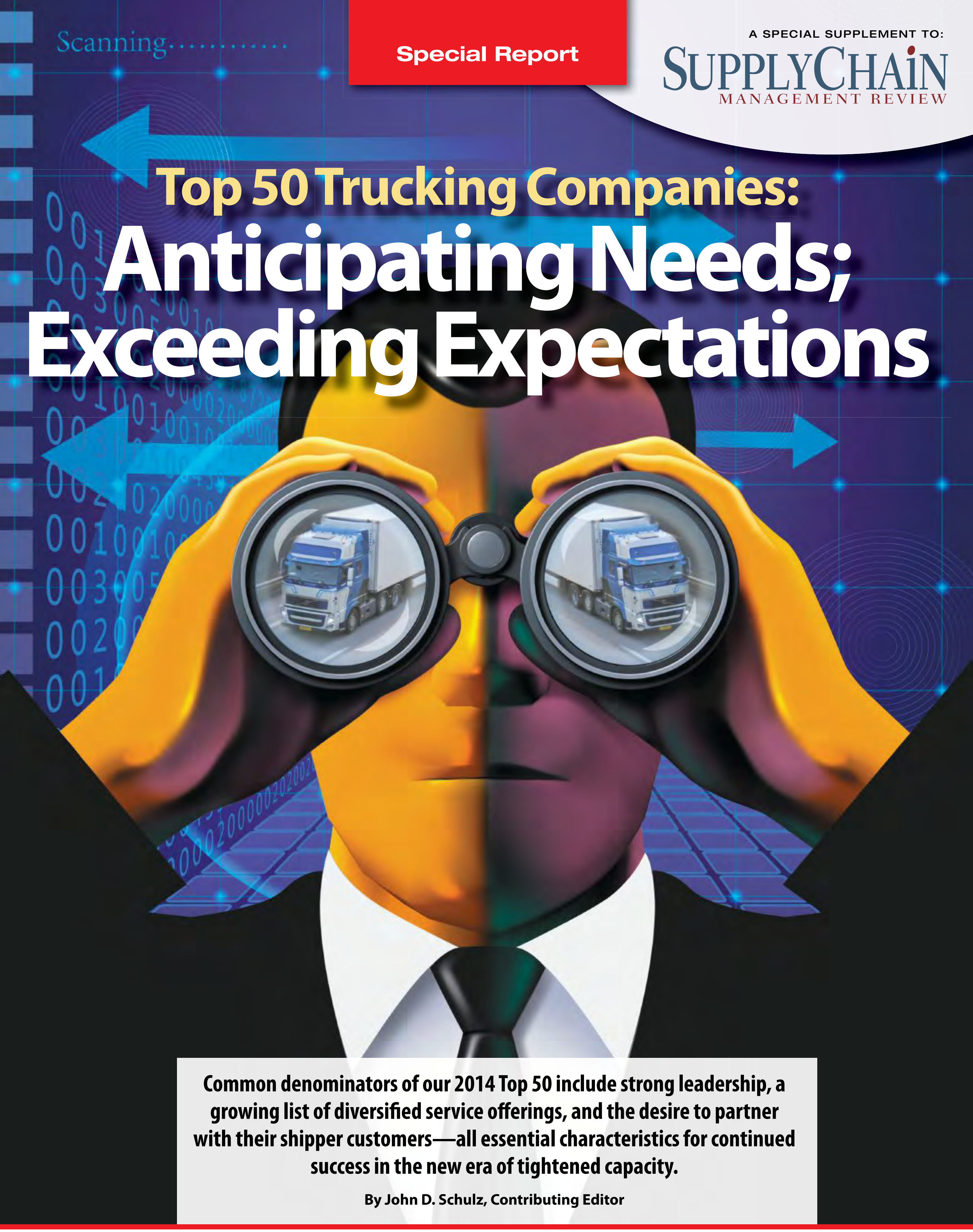
Some have even created a virtual platform to allow suppliers to share breakthrough ideas with one another and feed off of each other to drive innovation. Companies that successfully practice SRM also invest time in developing an in-depth understanding of their suppliers' capabilities that enables them to execute supplier management in an operating model where they focus on the most critical outsourced products or on those suppliers that need the most help, while allowing more capable suppliers to take the lead in managing the relationship. They can then shape their contract manufacturing management organization to be aligned with that operating model and make better use of those resources.

Closing the Gap

From the survey, it became obvious that closing the gap between strategic intent and the day-to-day reality requires that companies looking to outsource manufacturing operations should, first and foremost, have an objective and a consistent make vs. buy decision process—linked to their business and supply chain strategy—that should periodically be revisited. They also need a robust supplier selection and contracting process, followed by an effective integration process and an ongoing management routine that leverages the best practices from SRM. This will lead these companies to put in place the appropriate organizational structure, with clear roles and responsibilities that can ultimately be held responsible, with confidence, to meet and even exceed the expectations and objectives that the organization has placed upon their contract manufacturers.

A SPECIAL SUPPLEMENT TO:
SUPPLYCHAIN
MANAGEMENT REVIEW

Top 50 Trucking Companies: Anticipating Needs; Exceeding Expectations



Common denominators of our 2014 Top 50 include strong leadership, a growing list of diversified service offerings, and the desire to partner with their shipper customers—all essential characteristics for continued success in the new era of tightened capacity.

By John D. Schulz, Contributing Editor

Some are full truckload (TL) carriers operating from Point A to Point B as quickly and efficiently as possible. Others are less-than-truckload (LTL) operators handling partial shipments to literally hundreds of thousands of customers each day. And still others are providing a plethora of services as they seek to become the final, vital portion of a shipper's complex supply chain.

SCMR sister magazine, *Logistics Management*'s 2014 roster of the nation's Top 50 trucking companies have some common denominators: All have excellent top management teams with a vision for the future, keeping a sound eye on what shippers will be asking for next; most have modern fleets of trucks; and the best are becoming a vital partner, able to streamline all transportation needs.

"I would say that some are morphing into supply chain optimizers for their customers," says John Larkin, the veteran trucking analyst for investment firm Stifel Inc. "They're offering or plan to offer all the services a customer may need to run an efficient supply chain operation."

No matter what the specific service is—TL, LTL, truck brokerage, intermodal, dedicated, or international to Mexico and Canada—these leaders all focus on the day-to-day "blocking and tackling" in the execution of their services.

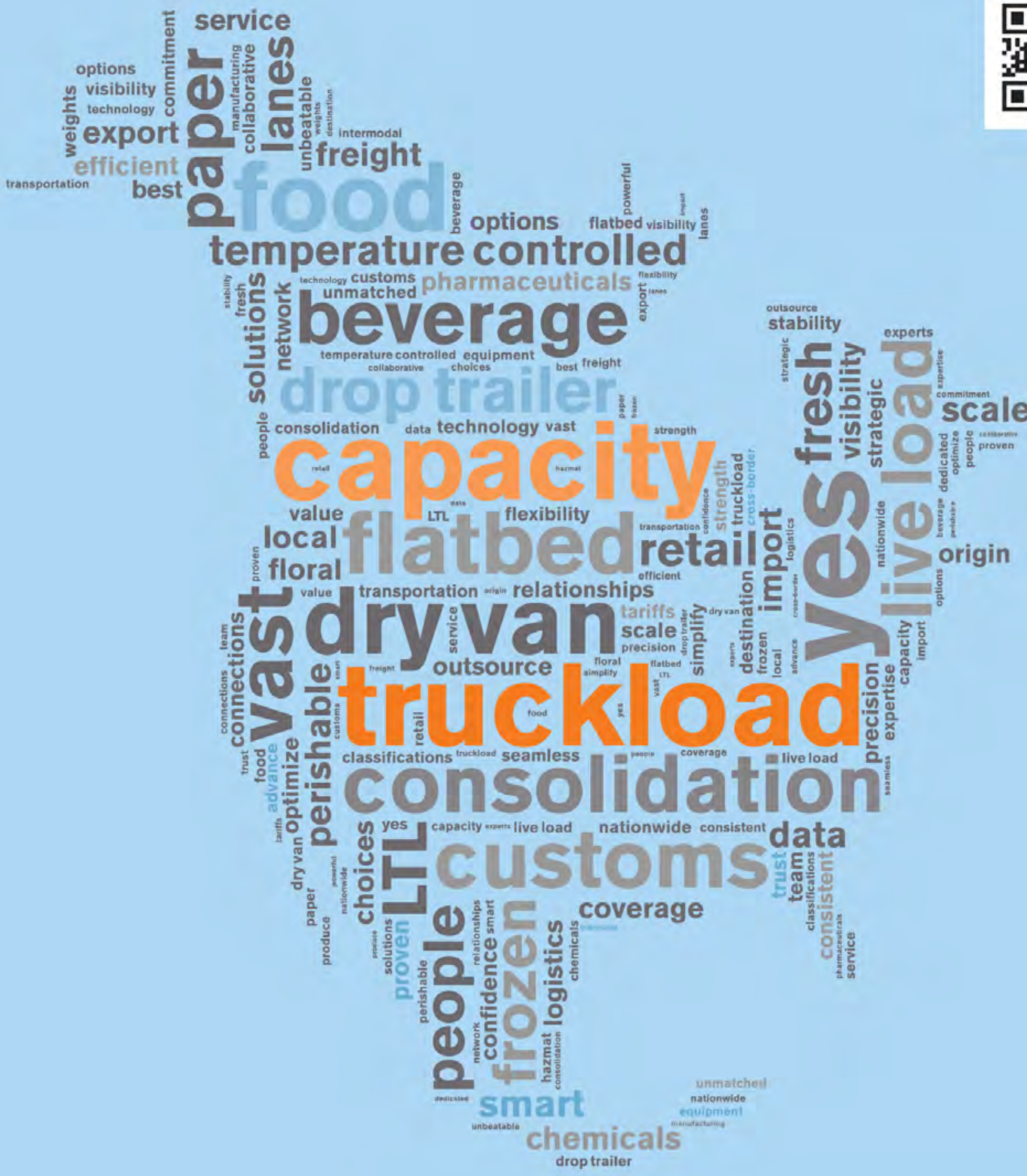
According to Larkin, it's the combination of vision and execution on the ground that separates the best from the rest. "Others are inclined to be the best operators they can be by focusing on service and cost," says Larkin. "Sometimes they offer complimentary services to help some customers, but they shy away from endeavoring to be all things to all people."

Pitt Ohio (No. 17 LTL), A. Duie Pyle (No. 19

Top 25 less-than-truckload carriers: 2012-2013 revenues
(including fuel surcharges)

2013 Rank	Carrier name	2012 revenue ($ million)	2013 revenue ($ million)	Year-to-year % change
1	FedEx Freight	$5,011	$5,095	1.7%
2	Con-way Freight	$3,393	$3,466	2.2%
3	YRC Freight	$3,187	$3,127	-1.9%
4	UPS Freight	$2,378	$2,502	5.2%
5	Old Dominion Freight Line	$1,942	$2,126	9.5%
6	Estes Express Lines	$1,751	$1,835	4.8%
7	YRC Regional	$1,641	$1,730	5.4%
8	ABF Freight System	$1,669	$1,721	3.1%
9	R+L Carriers*	$1,250	$1,298	3.8%
10	Saia Motor Freight Line	$1,099	$1,139	3.7%
11	Southeastern Freight Lines*	$875	$914	4.5%
12	Averitt Express	$579	$606	4.6%
13	Roadrunner Transportation	$511	$559	9.4%
14	AAA Cooper	$465	$500	7.5%
15	Central Transport Intl.	$380	$488	28.4%
16	Dayton Freight Lines*	$353	$386	9.4%
17	Pitt Ohio Express	$327	$362	10.9%
18	New England Motor Freight	$351	$358	2.0%
19	A. Duie Pyle*	$286	$293	2.4%
20	Central Freight Lines*	$202	$208	3.0%
21	Daylight Transport	$169	$183	8.6%
22	Oak Harbor Freight Lines	$156	$168	7.9%
23	Wilson Trucking	$150	$156	3.6%
24	New Century Transportation	$151	$145	-4.5%
25	Ward Trucking	$128	$140	9.8%
	Total Top 25 LTL carriers	**$28,401**	**$29,504**	**3.9%**

Note: Revenue for LTL operations only, unless otherwise indicated and include Canadian operations
*Revenues primarily LTL and include less than 10 percent for truckload and other services
Source: Company reports and SJ Consulting Group estimates



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Special Report

Top 25 truckload carriers: 2012-2013 revenues
(including fuel surcharges)

2013 Rank	Carrier name	2012 revenue ($ million)	2013 revenue ($ million)	Year-to-year % change
1	Swift Transportation	$3,007	$3,052	1.5%
2	Schneider National	$2,290	$2,320	1.3%
3	Werner Enterprises	$1,686	$1,642	-2.6%
4	J.B. Hunt Transport Services	$1,563	$1,622	3.8%
5	Landstar System*	$1,680	$1,606	-4.4%
6	U.S. Xpress Enterprises	$1,630	$1,480	-9.2%
7	Prime**	$1,372	$1,478	7.7%
8	C.R. England	$1,071	$1,203	12.3%
9	CRST International	$1,061	$1,071	0.8%
10	Crete Carrier Corp.**	$999	$1,008	0.9%
12	Knight Transportation	$862	$822	-4.6%
11	Cardinal / Greatwide Logistics	$900	$780	-13.3%
13	Ruan Transportation Management Services	$708	$735	3.9%
14	Ryder Systems	$665	$709	6.6%
15	Covenant Transport	$640	$634	-1.0%
16	Con-way Truckload	$636	$630	-0.8%
17	Stevens Transport	$609	$621	2.0%
18	Celadon Group**	$551	$601	9.2%
19	Heartland Express	$546	$582	6.7%
20	Anderson Trucking Service	$668	$567	-15.1%
21	Central Refrigerated Service	$485	$534	10.2%
22	Universal Truckload Services*	$465	$533	14.6%
23	NFI Industries	$460	$512	11.3%
24	Marten Transport	$483	$507	5.0%
25	Mercer Transportation*	$492	$483	-1.8%
	Total Top 25 truckload carriers	**$25,527**	**$25,732**	**0.8%**

* Light-Asset Carrier
** Results adjusted to closer resemble calendar year
Revenues primarily for truckload operations and may include less than 10 percent for non-truckload services
Source: Company Reports and SJ Consulting Group estimates

LTL), Stevens Transport (No. 17 TL), Heartland Express (No. 19 TL), as well as smaller carriers Raven Transport and Cowan, have all tweaked their operations in recent years to expand services from their original offerings.

James Welch, CEO of YRC Worldwide (parent of long-haul YRC Freight, No 3 LTL, and YRC Regional, No. 7 LTL) says the best carriers are not just cost competitive, but efficient and consistent in their overall offerings. "We seek to provide competitive and consistent service," says Welch. "Shippers tell us they need their carriers consistent."

The best are also conscious of their position in the industry and are willing to take a leadership role. "We push ourselves to be much more than just a good service carrier," says Chuck Hammel, president of Pitt Ohio. "We feel every aspect of doing business is as important as service. We make our customers, employees, and our community feel that they have a trusted partner in us."

Now let's delve deeper into the inner-workings of the *2014 Top 50 Trucking* list and see what moves the top players are making to maintain the delicate balance of providing leading service while delivering strong results on the bottom line.

How They Stay on Top

Trucking is a capital- and labor-intensive business. Between labor and rolling stock, carrier executives say that nearly 70 percent of all revenue gets eaten up immediately.

Throw in fuel, insurance—both liability and healthcare for employees—and debt service, and that percentage rises to nearly 85 percent. So even the best and

most profitable carriers are running rather thin profit margins compared to railroads and other industries.

Larkin says that the most important things carriers can do to stay on top in this brutal operating environment is to price their services properly, maximize equipment utilization and productivity, proactively manage safety, recruit and retain high-quality drivers, manage driver turnover, maximize fuel efficiency, trade in rolling stock regularly, and avoid an over-leveraged balance sheet. That, of course, is easier said than done.

"The most important thing is pricing properly," says Larkin. "Without that, all cost and efficiency measures are for naught."

Myron "Mike" Shevell, chairman of the Shevell Group (parent of Northeast Regional giant NEMF, No. 18 LTL) who's been in trucking for more than 60 years, heartily agrees with Larkin's assessment. "There's so much discounting going on, it's crazy," he says. "Everything we buy has been going up—equipment, fuel, insurance, driver pay, terminals—but some guys insist on cutting rates. If this keeps up, we're going to end up like the airlines, with one or two carriers dominating every region. You have to recapitalize and invest to stay in business."

The profit leader in the LTL sector is Old Dominion Freight Line (No. 5 LTL). While not immune to rising health care costs and difficult winter operating conditions, ODFL still posted an impressive 87 operating ratio (OR) with 10.9 percent year-over-year tonnage growth in the fourth quarter of 2013.

Even so, ODFL is not standing still. It is making significant IT investments, including a three-year to five-year project of expanding and enhancing its technology platform and getting a new mainframe to position the company for another doubling of capacity over the next 10 years.

TL carrier U.S. Xpress (No. 6 TL) takes great pride that its fleet of 6,000 tractors and 16,500 trailers is among the youngest in the industry, with power units averaging less than four years old. "We routinely recapitalize our fleet assets in order to provide our customers one of the safest and most efficient TL fleets on the road today," says Todd Davis, USX senior director of pricing and marketing.

And it's not just in rolling stock. "Just as we are investing in our physical assets, we are also investing in our human assets," Davis adds. "We are undertaking a company-wide Lean Six Sigma training program to further improve quality and efficiency."

In that category, USX joins Con-way (No. 2 LTL and No. 16 TL) in embracing Lean Six Sigma. Con-way formally began its continuous improvement process about six years ago. According to Doug Stotlar, president and CEO of parent Con-way Inc., it is a process, not an event. In fact, its third party logistics unit, Menlo Worldwide Logistics, has been a leader in Lean for nearly a decade, Stotlar adds.

"The past two years have seen these continuous improvement practices roll into our trucking operations, which we believe will drive efficiencies and more fully engage employees in the business," says Stotlar. "Our focus is now on becoming a world-class safety organization."

Stotlar says that Con-way has invested in advanced onboard safety technologies, while changing its approach to safety. "We are focused on going beyond the traditional rules-based safety program to developing a true, high-performing safety culture."

Even the best and most profitable carriers are running rather thin profit margins compared to railroads and other industries.

According to Hammel, "Pitt Ohio continually invests in technology to become more efficient and to understand our customers better. We know which customers work well for us in certain lanes and which customers don't. We're also investing in back office functions to keep our costs low and our service high."

Pitt Ohio enjoyed 10.9 percent jump in revenue last year, the largest organic revenue increase of any LTL carrier, according SJ Consulting, *Logistics Management's* partner in producing the annual Top 50 Trucking list.

Hammel says that jump is partially due to Pitt Ohio's solid relationship with third-party logistics providers (3PLs), which increasingly control an ever-larger share of freight. "From a go-to-market standpoint, we have embraced 3PLs as a valued sales channel," Hammel explains. "Many carriers see them as competition, but we see them as an efficient way of onboarding new business at a fair price."

Another innovation is the formation of new creative services on the ground. Pitt Ohio and Averitt Express (No. 12 LTL) have teamed with a handful of other traditionally regional LTL carriers to form the "Reliance Network," which allows for longer-haul, national coverage.

Averitt also introduced "PortSide" services in response to the near-shoring trend in manufacturing. This provides shippers with one-stop shopping for transloading, drayage, inland transportation management for road and rail, distribution and consolidation, as well as warehousing and other services.

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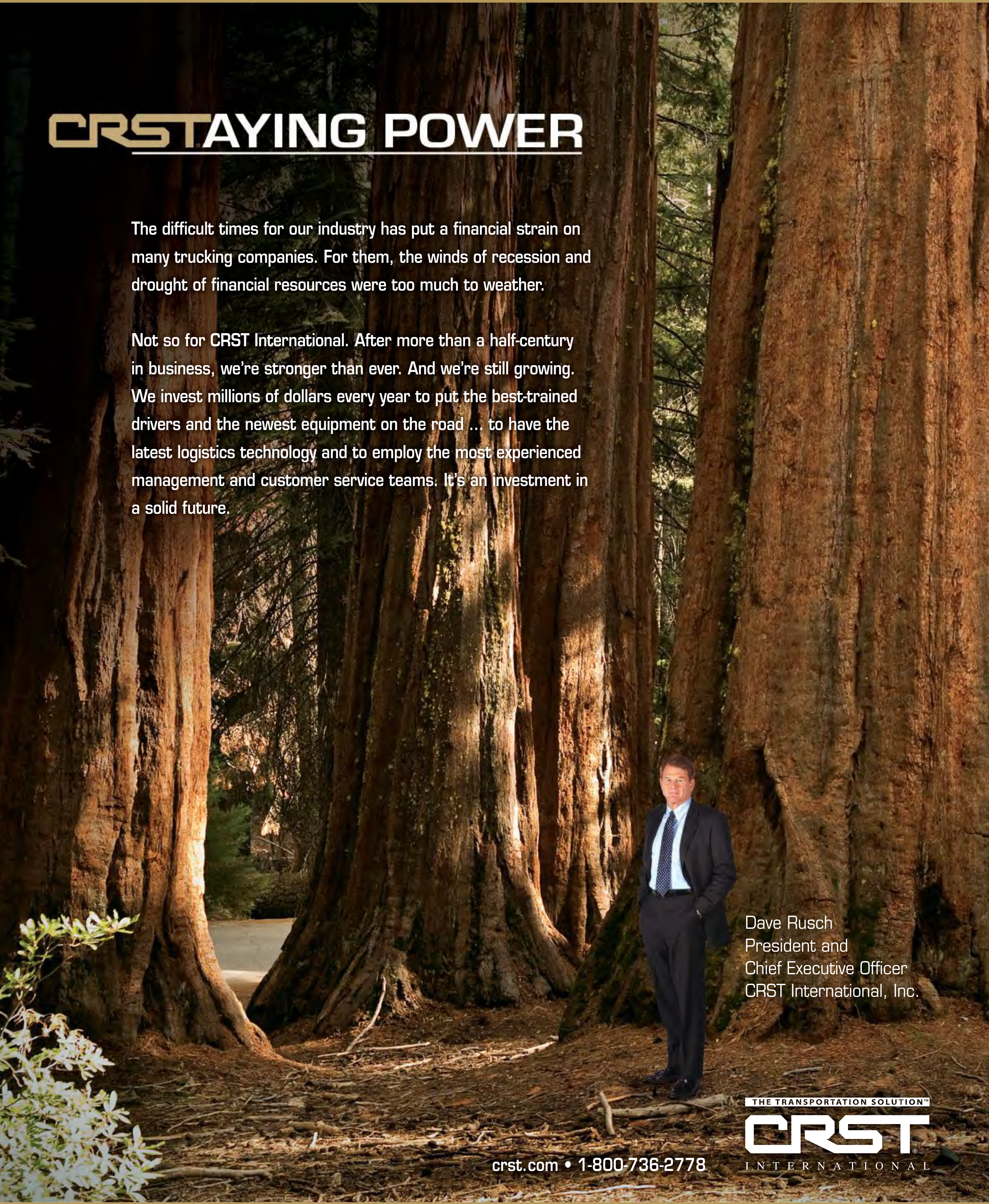

CRST – THE TRANSPORTATION SOLUTION

Information services is another differentiator for the Top 50 carriers. Besides moving boxes and pallet loads of freight consistently, YRC's Welch says that there is a new demand to provide timely and reliable information about where those boxes and pallets are.

Race for Drivers

Besides offering new services, chasing freight, and trying to keep their customers happy, all truckers face the prospect of coping with $4-per-gallon diesel, increasingly costly government regulations, greater capital expenditures for rolling stock, information technology investments, and higher driver pay.

Of all those cost, perhaps the driver situation is the most vital. Very few fleets are expanding significantly, mostly because they don't have the additional supply of drivers. "The truckload driver shortage is as severe as ever," Larkin says. "Finding drug free, CSA compliant drivers remains a challenge, despite commendable efforts on the part of many carriers."

Some carriers are turning to military veterans returning from Iraq and Afghanistan as a partial solution. Con-way, for instance, actively recruits from the military and already has 2,500 ex-military working at its various units. Con-way Truckload has a goal of hiring 500 drivers this year who are veterans.

Driver retention has always been challenging, says Phil Pierce, executive vice president of sales and marketing for Averitt Express. He says Averitt hires only 2 percent to 3 percent of all driver applicants, utilizing one of the most selective hiring practices in the industry.

Once drivers are behind the wheel, they must try to use best driving practices to conserve fuel and lower a fleet's operating costs. Some carriers are using the carrot—rather than the stick—approach. Pierce says Averitt drivers have been rewarded with thousands of dollars in gift cards, a new Mercedes Smartcar, and a Ford F-150 pickup truck.

The Rate Effect

Trucking rates in 2014 will largely be determined by which type of trucking service is desired, capacity restraints in that area at any given time, the cost of fuel, geographic lane, the carrier's lane balance and freight density, and the ascent of the U.S. economic recovery.

Perhaps most importantly, contract rate increases will depend on a shipper's particular relationships with their carriers. Factors such as freight volumes, lanes, ease of delivery/drop-offs, and percentage of "driver friendly" freight tendered play a huge part, carrier executives say, when it comes to contract renewal time.

However, in talking with analysts and industry executives, and taking all the operational challenges into consideration, the following ballpark estimates of rate increases can be expected in 2014: dry van TL freight may see 1 percent to 3 percent rate hikes (net of fuel surcharges); temperature-controlled TL carriers perhaps 3 percent to 5 percent; and LTL rate hikes in the 3 percent range, but perhaps higher in some lanes with tighter capacity.

"Capacity is currently at a premium, and it looks as though it will stay that way for a long time," Pitt Ohio's Hammel says. "Rates certainly will go up, as they have been, for the foreseeable future."

Of course, geographic lanes and shippers' individual freight characteristics will largely determine precise increases. An increasing number of carriers, including Pitt Ohio and Con-way, are eschewing large announced general rate increases (GRIs) in favor of working individually with customers.

"Capacity is currently at a premium, and it looks as though it will stay that way for a long time. Rates certainly will go up, as they have been, for the foreseeable future."

—Chuck Hammel, president, Pitt Ohio

"Rates and capacity are always linked and are often driven by fluctuations in the market," Averitt's Pierce says. "Our philosophy is to position ourselves for as many contingencies as possible."

Con-way's Stotlar adds that savvy shippers are aligning themselves with carriers as "strategic partners," working collaboratively to make both sides better. "It's not a pure rate play," he says. "It's understanding the value of service and having capacity where and when you need it. Those shippers who demonstrate true partnerships and can work toward continuous improvement for both sides are the ones who will fare best in a tightening market."

On the truckload side, USX's Davis says that his company has been "up front" with shippers on the double whammies of the tightening driver supply and increasing cost of compliance with government regulations. "We primarily seek to improve network velocity, density, and eliminate deadhead," Davis says. "Then we review the rate to ensure all aspects are being adequately addressed."

The bottom line for shippers: They can help mitigate inevitable rate hikes by working collaboratively with the best in the industry.

—John D. Schulz is a Contributing Editor to SCMR

MODEX 2014
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A SPECIAL SUPPLEMENT TO SUPPLYCHAIN MANAGEMENT REVIEW

Show WrapUp

By Supply Chain Group Staff, Peerless Media

George Prest, CEO of MHI; John Paxton, president of MHI; and Laurent Noel, VP of transportation and logistics for Reed Expositions, at the show's opening.

Modex 2014 in Review

With more than 800 exhibits, 150 show floor seminars, and 10 co-located education partners, Modex 2014 showcased the "best of the best" in supply chain, transportation, and logistics information and technology.

AT 10 A.M. ON MONDAY MARCH 17, John Paxton, president of MHI, welcomed attendees and exhibitors to Modex 2014, "the greatest supply chain show on earth."

This year, the Supply Chain and Transportation USA (SC&T) show was co-located with Modex to deliver a complete supply chain experience for attendees. Laurent Noel, vice president of transportation and logistics at Reed Exhibitions, said SC&T chose the arrangement to showcase leading suppliers in global logistics and supply chain.

This installment of Modex featured 800 exhibits and a broad scope of educational content that included three keynotes and more than 150 show floor seminars. The show also included the events of 10 co-located education partners including the Georgia Logistics Summit.

The combined event offered a broad scope of educational content and insights while also giving attendees a first-hand look at some of the newest innovations in supply chain technology and equipment.

KEYNOTE

Speed and sustainability win in global logistics

The Monday morning keynote address featured William Strang, president of the Americas Operations Group for TOTO USA, and Gil West, EVP and COO of Delta Airlines.

William Strang

Strang explained how near-shoring has shortened the supply chain and improved sustainability for TOTO, a plumbing products manufacturer with worldwide operations. Ten years ago, Strang said, TOTO North America sourced about 70 percent of its products from Asia, but today, 73 percent is made in the Americas, cutting logistics time and its carbon footprint while also avoiding trade disruption risks involved in longer overseas routes. "We want to make sure we can mitigate those risks as much as possible," he said.

Delta uses a "speed wins" philosophy for its operations, said West, including keeping better track of baggage to improve handling performance to an industry-leading position within the last five years, and proactively rerouting customers when flights are canceled, using text alerts and mobile apps to keep customers informed.

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KEYNOTE

Omni-channel and supply chain analytics top trends in industry survey, say Modex keynote presenters

The impact of omni-channel fulfillment and the power of analytics emerged as the most important trends in an industry survey released and highlighted at Wednesday's keynote, according to Scott Sopher, a principal with Deloitte, and co-presenter of the keynote with George Prest, CEO of MHI. The survey was conducted by MHI and consulting firm Deloitte.

In the survey of 450 supply chain professionals titled *2014 MHI Annual Industry Report: Innovations that Drive Supply Chains*, 61 percent of respondents called multi-channel, also known as "omni-channel" fulfillment, as either very strategically important or moderately important, though only 46 percent planned to increase investment on it over the next three years, indicating a potential gap in the industry in being able to take advantage and lead with this trend, said Sopher.

"I believe companies are going to need innovative materials handling equipment to meet this need," said Sopher.

The two major barriers preventing innovation in the supply chain are a talent shortage and a continuing focus on cost reduction, the study found.

Prest encouraged companies to invest in talent development and education efforts to cope with technology priorities and interests revealed in the study, which included mobility, 3D printing, and sustainability. While cost reduction remains the dominant driver in the industry, abruptly shutting down talent recruitment efforts or employee education to cut costs is a bad move because it effectively "cuts off your talent supply chain," said Prest.

STATE OF THE INDUSTRY

Growth to continue, but at a slower pace, MHI says

Growth will continue in the materials handling industry in 2014 and 2015, announced MHI, the sponsor of Modex, in the group's annual State of the Industry press conference on Tuesday.

"We anticipate growth in the range of 7 percent to 8 percent in 2014, and from 9 percent to 10 percent in 2015," said George Prest, CEO of MHI. Prest tempered his comments by noting some downside risk remains for the first half of 2014, due to global economic and political uncertainty, as well as tentative U.S. consumer and investor confidence.

Breaking down the numbers, Prest highlighted:

• New orders grew by 8.2 percent in 2013 over prior year orders. MHI anticipates new orders to grow by 8 percent in 2014 and 10 percent in 2015.

• Shipments grew by 7.8 percent in 2013 over prior year shipments. MHI expects shipments to grow by 7.7 percent in 2014 and 8.7 percent in 2015.

• Domestic demand, which is defined as shipments of materials handling equipment plus imports less exports, grew by 8.5 percent in 2013. Domestic demand is forecasted to grow by 7.9 percent in 2014 and 9 percent in 2015.

• Import growth in 2013 was 3.9 percent in 2013—a significant decrease from 17.9 percent in 2012. Export growth was flat in 2013, down from 12.4 percent in 2012. MHI projects a modest rebound on both imports and exports beginning mid-2014, and continuing to grow into 2015.

"The numbers are slightly down from where we were projecting last year," Prest said, "but we've had a really nice run as an industry overall for the past four years. Although we are now on the decelerating side of growth in our cycle, things have been very strong, and the economic indicators continue to be strong for our industry."

Prest also highlighted MHI's involvement in the *U.S. Roadmap for Material Handling & Logistics*, a joint effort among multiple industry associations and publications. The Roadmap, published in January, offers a visionary look at how the industry will change between now and 2025.

Additionally, Prest introduced Daniel Stanton, MHI's new VP of education and professional development. MHI's Young Professionals Network (YPN) was also showcased as a means to help develop the careers of those entering the industry through networking, mentoring and professional development activities.

Finally, Prest encouraged attendees to make plans to attend ProMat 2015, scheduled for March 23 to 26, 2015 in Chicago's McCormick Place South. The tradeshow will showcase the latest manufacturing, distribution and supply chain solutions in the materials handling industry. Registration for ProMat gives attendees free entrance to Automate 2015, highlighting automation and motion control technologies, as the two shows will once again be co-located.

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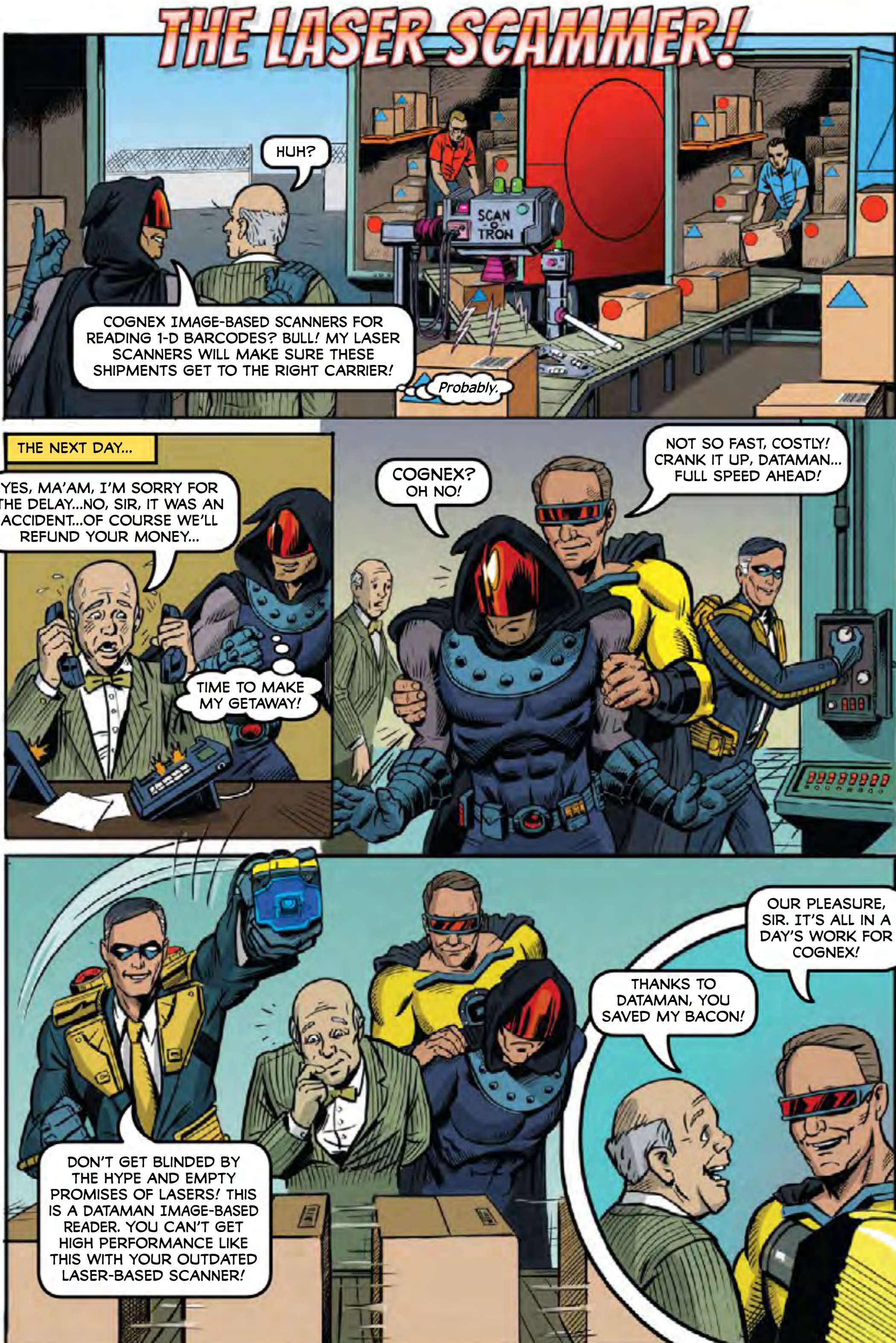

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Seegrid unveils vision-guided walkie stacker

In a press conference at Modex, Jeff Christensen, director of product development at Seegrid showed off the new GWS35 automated, vision-guided walkie stacker.

Jeff Christensen, director of product development at Seegrid, demonstrates the new GWS35 automated, vision-guided walkie stacker.

"In keeping with our 'Automation for Everyone' theme in 2014, we've added the GWS35 to help users take advantage of their vertical transportation," he said. "This automatic guided vehicle (AGV) can place or pick loads elevated on a conveyor, an ergonomic lifting device or racking."

Capable of lifting 3,500-pound loads to heights of 72 inches, the unit travels without wire, laser, tape or magnet.

Its 360-degree vision system uses the existing infrastructure to map its own guidance path.

"The stacker can be added to an existing fleet of Seegrid AGVs, and can be operated in either manual or automatic modes, reducing labor requirements," added Christensen.

To reinforce the "Automation for Everyone" message, the company gave away a free GWS35, fully installed.

Lucas Systems launches voice picking solution for smart phone

Lucas Systems announced that its Jennifer VoicePlus voice picking applications will be certified on smart phones, starting with the Samsung Galaxy S4, with general availability planned for May 2014.

The Jennifer solution for smart phones includes industrial-grade accessories to create a rugged, secure, and economical solution for the warehouse, said Jennifer Lachenman, VP of product strategy at Lucas Systems. Lucas also continues to support best-of-breed industrial computers, but certifying the solution for smart phones builds on the company's tradition of concentrating on applications and giving end users a wide range of hardware options, said Lachenman.

"For us this is not so much a revolution as an evolution of what we've been doing," said Lachenman. "Ultimately it's about offering our customers the best range of choices."

A demonstration of Jennifer VoicePlus running on a Samsung Galaxy S4 was shown at the booth. The solution can leverage the smart phone's imaging engine to perform scanning, or can be outfitted with a Bluetooth wireless ring scanner.

According to Lachenman, smart phones are well suited to voice picking because they are built with features like Bluetooth connectivity in mind, and have become more rugged and secure as well. Some case options for the Galaxy S4, she noted, bring the hardware's IP rating up to 68.

"Smart phones are designed to support the use of voice, screen, and imaging, so they are a natural fit for Jennifer VoicePlus," she said. "More importantly, the smart phone ecosystem is driving mobile technology innovation and new types of smart and durable wearable devices that create the possibility of even more powerful, productive warehouse applications in the future."

Honeywell releases new picking solutions

Bringing together the technologies of both Honeywell and Intermec RF scanners is the new Granit 1280iFR device that was introduced in the companies' shared exhibit.

The unit features near/far scanning capabilities that enable 1D bar code reads at distances up to 54 feet, in a ruggedly engineered unit, designed to withstand harsh environments, said Bruce Stubbs, director of industry marketing at Intermec by Honeywell.

"This rugged device is ideal for refrigerated and freezer applications in particular," Stubbs added. "It's IP65-rated to remain sealed against condensation and resist fogging and frosting on the scan face. Its rugged construction can also withstand repeated drops to frozen concrete floors."

Also on display is Vocollect's new Talkman A720 voice-directed picking device equipped with two TCO connectors. "Having two connectors supports wired headsets and other peripherals, such as long-range scanners," said Jay Armant, VP of product management for Vocollect by Honeywell.

SSI Schaefer showcases parts handling solutions for low-volume applications

SSI Schaefer demonstrated integrated standardized systems for small parts handling, including the Logimat AS/RS, the Pick@ Work workstation, and the Autocruiser transport system.

Norbert Hübler, business development manager for SSI Schaefer.

In principle an automated tool drawer cabinet, the Logimat can be configured as high as 60 feet. One operator could operate as many as six of the units, which deliver goods on a tilted tray with target picks illuminated from above.

The Pick@Work solutions combine ergonomic workstations with pick-to-light technology that leads the employee step by step through a work process. The system is suitable for the assembly of tiny (batch size 1) and small series (maximum recommended batch size 300) and/ or assembly at a pick speed of up to 600 lines per hour.

The Autocruiser is a scalable transport solution closing the gap between forklift transports and conventional conveyor technology. Designed for 10 to 500 transports per hour of weights up to 30 kg, the system requires no software or controls.

Swisslog announces major U.S. installation of robotic order fulfillment system

In a press conference, Swisslog detailed a commissioned installation of its Click&Pick goods-to-person, multi-channel robotic order fulfillment system for LIDS Sports Group, part of Hat World.

The system will be installed at the company's central DC in Indianapolis, said T.J. Fanning, Swisslog's director of customer support sales and account management. "This project will support continued sales growth and ensures fast, accurate order fulfillment to their stores, third-party partners, and direct e-commerce customers," he said.

Click&Pick's 3D grid of stacked cubes holds bins of SKUs. Wheeled robotic pickers travel across the top of the grid tracks, pulling each required bin and depositing it in a chute that sends it to a picking station. There, an operator selects the required item and routes it to packing.

"Click&Pick will transform the automated omni-channel solution landscape through speed, efficiency, storage density, and sustainability," said Markus Schmidt, SVP of Swisslog. □

MHI looks ahead to ProMat 2015

A note by George W. Prest, Chief Executive Officer, MHI, upon the conclusion of Modex 2014.

You have seen these challenges addressed in more than 100 educational conference sessions, including three keynotes and several collocated education sessions. You have experienced the solutions demonstrated on the Modex show floor by 800 exhibiting companies, first hand.

Now the real work begins, applying the solutions discovered here to your business to cut costs and increase productivity and safety in the years ahead. Even though Modex closed, it continues on-line at MODEXShow.com as an on-going resource to both exhibitors and attendees.

MHI will sponsor another world-class trade event in March 2015. **ProMat will be held March 23-26, 2015 at Chicago's McCormick Place.**

More information and free on-line registration for ProMat can be found at ProMatShow.com.

MHI was privileged to be your host during Modex and would like to serve as a year-round resource as you face the challenges and opportunities of a more complex and ever-changing commercial world. We can be reached by phone at 704-676-1190, by fax at 704-676-1199 or by visiting us on-line at mhi.org .

We hope you found your visit to Modex both enjoyable and productive, and we look forward to seeing you in March 2015 in Chicago at ProMat.

Continuous Replenishment Can Boost Logistics Efficiency

Providing continuous replenishment to customers can have its benefits, but you have to get it right.

By Becky Partida, research specialist, Supply Chain Management, APQC

To streamline their deliveries to customers, many organizations have adopted continuous replenishment programs. By monitoring customer inventories and automatically replacing used materials when needed, these organizations have also taken steps to improve their operations by eliminating the need for purchase orders and other related paperwork. Continuous replenishment programs offer the additional potential to create close relationships with customers that can increase customer loyalty.

According to APQC's Open Standards Benchmarking in logistics, only a slight majority (57 percent) of participating organizations have implemented continuous replenishment programs for their customers. Of this group, 27 percent have extensively implemented these programs. To determine whether these programs offer the potential for superior logistics performance, APQC compared the logistics performance of organizations that have adopted these programs against that of organizations that have not adopted continuous replenishment. The data indicates that the two groups have similar inventory carrying costs, but that organizations with continuous replenishment programs need fewer full-time equivalent employees (FTEs) in logistics, have a higher perfect order performance rate, and ship a greater amount of their sales orders as part of full-load shipments.

Inventory and Staffing Needs

APQC's data indicates a similar inventory carrying cost for organizations that have and have not implemented continuous replenishment programs. At the median, organizations that provide these programs for their customers have a 4 percent inventory carrying cost as a percentage of their average inventory value. Organizations that have not implemented these programs have an inventory carrying cost of 4.2 percent of their average inventory value.

These results are interesting given that one would expect organizations offering continuous replenishment to have lower inventory carrying costs due to their ability to better determine the timing of deliveries to their customers. With this ability, organizations would be able to keep less material on hand at any given time. It is possible that organizations without continuous replenishment programs have adopted other approaches to reduce the inventory they keep on hand.

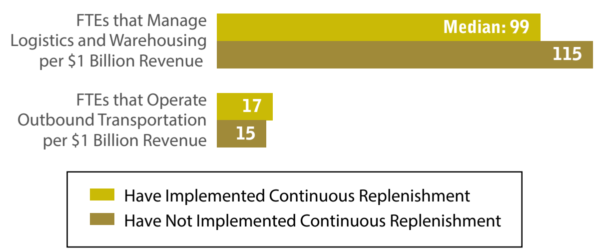
APQC's data also reveals that organizations offering continuous replenishment programs for their customers need fewer FTEs for their logistics processes overall. As Exhibit 1 shows, organizations that offer these programs need 99 FTEs per $1 billion in revenue at the median to manage logistics and warehousing, whereas organizations that do not offer these programs need 115 FTEs per $1 billion in revenue.

However, the data also shows that organizations offering continuous replenishment need slightly more FTEs to operate outbound transportation than their counterparts without these programs.

Although continuous replenishment programs may reduce the need for staff for activities such as managing inbound materials and managing warehousing, these programs do not reduce the need for staff to ship materials to customers. However, the fewer staff needed in other areas of logistics more than compensates for any additional FTEs needed to manage outbound transportation.

EXHIBIT 1

Continuous Replenishment and Logistics Staffing



Source: APQC

Potential Impact on Delivery Quality

APQC's data also reveals that organizations offering their customers continuous replenishment programs have a higher performance overall on deliveries of customer orders. APQC looked at perfect order performance: the percentage of orders delivered on time, complete, and with accurate billing. As shown in Exhibit 2, among bottom performers and at the median, organizations that have adopted continuous replenishment programs for their customers have a higher perfect order performance than organizations without these programs. The difference between the two groups tapers off at the top-performer level, with both obtaining a 95 percent perfect order performance rate.

At the median and bottom-performer level, there is a 2 percent difference in the perfect order performance between the two groups of organizations. One would expect that tracking customers' inventory to better anticipate needed shipments would ensure the prompt fulfillment and delivery of customer orders, but there is clearly room at these two levels for improvement. The fact that there is no difference in performance between the two groups at the top-performer level may indicate that many organizations without continuous replenishment have adopted other programs aimed at improving the efficiency and reliability of the shipments they make to their customers.

APQC's research also reveals that organizations using continuous replenishment programs with their customers ship more of their sales orders as part of full-load shipments. As illustrated in Exhibit 3, at the median these organizations send 56 percent of their purchase orders to customers as part of full-load shipments, whereas organizations that do not use continuous replenishment ship 20 percent of their sales orders as part of full-load shipments. Among bottom performers, organizations without these programs ship only 5 percent of their sales orders as part of full-load shipments.

The higher percentage achieved by organizations using continuous replenishment may be related to the close monitoring of inventory conducted as part of these programs. Organizations with a clear picture of when they will need to ship additional product to their customers have more time to plan their shipments and thus can utilize more full-load shipments. This in turn can translate into a reduction in shipping cost for these organizations.

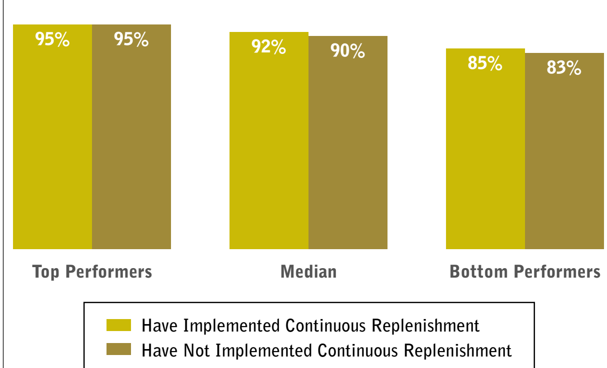
Organizations offering their customers continuous replenishment programs have a higher performance overall on deliveries of customer orders.

The Importance of Getting it Right

APQC's data shows that organizations that have implemented continuous replenishment programs for their customers need fewer FTEs to manage logistics and warehousing and can ship a greater percentage of their sales orders via full-load shipments. These benefits can lead to cost savings, but the potential for reduced logistics costs is only one of several factors that an organization looking

EXHIBIT 2

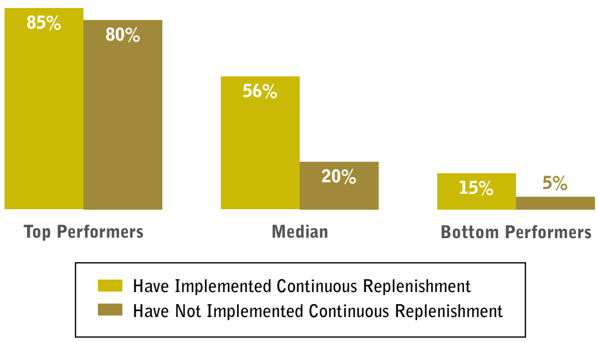
Continuous Replenishment and Perfect Order Performance



Source: APQC

EXHIBIT 3

Continuous Replenishment and Sales Orders Shipped as Part of Full-Load Shipments



Source: APQC

to adopt continuous replenishment programs should consider. Another factor to consider is the organization's customer base and which customers are strategic to the business. It may not make sense for an organization to adopt a continuous replenishment program with each of its customers. Instead, it may be more advantageous to establish such programs for strategic customers. Organizations must also consider which strategic customers would be the best fit for a continuous replenishment program.

Through collaboration, organizations gain an understanding not only of how their customers' inventory systems work and how frequently the data is updated, but also of their customers' expectations for the programs.

Another factor to consider is the amount of time and resources needed to properly implement a continuous replenishment program so that it can provide the most benefit both to the organization and the customer. This involves deepening relationships with customers (if such relationships do not exist already) and gaining access to the customers' inventory data. It also requires that the customers for these programs have accurate, up-to-date inventory tracking so that the provider organization can best determine when to send additional materials.

If a continuous replenishment program is established without thorough planning or a complete understanding of the customer's inventory, delivery performance and inventory carrying cost could be affected. In fact, APQC's data indicates that organizations that have implemented continuous replenishment programs recognize that they could make improvements to their programs to improve effectiveness. Forty-three percent of the organizations with continuous replenishment programs indicate that their programs are only somewhat effective, and 48 percent believe that their programs are extremely effective. A full 9 percent indicate that their programs are not effective at all. An evaluation of customers best suited for these programs, as well as in-depth planning of the programs' internal and customer-facing aspects, can enable organizations to obtain the most benefit from these programs.

Another important aspect of creating a continuous replenishment program is collaboration with customers to ensure that the program is set up correctly and runs smoothly. Through collaboration, organizations gain an understanding not only of how their customers' inventory systems work and how frequently the data is updated, but also of their customers' expectations for the programs. Close collaboration between an organization and a customer can also extend beyond continuous replenishment and lead to improvements in an organization's sourcing decisions and product offerings.

About APQC

APQC is a member-based nonprofit and one of the leading proponents of benchmarking and best practice business research. Working with more than 500 organizations worldwide in all industries, APQC focuses on providing organizations with the information they need to work smarter, faster, and with confidence. Every day we uncover the processes and practices that push organizations from good to great. Visit us at www.apqc.org and learn how you can make best practices your practices.