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The reinvention of procurement

"The procurement function is at an inflection point." So begins "The reinvention of procurement," an article by Jonathan Hughes and Danny Ertel, partners at the Boston-based consulting firm Vantage Partners. The authors argue that while many leading companies have transformed their procurement organizations into a linchpin of their enterprise strategy, far too many others remain trapped by procurement models that are out of date in today's fast-paced economy, where the acquisition of innovation, collaboration, services and solutions is more important than transactions based on the lowest cost per unit.

Reinvention is a fitting theme for this issue, which coincides with the ISM conference in Indianapolis. It is the foundation for the Ramp Up at Pratt & Whitney, where the jet engine maker has remade its supply chain processes in order to double its production of jet engines over the next five years while eliminating potential points of failure. One of its first priorities was to protect its base of supply.

To that end, Pratt & Whitney has executed long-term agreements with over 300 key suppliers. To ensure the quality and flow of supply, it has opened supplier resource centers around the globe; taken steps towards the digitization of its supply chain; and launched an aggressive quality assurance program. Most importantly, Pratt & Whitney is embedding its engineers, manufacturing and supply chain experts in its suppliers' operations in order to eliminate points of failure down the road. "I think we've taken supply chain management to a new level to remove risk," Sergio Loureiro, the company's supply chain leader, told us.

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Similarly, authors Frank Mobus and Bill Sanders lay out a new way of thinking about contract negotiation—especially for companies like Pratt & Whitney that are putting together long-term agreements and implementing new ways to work with their suppliers.

MRO management is another process in the midst of reinvention, according to new research from Penn State. Based on interviews with MRO experts along with a survey of *SCMR* readers, the Penn State team argues that MRO management is increasingly recognized as an opportunity to lower costs and boost performance by those companies that are taking an integrated approach, one that facilitates operational excellence and promotes the total cost of ownership. Read to see if your MRO organization is a leader, evolver or trailer in comparison to the competition.

Last but not least Jim Tompkins tackles the management side of supply chain management. One of the industry's most widely-published authors, Tompkins offers managers a framework for decision making, especially for those who are overwhelmed by data and the number of choices they have to move their organizations forward. You could say it's time to reinvent management, too.

Bob Trebilcock

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BY LARRY LAPIDE

Execution managers need the S&OP plans, too

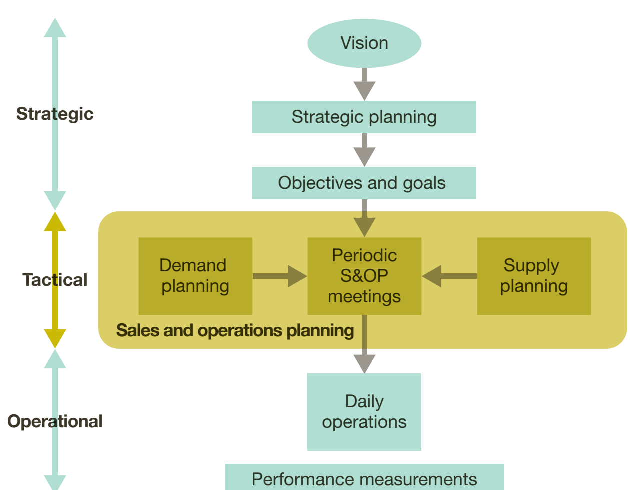
Dr. Lapide has extensive experience in the industry as a practitioner, consultant, and software analyst. He is currently a lecturer at the University of Massachusetts' Boston Campus and is an MIT Research Affiliate. He received the inaugural *Lifetime Achievement in Business Forecasting & Planning Award* from the Institute of Business Forecasting & Planning. He welcomes comments on his columns at llapide@mit.edu.

I recently got two calls from trade publication writers interested in how warehouse (and perhaps other supply chain execution) managers might get involved in their company's sales and operations (S&OP) processes. It seems S&OP teams often have little to do with execution/operations managers regarding synchronizing execution to plans. While some software companies purport to do this—perhaps from a computer systems perspective—the business processes of supply chain planning (e.g., S&OP) and execution ought to be integrated.

These managers often don't need to be at S&OP meetings because supply chain planners typically represent their interests. However, S&OP supply plans ought to be communicated to operations managers because they need them to drive their own short- and long-term planning efforts. This is the way to tie business strategy to operations (e.g., strategy executed daily on the manufacturing plant floor and in the warehouse).

FIGURE 1

S&OP should be the linchpin process tying execution to strategy



Source: Peng Kuan Tan, "Demand Management: A Cross-Industry Analysis of Supply-Demand Planning," MIT Master of Engineering In Logistics Thesis, June 2006

Synchronizing operations with planning is strategic

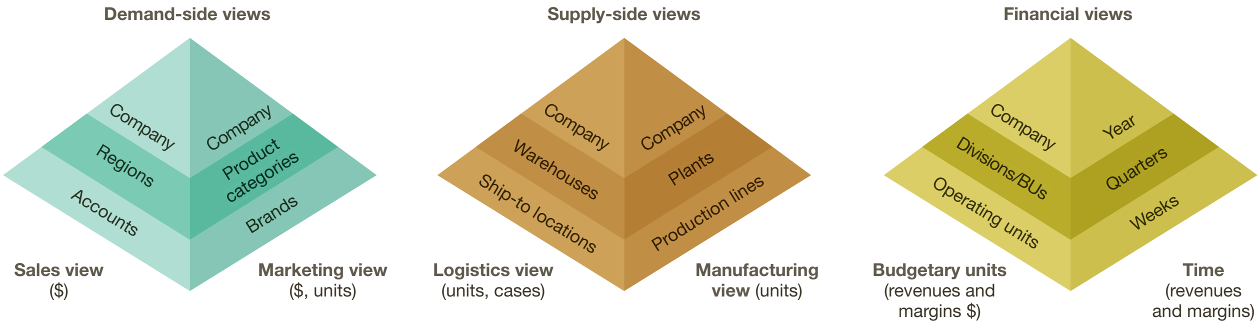
Operational managers don't necessarily need to attend S&OP meetings because these meetings are focused on more aggregated business views over longer planning horizons than the managers are interested in. SO&P plans that typically focus on six months to 18 months out, and on a weekly or monthly basis, don't provide operations managers with enough detail about products, customers and geographies.

These include managers in warehousing, transportation, procurement, manufacturing, and inventory management. Lacking a detailed focus, S&OP meetings are usually of less interest to them. An exception to this is in distribution-intensive businesses, such as wholesale distributors, retailers and e-tailers. The reason that execution managers in these industries might be more interested in S&OP is that distribution limitations and constraints might significantly affect meeting customer demand and achieving corporate performance goals.

My column, "S&OP: The Linchpin Planning Process", *Supply Chain Management Review*,

FIGURE 2

A hierarchy translates plans and forecasts into the language each manager understands



Source: L. Lapide "Designing a Sales and Operations Planning Process," Institute of Business Forecasting and Planning Tutorials, August 2006, Chicago, Ill.

November, 2011, discussed three levels of planning and how S&OP—if driven by strategic goals and objectives—can tie operations to strategy. The three levels of planning were: strategic (long-term); tactical (medium-term); and operational (short-term). Major differences among the planning levels are: the length of their "planning horizons," and the planning "time buckets" they focus upon. Strategic plans have long planning horizons, are developed at aggregated levels and change infrequently—often lasting multiple years until a change in strategic direction is warranted. Tactical plans have medium-term planning horizons, are more detailed and are changed more frequently. Lastly, operational plans have short planning horizons, are the most detailed and are routinely and frequently changed as real-time business activity unfolds.

Figure 1 depicts how the S&OP process is sandwiched in the middle of the planning processes. S&OP is the routine tactical planning process in which tactical supply and demand (i.e., marketing and sales) plans are synchronized, matching future supply and demand. S&OP should be driven by strategic objectives and goals in order to develop plans that, in turn, drive operational plans and execution. This renders S&OP the "linchpin" process that connects the strategic plans to operational execution. The accuracy of its plans invariably determines how well a company is able to achieve its strategic operational goals and objectives, as well as annual financial goals.

Each planning level is unique in how it deals with the future, yet all need to be integrated to ensure that operations ultimately synchronize to strategy. While this may sound straightforward, the length and time buckets of planning horizons differ, making it complex to carry out. In addition, the amount of detail needed within the planning processes differ, with operational planning requiring the most detail for the shortest planning horizons.

A hierarchy enables synchronization

A forecasting/planning hierarchy is a key enabler of an S&OP process as it fosters cross-functional collaboration, consensus and synchronization.

Each planning level is unique in how it deals with the future, yet all need to be integrated to ensure that operations ultimately synchronize to strategy.

Figure 2 depicts an illustrative forecast/planning hierarchy that I discuss when I conduct forecasting and S&OP process design training sessions. This figure has three pyramids representing forecast and plan aggregations that various functions might need to view before agreeing to be accountable and committed to achieving plans. The lowest details are on the floor of the pyramids, and aggregations are specific views tailored for each functional manager. The three pyramids comprise two demand-side and two supply-side aggregated views, as well as a two financial views.

Cross-functional teams comprised of members from supply chain, operations, marketing, sales, and finance organizations discuss the views. To get commitment from all organizations requires that forecasts/plans be aggregated and disaggregated to various levels to be reviewed and revised by each function in terms that they best understand. The hierarchy maps and translates all the levels among themselves to the highest, the lowest, and the most detailed planning levels.

Operations needs more detail

By their nature, S&OP meetings need to focus on aggregated plans and forecasts. Conceptually, they focus on the upper portions of the pyramids because bogging down meetings with discussions about excruciating details tends to draw the focus away from synchronization and achieving consensus. Thus the supply-demand plans generated by an S&OP process are too aggregated to drive operational plans and execution.

The lower portions of the pyramids show what operations managers need. For example, specific country, product and account-level detail would be needed by demand-side managers to drive sales and marketing execution. Supply-side execution management from manufacturing, transportation, warehousing, and inventory management might need specific warehouse-, ship-to location, plant-, production equipment-, and product-level detail. They might also need item-level detail about new product launches and promotional campaigns. In addition, procurement managers might need detail for scarce raw materials/components that are used in the manufacturing process. Financial management might need specific budgetary operating account, country, and divisional-level detail to drive financial performance. In addition, operations managers need shorter planning horizons and time buckets that are in terms of days and weeks, rather than weeks, months and fiscal quarters.

Forecasters and planners should provide the detail

An S&OP team's job is not entirely done once S&OP plans are finalized. In order to synchronize with operations, the S&OP plans ought to be disaggregated into the details needed by various operations managers. Conceptually, this is most easily done if the upper-aggregated portions of the pyramids are synchronized with the detailed lower portions throughout the S&OP planning process, rather than after the upper portions are finalized. Top-down, bottom-up and middle-up-and-down forecasting and planning methods are most useful for this.

Take the example where monthly aggregated-product demand forecasts are discussed during S&OP meetings when getting to consensus. A manufacturing plant usually needs a weekly item-level master production schedule (MPS) as input into its materials requirement planning (MRP) system. To generate the MPS, weekly item-level demand forecasts are required, and the forecasting organization ought to provide them along with the aggregated S&OP forecasts.

In order to synchronize with operations, the S&OP plans ought to be disaggregated into the details needed by various operations managers.

I recall some research some students and I did with a major CPG company that only generated monthly demand forecasts that were given to its manufacturing organization. Because the plant managers needed weekly forecasts they did their own forecast by dividing the monthly forecast by four to estimate each week. This is rarely a great method to develop weekly from monthly forecasts. In essence the forecasting organization abrogated its responsibility to support these plant managers. They should have, at minimum, helped them develop reasonable methods for generating weekly demand forecasts from the monthly forecasts provided. The ultimate accountability for forecasting performance should always lie with the forecasting organization. Similarly planning accuracy is the responsibility of the S&OP team.

In summary, execution managers may not need to attend S&OP meetings. However, they should be given the details of the S&OP-generated plans and forecasts in order to drive their operations planning. If they haven't done so already, forecasters and planners that support an S&OP process should meet with these managers and find out what detail they need. Why? The "devil is in the details" and, in this case, the details affect strategy execution on a day-by-day basis.

Desigual's multi-stranded approach to omni-channel

By Maria Jesus Saenz and Elena Revilla

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Transitioning to an omni-channel supply chain undoubtedly brings many challenges for retailers. However, omni-channel is also a major source of supply chain innovation (see Figure 1). The journey involves multiple changes that are forcing companies to rethink the way they design, build, implement, and manage global supply chains, as well as how they relate to key supply chain players.

Fashion company Desigual is deep into its migration to an omni-channel model. The transition is on track for a successful completion and the strategy has already spawned a number of innovative approaches that will benefit its business. These include two areas of fundamental change. One concerns operational activities such as inventory management, as well as broad logistics transformations that are making the company more flexible and agile. The second area pertains to redefining Desigual's customer relationships, again, under the premise of leveraging the company's unique brand.

Distinctive style

Desigual was created in Barcelona, Spain, in 1984 by entrepreneur Thomas Meyer. The company now has nearly 5,000 employees, and in 2015 reported annual sales of 933 million euros.

From the outset, innovation was woven into the fabric of the business. Desigual is known for its upbeat, original clothing designs, summed up in the philosophy: "We believe in dressing people, not bodies." The company says that it has created "a world of patchwork, textures, graphic motifs and handcraft."

These values are reflected in the Desigual product collections: Woman, Man, Kids, Accessories, Shoes, Living, Sport, and Beauty. It's designs are sold in more than 500 Desigual stores, 7,000 multi-brand stores, 2,700 department stores, 11,000 new category points of sale and 23 own online stores, and in more than 100 countries. In 2015 its online store clocked some 50 million visits and sold more than 30 million garments worldwide.

Innovation in the supply chain

This extensive network can be broken down into a number of main channels, such as wholesalers, retail stores, franchises, department stores, e-commerce and new categories point of sales. Each channel has its own logistics and competitive challenges.

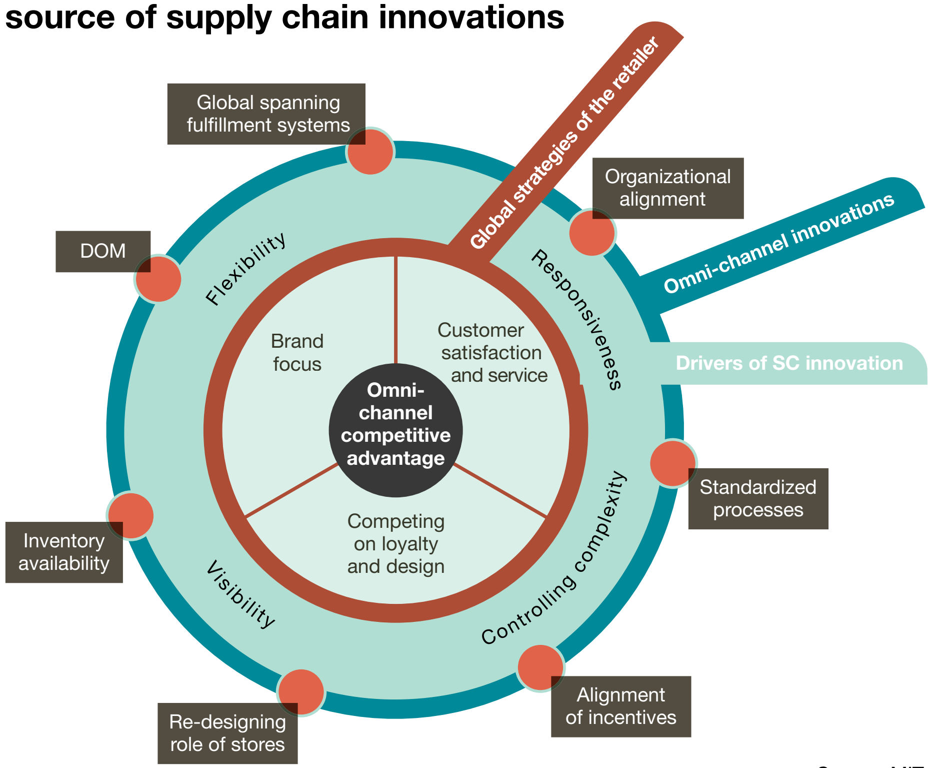
The shift to an omni-channel strategy is partly a response to the importance Desigual attaches to being a consumer-centric company. In addition, changing customer demands have redefined traditional purchasing practices and how customers relate to brands, especially as a result of the dramatic growth in digitalization. Customers don't care which division of the company owns the inventory—they just want the product whenever and wherever they desire. But the strategy has to enhance the Desigual brand. For example, products are updated more often (up to four times a season) in order to meet consumer demand. The company's omni-channel supply chain must support inventory replenishment systems for different combinations of online and bricks-and-mortar purchases, while supporting the brand's unique identity and customer satisfaction: "Desigual's experience is based on connecting with our customers' emotions," states the company.

Here are some ways in which the changeover to an omni-channel retail model is spurring innovative supply chain approaches.

Aligning organizational change to the omni-channel strategy. Redefining supply chains in response to the demands of omni-channel

FIGURE 1

Omni-channel strategy as a source of supply chain innovations



Source: MIT

retailing requires companies to change their organizational design.

Omni-channel is really a company project. With the support of senior management, Desigual created an omni-channel team that is involved and engaged across departments such as Supply chain, IT, Finance, HR, and across e-commerce and traditional retail commercial channels. This cross-organizational approach is essential to developing a holistic view of the various markets—a key requirement as Desigual responds to changing consumer demand.

Even though the company is creating a supply chain geared to serving multiple channels, in the context of its customers, "we don't have channels any more, we have one omni-channel that is focused on consumers" says a team member. This is because customers must receive the same level of service regardless of the combination of flows used to make a purchase. Similarly, traditional organizational silos get in the way of achieving the high level of integration that an omni-channel supply chain needs. In many ways, this holistic view reflects the customer experience.

Inventory management and fulfillment. Omni-channel customers buy and return goods online or via physical stores, and expect excellent service regardless of how they receive their purchases. Meeting these expectations requires inventory to be visible and available globally. Desigual is working hard to integrate its warehousing system with the stores that sell its wares. In the past, inventory was visible mainly at the warehouse level; now this field of vision must be expanded to stores as well.

An e-commerce order comes in via its website, and the order is allocated according to predetermined rules built into an automated fulfillment system the company has developed. Process algorithms account for the cost and service implications of different fulfillment configurations across Desigual's global distribution network.

A primary goal is to prevent lost sales because an item is not available. This has required the company to increase global visibility in real time along its supply chain, and fine-tune its decision making when managing inventory and fulfilling orders. Desigual is achieving these goals through an advanced Distributed Order Management system (DOM). It allows the company to manage its 16 channels and eight product categories holistically, supported by a single, real-time view of its global stocks that delivers product according to availability, proximity and delivery criteria. For example, at the end of a season, especially during sales periods, there is typically more stock in stores than in warehouses, so it is generally better to deliver from a store during those periods.

In 2015, the company opened a warehouse in Viladecans, near Barcelona, Spain, to support the omni-channel operation and maintain the retail company's push to improve service levels. The facility is modular so its capacity can change in line with fluctuating demand, and can store 200,000 boxes and transport 30 million units annually. A key aspect of its distribution model is technological integration that complements the global reach of existing warehouses in Gavá (Spain), Hong Kong and in New Jersey in the United States.

"The central idea is to concentrate stock, standardize processes and become more responsive," says a team member.

Aligning the role of the stores. Not only do Desigual's management and operational teams have to adapt to an omni-channel way of doing business—so too do store personnel. The company has created a comprehensive training program for those stores that are part of its multi-channel network.

Each store has designated personnel for the handling of e-commerce orders. These individuals are trained to develop a multi-channel mindset. For example, they must know how to prioritize orders and set delivery times. A future practice is to offer a range of delivery times that are well within the system's capabilities, in the knowledge that besting these deadlines scores points with the customer. Store employees must also learn how to process returns, even for online purchases. Customers can return e-commerce purchases to stores or via a courier. When the store is the receiving point, the inventory system automatically allocates the returned product to another order if appropriate, thus facilitating product availability. The store has visibility into this process, which gives personnel valuable insights into the omni-channel process.

In order to establish a single view of the customer, regular meetings with country managers keeps Desigual attuned to cultural differences and practices in the different regions. It is rolling out the training program to more stores over a wider geographic area. To support the new role of employees, Desigual also helps stores to align their employer incentive systems with a multi-channel sales platform.

Omni-channel customers buy and return goods online or via physical stores, and expect excellent service regardless of how they receive their purchases. Meeting these expectations requires inventory to be visible and available globally.

Building on the gains

Desigual has almost completed the first phase of its omni-channel program. The transition to omni-channel has yielded some important gains. The company is more responsive and flexible, and better able to manage supply chain complexity as a multi-channel, multi-category enterprise. These benefits will increase efficiency as the company achieves shorter lead times and more streamlined inventory management practices.

The omni-channel team will continue to refine the model. Improving service levels while reducing costs is as an overarching customer satisfaction goal. To do this, the company plans to bring other supply chain players into the loop. An example of this approach is a "save the sales" service, that checks the availability of a product in all channels from the store. A future option is to deliver product direct from suppliers.

"There is always pressure to be innovative as every aspect of our business becomes more digital and we work to get deliveries to our customers sooner while constantly improving," says a member of the team.

Authors' note: *We would like to acknowledge Desigual Supply Chain Group for their valuable contributions and feedback on this article.*

BY PATRICK BURNSON

Investing in supply chain resiliency

Add "cyber exposure" and widespread fraud to the mix, and we have a daunting checklist to address before supply chains can be regarded as efficient and secure. Several recent studies indicate that risks are mounting for supply chains in even the most developed parts of the world.

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

Vigilance is a must no matter where you are doing business in today's global marketplace. Indeed, add "cyber exposure," extreme weather conditions and widespread fraud and piracy to the mix of their concerns, and supply chain managers have a daunting checklist to address before supply chains can be regarded as efficient and secure.

When it comes to ocean cargo shipping—the backbone of global supply chains—the world appears to be more secure: According to the Allianz Global Corporate & Specialty (AGCS) fourth annual *Safety and Shipping Review 2016*, vessel losses declined by 3% last year. Furthermore, losses have declined by 45% since 2006, driven by an increasingly robust safety environment and self-regulation.

While the long-term downward trend in shipping losses is encouraging, there are still reasons to be concerned as weak economic and market conditions, depressed commodity prices and an excess of ships continue to pressure costs and raise safety concerns. AGCS has seen an increase in the frequency of losses over the past year that can be attributed to this environment to some extent.

"The economic downturn is likely to have a negative impact on safety," says Captain Rahul Khanna, Global Head of Marine Risk Consulting, AGCS. "Many sectors, such as general cargo, bulk and offshore, are already challenged and any drop in safety standards will be a serious case for concern."

As well as affecting investment in vessel maintenance, cost pressures can impair crewing conditions and have an impact on salvage and rescue operations. AGCS has seen an increase in fatigue-related insurance claims over the past decade. With crew numbers already often at their lowest possible level, and in anticipation of future staffing shortages, longer shift patterns could exacerbate this issue. Meanwhile, training remains below par in areas such as electronic navigation, which should not be seen as a panacea but as a complementary tool.

Super storms, piracy and cyber risk

Exceptional weather events are also becoming more commonplace, bringing additional risks and disruption to supply chains. This year, the effect of an El Niño is expected to lead to more extreme weather conditions. Bad weather was a factor in three of the five largest vessels lost last year, including the *El Faro*, one of the worst U.S. commercial maritime disasters in decades.

"The fact that super storms are causing ships to sink is concerning," says Sven Gerhard, Global Product Leader Hull & Marine Liabilities, AGCS. "We are seeing more and heavier natural catastrophe events. Weather routing will continue to be a critical component to the safe navigation of vessels."

For the third consecutive year, about 30% of Deloitte poll respondents say that their companies experienced supply chain fraud, waste or abuse in the preceding year.

AGCS analysts also note that for the first time in five years, piracy attacks failed to decline in 2015. Attacks in South East Asia rose, accounting for 60% of all incidents, and attacks in Vietnam surged year-on-year.

Of more worry though is the shipping industry's reliance on interconnected technology. As a result, cyber risk exposure is growing beyond data loss. There have already been a number of notable cyber incidents and technological advances, such as the "Internet of Things" (IoT) and electronic navigation, mean that the industry may have only a few years to prepare for the risk of a vessel loss due to cyber crime. "Pirates are already abusing holes in cyber security to target the theft of specific cargoes," says Captain Andrew Kinsey, Senior Marine Risk Consultant, AGCS. "The cyber impact cannot be overstated. The simple fact is you can't hack a sextant."

Investing in resiliency

Analysts composing the *DHL Resilience 360* study observe that catastrophic losses from real and "virtual" pirates can be curtailed—along with other more mundane risks—by investing in analytics. In its ten-point checklist, DHL observes that supply chain managers should attend to the following concerns:

- prevent cargo and inventory loss by knowing where to invest in mitigation;
- avoid supplier failure by strengthening management and reducing the impact from external factors;
- reduce premium freight by rerouting shipments rather than expediting them;
- reduce buffer stock by considering external influences on former policies;
- avoid production outage by preparing in advance when loses cannot be recovered;
- avoid lost sales by leveraging network visibility;
- be compliant and follow regulations to demonstrate operational transparency;
- consider health, safety and the environment to further social responsibility;
- maintain order volume and customer loyalty to enhance "post-disruption" recovery; and
- limit reputational loss by building trust with all stakeholders during a crisis.

"Average reputational and shareholder value drops by 10% after a major supply chain disruption," notes DHL. "Managers, therefore, must immediately communicate impact analysis and demonstrated compliance adherence to remain in control."

Trust (and the lack thereof) is the subject of the final piece of research gathered for this column.

Finding fraud

For the third consecutive year, about 30% of Deloitte poll respondents say that their companies experienced supply chain fraud, waste or abuse in the preceding year. Yet, just 29.3% of the same respondents use analytics to mitigate supply chain fraud and financial risks. Two-thirds (67.1%) are confident employees will report any schemes they see in the coming year.

"In my 20 years conducting forensic investigations, trust in employees and third parties is often misplaced," says Mark Pearson, Deloitte Advisory principal, Deloitte Financial Advisory Services, LLP. "As a result, many organizations are trapped in a pay-and-chase model for fighting supply chain fraud—invoices are paid first, then retribution is sought much later when fraud is found, if it's found at all."

Two industries saw supply chain fraud rise between 2014 and 2016: Life sciences and health care respondents report an increase to 35% in 2016 (31% in 2014); and energy and resources was 34% in 2016, compared to 27% in 2014. Conversely, technology, media and telecommunications reported a drop to 27% in 2016, from 2014's 33%.

"As distress from falling oil and gas prices puts pressure on the energy and resources industry, many leaders are working hard to avoid leaving any cash on the table," adds Larry Kivett, Deloitte Advisory partner, Deloitte Financial Advisory Services, LLP. "Using supply chain analytics to identify and investigate supply chain financial risks can help stem fraud schemes that we increasingly see in today's challenging, complex and global environment."


JLG LIFT

How They Did it: Pratt & Whitney's Ramp Up

While many companies are challenged to grow their revenue in today's slow economy, Pratt & Whitney faces a different Issue: How to lock up supply as it ramps up to double the output of its new jet engine over the next five years. This is how they did It.

By Bob Trebilcock

Bob Trebilcock is editorial director of Supply Chain Management Review. *He can be reached at btrebilcock@peerlessmedia.com.*

"This changes everything."

So goes Pratt & Whitney's tagline for the PurePower PW1000G family of geared turbofan jet engines. Pratt invested $10 billion and 20 years of R&D into the development of the new engine, which relies on a state-of-the-art gear system that separates the engine fan from the low pressure compressor and turbine. The design allows each of the modules to operate at their optimum speeds: The fan rotates at a slow speed while the low pressure compressor and turbine operate at high speeds, increasing engine efficiency and delivering significantly lower fuel consumption, emissions and noise, according to company reports.

How much lower? The new design, considered revolutionary in the industry, boasts double-digit fuel burn reduction, a 50% reduction in noise and low emissions.

With orders in hand from Airbus, Bombardier, Embraer and Mitsubishi for some 7,000 engines totaling more than $18 billion, Pratt & Whitney's business is about to ramp up in an unprecedented way. Production is forecast to double by 2020—indeed the project to meet this demand is known internally as the "Ramp Up".

While the Ramp Up changes everything for Pratt's top line, meeting the demand for that many engines over the next five years will also change how Pratt manages its supply chain. Jet engines are built slowly and to exacting quality standards. What's more, the traditional aerospace supply base of critical components are small-to-mid-size businesses with limited capacity and long lead times. A number of critical suppliers also provide parts to GE and Rolls Royce, competitors that are also looking to secure limited capacity for their operations. Doubling production over such a relatively short period means that any recovery time has been removed from supply chain processes—there is very little room for error from the standpoint of quality or delivery.

Pratt's supply chain challenge is how to ramp up production in a way that protects its base of supply, engineers in quality and delivers the final product in a timely and economical way.

To meet that challenge, Pratt & Whitney had to develop a new supply chain strategy which included a "no single point of failure" policy, according to Sergio Loureiro, who was recently named Pratt & Whitney's vice president of Manufacturing and Module Center Operations and was formerly the vice president of Pratt's global supply chain.

To launch the Ramp Up, Loureiro's team mapped and modeled its supply chain to identify as many points of failure as possible across the supply base. The team then defined the programs and processes Pratt needed to put in place to protect its cost position and capacity. The result was a four-pronged approach that included:

- long-term agreements with key suppliers to ensure the supply of parts and components (see sidebar);
- command centers in Connecticut and Canada to monitor the real-time performance of the supply chain, laying the foundation for a digital data stream across all parts and product lines;
- strategically-located regional offices across the globe that position cross-functional skills in engineering, production, quality and supply chain management. These offices serve as a resource to resolve issues for the supply base; and
- The UTC Production Part Approval Process (UPPAP), which was designed to identify and control the key variables that can affect the quality of a part before the part goes into production.

No single point of failure was devised so that nothing, including a financial problem or natural disaster, would delay the delivery of engines as required by Pratt's customers. This new model takes a proactive approach to quality and delivery

From supplier to partner

Armed with a long-term agreement from Pratt & Whitney, Polamer Precision has invested in its future and evolved from a job shop to a world-class production facility, and from a supplier to a partner.

Polamer Precision, Inc.'s new 152,000 square foot world headquarters in New Britain, Connecticut, is a testament to the strength of today's aerospace industry. The company was founded in 1997 with 2,000 square feet of space, a few machines and a handful of employees. The new building represents a $17 million investment, including a new ERP system, automated production equipment capable of lights out manufacturing and a three-acre solar panel farm that provides clean, sustainable energy to power the facility. Since moving in, Polamer doubled its head count from 60 to 130 employees with the potential of reaching 300 employees by 2019.

It will be put to good use by Pratt & Whitney. In late 2014, Polamer was one of the 350 suppliers to sign an LTA to manufacture engine parts and complex components for Pratt & Whitney's geared turbofan engine. The agreement guarantees Polamer's business with Pratt for eight years, with the potential to double the original agreement in future years.

While Polamer also supplies parts to Mitsubishi, GE, Rolls Royce and other global customers, Pratt has named Polamer's New Britain facility a Center of Excellence for complex housings. Most of all, the agreement has provided the stability and predictability that gives a supplier the confidence to grow its capabilities. "We understand what our business will look like today, tomorrow and potentially 12 years from today," says Chris Galik, Polamer's CEO and president. "Polamer has transformed from a job shop to a full production facility that is capable of supporting our customer's requirements, as well as the potential to expand our customer base. We're planning on Pratt taking the majority of that production."

Galik describes his company's work with Pratt as an example of the evolution from supplier to partner. Polamer became involved in the development of the geared turbofan engine four years ago, identifying the project as one that it could not afford to miss out on if it wanted to be a player. Being involved in this program is essential to our success. "The geared turbofan program has forced the entire aerospace industry to rethink its approach to engine power and efficiency," he says.

Being part of the team has been a collaborative process. During the design process of parts, Pratt & Whitney's engineering teams met continuously with Polamer's engineers to ensure that times rather than a reactive approach. While Pratt still designs most of what goes into the engine, suppliers are truly part of the process from the design stage through final delivery. They meet regularly with Pratt & Whitney engineers to ensure that the design can be manufactured in production quantities or to take advantage of a specialty process that may be unique to a supplier. "We are in their shops, working together to remove any barriers to production and anything that may affect delivery of a high-quality product to our customers," Loureiro says.

He adds, "Pratt also leveraged its extensive knowledge in managing high-volume programs from its Pratt & Whitney Canada small engine division and pioneered a new standard work for supply management developed across UTC."

"There are many things we can overcome, but we cannot overcome the dimension of time because this Ramp Up—it's now…it is our reality. So we are doing an extraordinary amount of due diligence up front to remove any failure points and drive momentum," Loureiro says of the strategy.

This is how they did it at Pratt & Whitney.

the new parts could be manufactured efficiently, economically and on time. "There's a thousand ways to approach any of these parts," Galik says. "By brining Pratt's design team in here, we could jointly establish changes that ultimately led to cost reductions when it came time to manufacture the parts."

Pratt & Whitney's team also exposed Polamer to best production practices from other industries, such as the way parts and work flow through a lean environment in the auto industry. "We are going to a cellular approach to manufacturing, where parts move from machine to machine, and, with automation, we're introducing a lights out concept where the equipment is running on its own," he says. "That came about from working with Pratt."

Perhaps the most important facet of the transformation involves the relationship between Polamer and Pratt & Whitney, as the engine manufacturer looks more than ever to its supply base for support. "Pricing and delivery will always be important," Galik says, "But Pratt is listening to our suggestions and we're collaborating on engineering changes. This is not a supplier-customer relationship, it's more like a partnership." —BT

Protect the base

A jet engine like the geared turbofan has between 2,000 and 2,500 parts. While many are consumables, like nuts and bolts, the new engine utilizes a number of new materials, new technologies and new production processes which may be in limited supply. As such, Pratt & Whitney is not only in a war for market share but also for capacity. At the outset, Pratt decided that it would continue to design the majority of the engine. Once that decision was made, Loureiro says the fundamental question for the supply chain was: What parts will Pratt manufacture versus buy from suppliers? If it's a buy, which suppliers will produce the part and what will be the conditions or governance of the contracts, including the limits of liability, quality requirements and delivery requirements. Finally, how can Pratt lock up the supply it needs to meet demand.

In 2013, Pratt launched an initiative to negotiate long-term agreements with key suppliers; to date, the company has executed contracts with some 350 suppliers valued at \$23 billion, with plans to execute contracts with another 200 suppliers by the end of 2017. The initiative will cover 90% to 95% of the part numbers that go into an engine. "First and foremost, the goal is to secure capacity," says Craig Musson, the director of strategic sourcing who is spearheading the initiative. "Beyond that, I want to have more than one source where required to mitigate risk."

The first step in the undertaking was to form a separate strategic organization staffed with handpicked personnel from inside and outside Pratt & Whitney as well as contract attorneys and paralegals. The new staff was then organized into teams that represented the dozen or so categories of parts that go into an engine. Each team was paired with a contract attorney. Before going into the field, the teams went through rigorous negotiation training. In addition, contract processes were standardized wherever possible so that one LTA looked the same across the parts categories. Musson says the start-up process took about three months and a considerable amount of internal alignment across all functional groups.

In addition to terms like price and delivery, the LTA's incorporate supplier performance through the inclusion of operational agreements, such as how many weeks of buffer inventory a supplier will keep on hand, and capability requirements that involve engineering in the sourcing activity. The goal is to design parts that meet the engine requirements and can also be produced to meet cost requirements. "In the past, we may have categorized a part as a machined part," says Darren Bicknell, the director of supplier performance. "For this program, we have 52 different families of parts because machining a case is different from machining an oil nozzle."

Once a contract is in operation, suppliers are scored against delivery and quality goals aimed at achieving the perfect part every time. To reach the Gold Level in Pratt & Whitney's supplier program, suppliers must meet 100% on-time delivery for a sustained 12 months with fewer than 250 parts per million defects. Gold suppliers are re-assessed every 18 months. For those that achieve Gold status, there are incentives, such as more favorable payment terms.

Pratt & Whitney at a glance

FOUNDED: 1925

PRODUCTS: Aircraft engines and auxiliary power units

SALES: $14 billion

EMPLOYEES: 33,500

CUSTOMERS: 11,000 worldwide. Approximately 470 customers operate Pratt & Whitney large commercial engines in 121 countries and nearly 30 customers operate aircraft powered by Pratt & Whitney military engines. More than 10,000 operators fly with engines made by Pratt & Whitney Canada.

Just as Pratt has had to invest in new equipment and automation for the Ramp Up, so have suppliers, many of whom are located in Connecticut and have been supplying parts to Pratt for 30 years or more. While Pratt is not directly investing in its suppliers' operations, many have been able to use their LTA's to obtain low interest loans from the state of Connecticut to make those investments.

Command Centers: The digital supply chain

The Ramp Up created the opportunity to further the digitization of Pratt & Whitney's supply chain. And while "the digital supply chain" has become one of those buzz words that is difficult to define, it has a specific meaning to Loureiro. "I want to understand the WIP position of every part of every engine, and all the inspection features, from the time we place a purchase order until we put it in an engine that is delivered to the customer. Then I want the reliability and repair data once it's in service so that we can follow the performance and movement of that part across the entire life cycle."

At present, he adds, Pratt & Whitney is tracking the movement of more than 45,000 parts a day through Command Centers in Longueuil, Canada, and East Hartford, Connecticut, which is still scaling up. A third Command Center will go live in Poland later this year.

The aim of the centers, according to Bicknell, the director of supplier performance, is to get real-time visibility into the supply chain from the flow of raw material to the supplier and the supplier's production and logistics processes. Think of these flows as the pulse of the business.

The tracking process begins when demand is created through Pratt & Whitney's S&OP process and is loaded into the materials planning system. The materials requirements to meet the plan then flow through the supply chain. "Suppliers see what we will need and when as far as three years out," says Bicknell. "We then ask them to commit to a promise date through a portal."

Once Pratt engineers working in the field verify the suppliers' promise dates, delivery information goes into a planning engine that identifies any potential supply issues. The system also identifies suppliers that are having issues and specific part numbers that have common root problems. "The system becomes the repository for the history of a late event, including the root cause, when we got involved and how we worked with the supplier to accelerate delivery," Bicknell says. "Anyone coming into the system can see what has already been done with that issue so we don't repeat ourselves."

Production-ready parts are shipped to a logistics center in New Hampshire operated by UPS, which is responsible for the distribution of the product to the manufacturing line. "We will be monitoring the value stream from raw material to finished good," Bicknell says. "If there are any hiccups, we will find out about them before they become a problem in production. That's where the tool becomes important."

One of the next steps in this journey to visibility is the implementation of Net-Inspect, an application that collects key product characteristic data, or KPCs, from machines on the shop floor. KPCs are characteristics of the part design that have been identified as critical by the supplier. "We're looking to see if there are any unexpected variations in the manufacturing process so that we can address them prior to delivery," Bicknell says. The target is to become aware of any deviations as early as 20 or 30 weeks prior to the promised delivery date. Pratt is also working to gain visibility into WIP and finished goods stocking levels across the supply base as part of its performance monitoring tool kit. Ultimately, the Command Centers will also track the performance of engines and parts in the field, including maintenance and repair histories.

Supplier development

The final two components of the new strategy fall under the umbrella of supplier development: The first is the opening of strategically-located regional offices that serve as resource centers to resolve issues for the supply base, and the second is the widespread adoption of the UTC Production Part Approval Process (UPPAP), which was designed to identify and control design KPCs and process key characteristics (KCs) that can affect the quality of a part.

Both reflect an evolution from a reactive supply chain—one that deals with quality issues as they arise—to a proactive supply chain that seeks to mitigate risk by addressing quality and production issues well before parts are shipped to an assembly line.

Regional offices are located in the United States, Canada, Poland and China with another planned for Japan. They are staffed with personnel experienced in engineering, quality control and supply chain management. They are also home base for members of the Supplier Development Team. These are generalists whose key responsibility is risk management. They have the experience to recognize scheduling, planning or manufacturing issues in the supply base that they can bring back to the experts in one of the regional offices for support. Each member of a supplier development team is assigned 3 or 4 suppliers that are located within driving distance so the team member can visit them every week.

The regional offices also host training and workshops—in 2016, for instance, Pratt & Whitney plans to train several hundred suppliers around the world on how to identify potential points of failure and mitigate supply chain risk. The regional offices also host training in the UPPAP initiative, a risk mitigation program borrowed from the auto industry.

UPPAP is built around the idea that there are certain key inputs and outputs that a supplier needs to control so that every part comes out of the process in perfect condition. "If a supplier can demonstrate that they can control the key inputs and outputs, they won't have to spend the non-value-added time associated with making non-conforming product, which just adds to the cost of a part," says Mary Schubert, the Pratt & Whitney UPPAP program manager.

The UPPAP program is built from the automotive PPAP concepts and requires a supplier to validate 19 elements, from fundamentals like having the right drawings and purchase orders to a demonstration that the supplier is in control and capable of consistently producing the part to the design. What's more, the UPPAP program extends beyond finished goods to also include key raw materials that go into creating a part or component. The program is currently applied to the majority of the engine programs that are part of the Ramp Up.

One example of how the UPPAP program works together with the regional offices is on part marking approval —element 17 in the UPPAP process. "You'd think that part marking is something that's easy to do, but most people in manufacturing aren't proficient in it," Schubert says. "We can connect our suppliers to part marking experts through our regional centers to address an issue."

The paradigm shift? "Historically, we were more reactive than proactive," Schubert says. "We've always required product to meet all the quality requirements, we've just raised the bar in the proactive identification and mitigation activity and objective evidence we review. We are focused on keeping non-conforming material from being produced in the first place. UPPAP helps the supplier ensure that only defect-free material is sent to Pratt & Whitney and subsequently an end use customer."

Now, she adds, a supplier can't ship parts until it demonstrates that it can meet Pratt & Whitney's quality standards, such as UPPAP, up front.

Taking off

Pratt & Whitney is some three years into the Ramp Up, with at least five years of strong production in front of it. The supply chain team believes it is positioned to protect its base to meet its supply and production goals. "Three years after launching this initiative, we still have opportunities for second and third sources for some parts," Musson says. "And we now have 350 LTAs in place and can go to bed at night knowing that we have capacity and that we're getting what I call 'best value' for our parts."

Adds Loureiro: "I think we've taken supply chain management to a new level of depth to remove risk and protect our customers. For us, this Ramp Up, does not have the typical take off acceleration of an airplane, it feels more like a rocket, propelling Pratt & Whitney to historic new heights, and it takes an entire ecosystem of our own facilities, suppliers and partners to execute it flawlessly. As we say to our suppliers: 'The Ramp Up is here, get on board!'"

THE REINVENTION OF PROCUREMENT

Procurement is at an inflection point. For many leading companies, procurement has been transformed into a linchpin of enterprise strategy. Yet many remain trapped by outdated paradigms and struggle for influence within their companies. Here's how organizations can reinvent the procurement function and put the past behind them.

AT MANY LEADING COMPANIES, procurement has been transformed in profound ways to become a linchpin of enterprise strategy. Meanwhile, many procurement groups continue to struggle for influence within their companies—in large part because they remain trapped by decades-old paradigms that are far too prevalent.

In this article, we will share what we have learned during our work with leading procurement organizations around the world as they seek to adapt to a future that is already upon them. In these organizations, the need to drive innovation is paramount, and an increasing proportion of the opportunity and risk with suppliers involves not only physical materials or equipment, but also complex services and intangible assets like intellectual property, data and brand equity. In that new environment, the strategies and skills that constituted a recipe for procurement success in the past need to be reevaluated, and to some extent upended, based on a 21st century world with new risks, threats and opportunities.

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A changing world and a changing context

In order to understand the future of procurement, it is useful to briefly review its history and evolution. For a very long time, procurement was a back office function focused on processing transactions. The selection of suppliers, and the negotiation of supplier agreements, was highly fragmented, unsystematic and non-rigorous. That began to change in the 1990s with the advent of strategic sourcing. Over the past several decades, this simple but powerful discipline has delivered enormous savings at countless companies, and earned procurement groups a substantial degree of respect and influence.

What is unacknowledged is the fact that strategic sourcing rests largely upon a set of concepts and principles laid out by Peter Kraljic in his classic *Harvard Business Review* article "Purchasing must become supply management"—which was published in September 1983.

By Jonathan Hughes and Danny Ertel

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The article is full of many useful examples and case studies that remain relevant, as do many of the principles and methodologies of strategic sourcing that developed later. At the outset of his article, for instance, Kraljic asks how a company can "…guard against disastrous supply interruptions and cope with the changing economics and new opportunities brought on by new technologies? What capabilities will a profitable international business need to sustain itself in the face of strong protectionist pressures? Almost every kind of manufacturer will have to answer these questions." Those questions remain top of mind to business leaders who are grappling with disruptions from natural disasters, rapidly changing technologies, the digitization of business and shifting geo-political alliances.

While the article remains an often quoted classic, there is also much that is obsolete, and some that has become counter-productive. For example, the word "innovation" never appears in this article. What's more, it viewed procurement through the lens of a manufacturing economy; indeed, all of Kraljic's article focused on the procurement of physical goods. Yet in 1984, services were already approximately 55% of U.S. GDP; today the number is approximately 70% (Figure 1). Here's another important statistic that procurement needs to understand and grapple with. According to Leonard Nakamura, an economist at the Federal Reserve Bank of Philadelphia, U.S. companies may have intangible assets worth more than $8 trillion. That figure is almost half of the $18 trillion market capitalization of the all the companies comprising the S&P 500 index. Moreover, according to research conducted by economist Carol Corrado and reported in the *Wall Street Journal*, in 2014, companies invested the equivalent of 14% of the private sector's share of GDP in intangibles (such as their brand and data assets) versus approximately 10% in physical assets (such as factories).

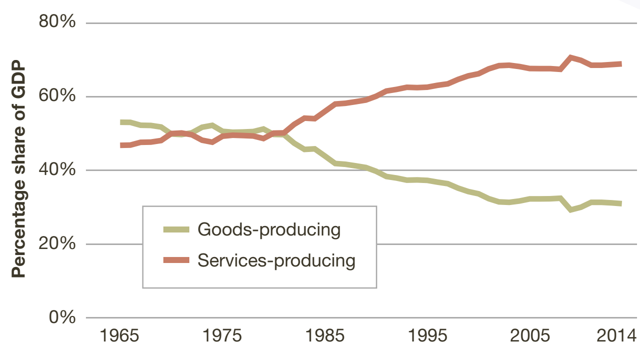
Clearly, the world economy has changed, and procurement needs to catch up—quickly.

The next wave of value

Procurement is, in many ways, a victim of its own success. As recently as 10 years ago, there was significant value to be gained by using competition to motivate better supplier performance and to re-balance supplier profit margins and customer costs. But rigorous and coordinated sourcing has enabled companies to maximize purchasing leverage based on their total spend. While there will always be some suppliers with a high degree of pricing power because of a unique technology or market position, today we find a consolidated supply base, operating with profit margins kept in check by competitive pressure.

FIGURE 1

Increase of services-producing companies as a share of U.S. GDP



Source: U.S. Dept. of Commerce Bureau of Economic Analysis–Gross-Domestic-Product-(GDP)-by-Industry Data; Gross Output (http://www.bea.gov/industry/gdpbyind_data.htm)

In other words, the low-hanging fruit has been picked. So what will drive the next wave of value?

Fundamentally, we believe it is innovation—not just in product design or manufacturing technology, but also in business processes and models, and in the capture and utilization of data and information. A critical function for procurement in the future will be the capability to strike the right strategic balance with different suppliers between competitive pressure and associated uncertainty (which helps guard against supplier complacency, but also acts as

FIGURE 2

Effective sourcing of services, solutions and innovation

	Value drivers of what is being sourced	Key strategies and skills required
Sourcing innovation	• Creative ideas • Risk taking • New investment	• Joint problem solving and co-creation • Learning from failure
Sourcing solutions	• Knowledge and expertise • Ability to integrate assets and capabilities	• Communicate context • Apples to oranges comparison
Sourcing services	• People • Talent management systems	• Creative payment and incentive structures
Sourcing goods	• Process • Scale • Prior capital investment	• Tight specifications • Competitive pressure

Source: Jonathan Hughes and Danny Ertel

a powerful disincentive to supplier investment), and deeper collaboration and longer-term commitments to suppliers (which act as a positive incentive to supplier investments).

In our experience, most companies need to re-balance their strategic focus with more emphasis on supplier commitment and joint investment. Companies are not simply in competition for customers and revenue. They are also in competition with one another for preferred access to supplier innovation, ideas, "A-team" talent, and investment of various kinds. As firms in industries from semiconductors to bio-pharmaceuticals to financial services recognize this fact, procurement is increasingly charged with developing and implementing strategies to become a "customer of choice."

Drivers of past success will not drive future success

A service-oriented and innovation-powered economy requires procurement to develop new strategies and competencies. While still relevant, Kraljic's original sourcing matrix is no longer sufficient. It is implicitly based on markets for physical goods and the traditional relationship between supply, demand, power and pricing in such markets. Of course, the physical economy and associated supply chains still exist. Capacity constraints will continue to arise in many markets and lead to cost increases and/or supply shortages that lead to lost revenue.

Nonetheless, the traditional way of classifying categories of supply and suppliers focuses primarily on zero-sum power dynamics between a company and suppliers—and thus encourages an unhelpful over-emphasis on "bargaining power" and an under-emphasis on the power of engaging suppliers in the joint exploration of ways to work together that deliver mutual benefits. Or, as Kraljic put it: "The purchasing portfolio matrix plots company buying strength against the strengths of the supply market and can be used to develop *counterstrategies* vis-à-vis key suppliers."

Traditional ways of thinking about supply markets and suppliers, rooted in an industrial past, also fail to guide effective thinking about the fairly different risks and opportunities that arise in working with suppliers of services, and suppliers whose primary value derives from their intangible assets.

Services, solutions and innovations

Procurement groups need a new framework for driving additional value in different sourcing contexts, including complex services such as legal services, marketing and advertising, research, design and engineering and yes, even management consulting. Such categories of spend used to be off limits, but are now increasingly managed by leading procurement organizations. Even in manufacturing contexts, companies increasingly rely on top suppliers to collaborate in early stages of new product design and development. Such suppliers may make most of their money from manufacturing parts, tools or equipment, but they also supply critical services on which their customers rely.

Sourcing services is different from sourcing physical goods in a number of ways. For one, economies of scale do not reduce unit costs in the same way as they do in a manufacturing environment. For another, the profit drivers of service supplier are different from those of manufacturers. The primary asset of service suppliers is talent—people. And "A-Team" talent is highly mobile—in a way that physical assets are not. Procurement needs to think differently about leverage, risks, opportunities and value with suppliers whose business depends in whole or in part on selling services. Moreover, companies should often be sourcing more than discrete products and services. They should be sourcing *solutions* to important business needs. What do we mean by this?

Consider an industrial company we worked with for many years. For this company, the regular maintenance of chemical manufacturing and storage tanks constituted a major spend category. Historically, procurement sourced specific services including the set up of scaffolding for maintenance workers, a number of specific cleaning and maintenance services and, when the job was complete, the breakdown of and removal of the scaffolding. What happened when the company looked at what they needed to source in a different way? They ran a sourcing initiative without traditional requirements. Instead, they shared information they had never shared before with potential suppliers under a non-disclosure agreement (NDA) about their business model, manufacturing processes, production schedules and bottlenecks. They then asked their suppliers for new and better ways to maximize production up-time and reduce operating costs. What happened when they did this?

Most suppliers offered proposals and bids similar to those they had provided in the past. But one supplier noted that they were prototyping a new portable elevator system that might eliminate the need for scaffolding set-up and break down. The supplier's bid was more expensive than its conventional competitors—but it reduced maintenance and lost production time from weeks to days. The increase in revenue from more up time made up for the increased cost many times over.

Of course, as companies seek revenue and profit growth in a hyper-competitive global economy, a further mental shift toward sourcing *innovation* is required. In this realm, customers may not even be aware of the needs or opportunities relative to which suppliers may have new technology under development, new ideas or untapped expertise. Procurement thus needs to engage with suppliers in completely different ways. They need to encourage and reward supplier investment and innovation—and ensure a disproportionate share of that comes to them versus their competitors. Traditional RFX and bidding processes will not go away, but they need to be augmented with greatly enhanced "upstream" engagement with key suppliers.

Such engagement may take many forms, including not only joint ideation sessions with suppliers, but also regular joint strategic business planning—during which a customer and its key suppliers exchange information about their respective strategies, business plans and technology road maps, looking many years into the future. Customers who do this well will gain disproportionate influence over supplier investments, and the innovations that results. Suppliers will benefit from more information to guide their investments such that risks are reduced and time to revenue is accelerated.

Figure 2 is by no means exhaustive, nor are the value drivers, nor are the strategies and skills for each context mutually exclusive. Nonetheless, this framework highlights some of the critical ways in which the effective sourcing of services, solutions and innovation differs from the sourcing of physical goods.

The questions we ask determine our answers

In our work with procurement organizations across a range of industries, we have observed that most are guided by a set of fundamental questions, often to a degree they are not consciously aware of.

FIGURE 3

Procurement paradigms

Traditional procurement paradigm	New procurement paradigm
• Primary value is cost reduction and securing external supply of goods and services	• Primary value is solving business problems and delivering competitive advantage
• Competitive pressure and leverage over suppliers is key to value	• Collaboration with suppliers and balanced dependence is key to value
• Internal focus is on stakeholder compliance	• Internal focus is on being a trusted advisor to the business
• Manage transactions	• Manage relationships
• Analytical skills	• Business acumen and soft skills
• Own and execute	• Facilitate and enable

Source: Jonathan Hughes and Danny Ertel

- How do we extract more savings from our suppliers?
- How do we motivate suppliers to improve their performance?
- How do we get internal stakeholders to involve us earlier, and comply with sourcing strategies, policies and decisions?
- How do we define supplier requirements in a way that enables us to conduct "apples-to-apples" comparisons across suppliers and maximize competitive leverage?
- How do we get more innovation *from* suppliers?

There is nothing wrong with these questions. But as with any questions, they focus attention in certain ways, and reflect and reinforce assumptions that can be limiting. In any event, new solutions to business challenges and the identification and realization of new value will not come from asking the same questions. Below are a fundamentally different set of questions. They are not meant to replace the questions above, but rather to augment them and expand the scope of solutions and opportunities that procurement can uncover and address.

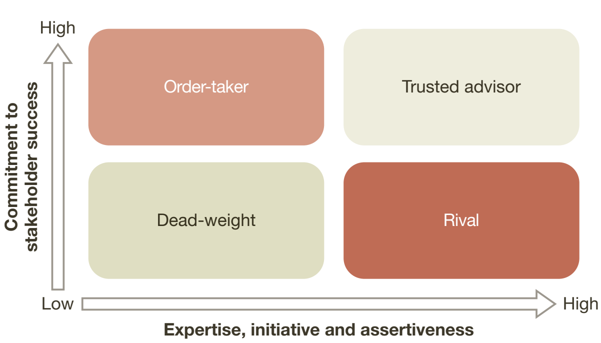
- How do our suppliers make money?
- What do we do that creates cost, risk or frustration for our suppliers? How do we inhibit their ability to deliver maximum value to us?
- How can we better support the goals and strategies of our internal business partners? How can we more effectively challenge their assumptions and thinking, while also remaining open to learning from them?
- How can we help our suppliers better understand the challenges and opportunities our business faces, so that they can propose solutions based on their unique expertise and capabilities?
- How do we create more innovation *with* our suppliers?

A new procurement paradigm

Sitting at the intersection of a company and its external suppliers, procurement can play a unique role in leveraging supplier assets and capabilities to drive innovation, actively support revenue growth and deliver competitive advantage—all while minimizing risk to a company's operations and reputation.

FIGURE 4

Ways procurement can engage with internal stakeholders



Source: Jonathan Hughes and Danny Ertel

In other words, procurement can—and must—focus on maximizing total value from suppliers. This requires a new procurement paradigm (Figure 3), or a revolution in the way procurement leaders and their teams see themselves and their role, the value they can add to their enterprise, and the ways in which they deliver value to the enterprise.

New metrics and KPIs for procurement

Currently, most procurement organizations focus primarily on a limited set of metrics and performance indicators—with cost-related metrics foremost amongst these. They also typically rely heavily on supplier spend levels to segment suppliers, and to make decisions about where and how to focus limited resources on supplier management. To be successful in the future, procurement organizations will need to learn from current leaders and expand what they measure to better align with an expanded focus and delivery of broader value.

For example, levels of spend (within a commodity or category, or with an individual supplier) are often a poor proxy for the strategic importance of that category or supplier. Often a more useful metric is "revenue-at-risk"—a more complex but also more meaningful calculation that links external expenditures to the customer revenue streams that depend on supplier inputs, whether those are materials, equipment or services.

Similarly, the current emphasis on cost-savings should be expanded with broader measures of value delivered—by suppliers and by procurement. For example, a few years ago we worked with a consumer products company that was in the process of designing a new product. Based on extensive research, the marketing organization believed that a more expensive packaging would be highly valued by consumers, which would lead to greater sales and higher profit margins. Rather than fight a battle to select the lowest cost supplier, procurement partnered with marketing and product designers to select a supplier that had the expertise to help design and manufacture a unique packaging solution. (Incidentally, this was not the supplier that the marketing group had initially wanted to work with.) The result was a substantial cost increase—but one that paid off in expanded market share, increased revenue and higher margins.

Companies put significant emphasis on measuring their return on assets and invested capital—naturally, because the shareholders that provide them with investment capital care about these metrics. But we now live in the world of the extended enterprise, where a majority of what goes into the products of most companies is manufactured, and often designed, by or with external suppliers; where an increasing percentage of a company's operations are outsourced and/or enabled by third-party solutions and services; and where a company's R&D

investments and patent portfolio are usually dwarfed by the combination of innovation investments and assets of its top suppliers. Consider that Unilever reported a few years ago that 70% of its innovations came from suppliers. World-class procurement organizations will therefore increasingly measure and report the returns they realize from supplier assets (RoSA), and the extent to which they are commanding and benefiting from a disproportionate share of supplier investment and innovation vis-à-vis their competitors.

New competencies for procurement

The transactional and routine activities (from PO processing to market analysis) that used to be procurement's focus are increasingly being automated or outsourced. What remains, as we have argued above, is for procurement to take on an increasingly strategic role within the enterprise. This entails developing the competencies that are most difficult to replace with software, and taking on a role that is so closely integrated with a company's core competencies and sources of strategic advantage that it cannot be outsourced.

Based on our benchmarking and work with clients, there are three broad competencies that procurement organizations generally need to strengthen. The first is business acumen. Analytical skills to calculate total cost of ownership or develop should-cost targets are valuable, but they are far less valuable than the ability to think like a business owner or executive, to understand the very different business models of different suppliers and how they make money (even when those suppliers operate in the same industry) and based on that, to determine how best to design an engagement model with a given supplier and construct contract terms as well as informal incentives to motivate that supplier to deliver maximum value.

The second competency is strategy development and strategic thinking. What passes for a category or commodity "strategy" within many procurement organizations would often be better termed a category "profile"—an often impressively researched and formatted report of past and projected spend, information about the supply market and the classification of spend or suppliers into segments like "strategic" or "bottleneck." Such analysis is useful, but it is not a *strategy*—a long-term plan that articulates important choices and explains why difficult choices and trade-offs must be made, and how. For example, if our company is highly dependent on a particular supplier, and our business is not particularly important to them, what should we do? Invest in developing one or more alternate suppliers? Or invest in trying to make our business more attractive to our current supplier—and if so, how? Framing such choices and rigorously articulating the costs, risk and benefits of different choices (under conditions of uncertainty) is the hallmark of true strategic thinking.

The third area of competence that is increasingly important, and often deficient, is that of soft skills, including: relationship building, influence, conflict management, negotiation, change management and leadership. For example, not too many years ago, procurement groups looking for negotiation training were often interested in the latest bargaining tactics and techniques. More recently, we have seen an increasing interest in building skills for a more strategic approach to negotiation focused on principled persuasion and joint problem solving, while also accounting for the psychological and emotional dimensions of negotiation.

Another example: We have seen a huge upsurge in requests for training focused on stakeholder engagement, alignment, influence and how to become a trusted advisor to internal business partners (Figure 4). This is a welcome change from a not too distant past in which many procurement organizations were focused on obtaining C-level mandates that they could use as a cudgel to enforce compliance from recalcitrant stakeholders.

A procurement road map to the future

Different industry sectors confront different procurement and supply management issues, and the pressures to bring procurement practices up to date with the realities of an innovation-driven and increasingly service-oriented economy will likewise vary. Nonetheless, we believe that almost any procurement organization that seeks to maximize the financial and strategic value it delivers to the enterprise must evolve and mature.

As we noted at the outset: Procurement is at an inflection point. Those organizations that evolve along a maturity model will drive innovation, deliver value and enable their enterprises' strategies. Those that remain trapped by old paradigms will continue to struggle in a 21st century world with new risks and threats, and miss out on new opportunities.

Creative Negotiating: RETHINKING the Right Way to Ink Purchasing Agreements

Long-term agreements between purchasers and suppliers are not conventional "one-and-done" deals—they are moving targets that require perpetual negotiation if they are to come close to delivering the value that inspired them in the first place. Here's how to think more creatively about keeping such agreements fresh, friendly and highly effective.

By Frank Mobus and Bill Sanders

Purchasers need to find new ways of dealing with suppliers.

It is commendable that so many procurement professionals have moved beyond the long-held transactional orthodoxies that pitted suppliers against one another to negotiate lower prices. Many of those pros now favor long-term agreements (LTAs) that yield better pricing because they allow the purchasers to concentrate their firepower on a few key suppliers. There are further benefits from lower transaction costs: fewer individual supplier files and scorecards to manage, for one thing. Equally important, purchasers can carve out the time for deep value creation that goes beyond price concessions and total-cost-of-ownership reduction alone.

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Yet LTAs are not the automatic answer either. With several decades of LTA history behind us (remember, U.S. carmakers were forging strategic agreements with selected tier one suppliers back in the 1980s, for instance), we can see how easy it is for LTAs to fall short of their original objectives.

In fact, what seems like golden opportunities to minimize materials and transaction costs and create more value can quickly become golden handcuffs. When purchasers fail to adapt their negotiating approaches to align with changes in their supply chain strategies or to accommodate shifts in the supply base, suppliers on which purchasing organizations have come to depend can sometimes become complacent. Advantages achieved by the supply chain organization can swiftly dissipate.

In our experience, successful LTAs hinge not so much on the letter of any agreement as on the long-term relationships between the buyers and suppliers. Sustaining those relationships requires more than vigorous negotiating in the old way. It calls for a whole new negotiating approach—a far more creative one.

Things fall apart, part 1: Caveman negotiating

The best way to make something right is to understand where it is going wrong. The problems can start as soon as the negotiators sit down with each other to define and develop the LTA. Lacking a fresh approach, the parties tend to be guided by experience. They resort to conventional negotiating tactics—and find themselves trapped in futile attempts to solve new problems with old tools.

Conventional negotiating leans heavily toward competitive price bargaining. It employs tactics designed to defend the negotiator's interests at all costs. Negotiators may cling to the "shut up" tactic in which little confidential information is disclosed for fear that it can and probably will be used against them. They may use the "room to negotiate" ploy, opening with an offer far from the price where they'd be willing to settle in an effort to soften up the other side, lower expectations and encourage concessions. There's a good chance they'll adopt the "no blink" tactic, where the first to concede is seen to be the loser. And it's very likely that they'll use the "trash talk" ploy, emphasizing the supplier's missteps while downplaying

Problems can start as soon as the negotiators sit down with each other to develop the LTA. Lacking a fresh approach, the parties may resort to conventional "caveman negotiating" tactics.

their strong suits in order to put the supplier on the defensive and give the buyer more bargaining power.

Some people refer to such transactional approaches as "caveman negotiating." This form of interaction is a classic power play, with each side seeking every ounce of leverage while anxiously defending its position. Unfortunately, the typical consequence of competitive bargaining is a trail of distrust. It precludes the close working relationship required for the LTA. The two parties may indeed put together an agreement, but it's highly likely that as soon as the ink is dry, one side will feel victorious while the other will feel bruised. In that case, the LTA is off to a very difficult start.

What's the way out of this dilemma? In recent decades, much has been made of the "win-win" situation. But that concept is widely misinterpreted. It baffles negotiators at the highest levels of major companies. Often they fall back on vague, generalized standbys: "If both parties expect to gain, and they're both satisfied with the deal, it's a win-win." But that definition tells us little. With few exceptions, the criteria of mutual gain and mutual satisfaction apply to most competitive bargaining outcomes. If people did not feel good about a deal, they probably wouldn't agree to it in the first place.

Leading business thinkers have struggled with what constitutes win-win. W. Edwards Deming, the American who taught quality to the Japanese, was an early mover on LTAs for U.S. businesses. But when asked how negotiations could strike a balance between competition and cooperation, his vociferous response was: "Balance? What the hell do you want balance for? Just get rid of competition!"

Things fall apart, part 2: Benign neglect

Deming evidently took his win-win straight. He expressed a hope held by many: that negotiation could be a non-conflicting activity, with successful LTAs simply steering away from differences. Once companies established these close working relationships, Deming went so far as to argue, they would "get beyond negotiating at all."

The reality, however, has fallen far short of Deming's rosy forecast. In practice, many LTAs suffer from benign neglect: no matter how equably they start out, they soon start to fray. Because negotiating the original agreement tends to be less contentious than settling a transactional deal, with a heavy emphasis on the positive benefits that will accrue over the long haul, there's a tendency to think the initial positive feelings will last forever. We have yet to see anyone establish a strategic relationship where someone says: "Sounds good now, but let's think about what can go wrong later." Yet that's precisely the question that needs be raised.

See if any of the following scenarios sounds familiar.

In a business-to-business LTA, there is often a downward spiral once the attention initially showered on the buyer's organization starts tapering off. Opportunistic suppliers who seek to gain by charging more while providing less can undermine the agreement. On-time delivery rates decline; lead times stretch out; prices inch up; joint innovation projects, which earlier generated so much enthusiasm within the supplier's organization, grow half-hearted. Even with suppliers that have the best of intentions, unforeseen problems still emerge: legitimate misunderstandings, differences of opinion or unexpected surprises. Especially disruptive are personnel changes, where new players—less informed and less committed to the relationship—are suddenly quarterbacking the supplier's team.

The apparent solution seems simple enough: Throw the bums out, or at least expand the supply base to keep the current suppliers on their toes. Unfortunately, this puts the supply chain organization right back where it started. But in many organizations, that's exactly what happens. To cite one example among many, we know a purchasing specialist who has been with a major aerospace company for 30 years. Every 10 years or so, the company would announce a grand plan to reduce the number of suppliers, only to reverse course and encourage the procurement department to expand its supply base. A few years later, this "accordion effect" would recur.

Things get even harder when buyers and sellers work closely together and are invested in the business relationship. The close feelings generated by any positive new relationship also work against raising differences when things go wrong. People feel uncomfortable when it comes time to say: "Here's how you let me down."

Buyers face an additional problem: loss of leverage. As a supply chain organization becomes more committed to a particular vendor, and the competition recedes from the radar screen, the favored supplier effectively becomes a single source. It's an unintended consequence—but a powerful one.

As their bargaining power wanes, buyers become even more gun-shy about negotiating. Rather than confront what has gone sideways in the relationship, they allow shortfalls to slide in the hope that they'll be corrected later. In fact, the opposite happens. Left unchallenged, lower performance standards quickly become the new normal. And before long, someone in top management raises the cry: "We're getting the short end of the stick—get some new suppliers in here!" And the accordion strikes up a familiar refrain: contraction-expansion, contraction-expansion.

In short, LTAs are not conventional "one-and-done" deals. They are moving targets that require perpetual negotiation. Without constant negotiation, LTAs can't possibly deliver the benefits that inspired them in the first place. It only stands to reason that these intricate relationships are more challenging to negotiate from the get-go.

Answering four big questions about the "problem child"

We recently consulted for a Fortune 100 company, a major manufacturer of consumer products, with hundreds of product lines. Their top managers called us after they had set up the LTA with one large supplier that they now described as "a problem child." The supplier had been helpful in some areas, but had badly under-performed in others.

In establishing the original agreement, the supply chain organization had outlined a number of areas of value enhancement, from shortening lead times to improving on-time delivery performance and dramatically reducing defect rates.

Many LTAs suffer from benign neglect: no matter how equably they start out, they soon start to fray. There's a tendency to think the initial positive feelings will last forever.

Price reductions over time were to be based on increased efficiencies. Most important, the LTA called for joint product development. In return, this customer had not only given the supplier exclusivity for its North American business, but had helped the supplier to qualify so that it could supply the company's overseas operations.

The problem, as they explained, was that the supplier received the LTA's benefits up front, while the benefits for the supply chain would accrue over time. At that time, the manufacturer wasn't getting everything they'd negotiated. They had four main questions:

1. How do we prevent "slippage" (or "opportunism") and get the performance we were promised?
2. How can we maintain leverage to deal with the supplier from a position of strength—particularly in the middle of joint development projects, when we can't switch sources?
3. How can we raise our points of disagreement without antagonizing the supplier and losing the cooperation we need to bring these joint projects to a successful conclusion?
4. How do we find mutual trust to work together more productively?

Our analysis of the consumer products company's relationship with this problem child of a supplier pointed to specific, actionable answers to each of those questions.

On the issue of slippage, the main source of performance shortfall stemmed from a lack of clarity over what was expected from the supplier.

We have yet to see anyone establish a strategic relationship where someone says: "Sounds good now, but let's think about what can go wrong later."

In our experience, companies that succeed in this area emphasize detailed standards, or KPIs (key performance indicators), with firm dates for the suppliers to hit.

Of course, there's a second step that goes with establishing detailed KPIs: close monitoring of the agreement. Monitoring goes beyond spot-checking. It involves a systematic approach to measuring the progress of the agreement. It's essential to have a task force staffed by managers from all departments affected by the agreement.

This highlights another feature of the more complex LTA relationship. The supply chain professional is effectively assuming a new role, shifting from transactional buyer to project manager. The crux of the redefined job is to track all of the value-generating initiatives and coordinate the efforts of other departments—engineering, production, logistics, accounting—that are party to the LTA.

By the same token, all those interacting with the supplier on joint projects must understand that they too have new roles—and are now part of this broader negotiation. They need to understand how to use those skills, too.

Now let's look at the Fortune 100 company's question about lost leverage. The root of the challenge is finding leverage when the supplier has effectively become a single source. Unfortunately, the consumer products company had created its own land mine by over-committing business before it could gauge the supplier's performance.

In conventional negotiating, an important planning tool is developing a BATNA (best alternative to a negotiated agreement) position. But for LTAs, we recommend that supply chain organizations develop a BALTA (best alternative to a long-term agreement). Wherever feasible, the organization should keep market lanes open by reserving a slice of business for a secondary supplier. By hedging its bet, the purchasers' supply chain continues to get market information and, most important, it gets pricing reconnaissance in the marketplace.

Even when an organization feels powerless facing a sole source, our message is that it has more power than its leaders may think. Those on the buying side feel vulnerable because of the drastic consequences of losing their supplier, as well they should. But they overlook an important question: What's going on with the other party? Specifically, how much of the account manager's quota is connected to this account? Half? Three-quarters? Perhaps even 100%? The point: The other side is also under enormous pressure to maintain the relationship.

Then there's the tricky question of raising disagreements—the third of the consumer products company's questions. Once a negotiating team realizes that it has more leverage than it had assumed, there is less cause for worry about upsetting the agreement by raising differences. In our work, we've noted that the closer the social relationship, the more reluctant people are to bring up differences and negotiate them to a successful conclusion. Overcoming our natural tendency toward passivity requires more negotiating energy.

So it is critical to build (early on) a framework for bringing up differences that are bound to crop up later. At the close of the original deal, at the point of happy handshaking, the negotiator should issue what constitutes both a polite warning and an invitation: "This is what we've agreed to, but follow-up is going to be crucial. Some things are likely to go wrong; unforeseen problems will crop up. If we see something go wrong, we're going to bring it to your attention. And we welcome you to do the same."

The value of an explicit forewarning is that it maintains your negotiating energy. Later on, as problems do surface, such forewarnings give the negotiator more freedom to bring up differences. As a result, the relationship can be maintained on an even keel.

The consumer products company's fourth question was about mutual trust. Our fundamental counsel is that trust can never be assumed. It must be built over time. More to our point, trust is negotiated when the two parties acknowledge both common goals and inevitable differences of opinion.

Let us give an example. We've done work for an EPC (engineering, procurement and construction) contractor that has successfully developed trusting relationships with major subcontractors. In one case, the company negotiated a $700 million deal with a final contract that ran to all of two pages! Contentious issues are unavoidable in the EPC business, and vigorous debate is essential. Even within a context of competitive negotiating, the firm had successfully built a cooperative framework based on mutual trust.

Once it's agreed that building trust is central to any successful LTA, the question we get from buyers and sellers alike is: What techniques can accelerate trust building? Our recommendation is to engage in "confidence-building measures." Specifically, that means offering unexpected concessions—"delight factors"—that generate good will.

For example, sellers will sometimes provide extra consulting, free upgrades, product samples or information about the latest trends in the marketplace. Supply chain professionals add value to the relationship when they open the door to more business for the supplier. Beyond serving as a reference, they might write a white paper, perform a case study or even serve as a demo site.

For strategic relationships to work, it's imperative to recognize that the deal you've negotiated is only the beginning. Yes, the starting point of any successful LTA, established up front, is that each party agrees to look out for *both* sides' interests in building mutual value. But each party must *keep* living up to all commitments. Each must *continue* to negotiate to make sure that the agreed-upon deal—with all its value-generating potential—is the deal it actually gets.

This third approach is a world away from conventional negotiating, based on hard bargaining, that can kill the relationship before it gets started. It is markedly different from the simplified win-win

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approach that emphasizes harmony at all costs and prevents negotiators from facing the differences that are bound to emerge. It emphasizes collaboration and trust building. It requires negotiators to confront, head-on, the conflicting issues inherent in complex agreements rather than skirting them.

In effect, this new approach is a creative endeavor, requiring new solutions to unexpected problems or better solutions than existing ideas. Because things will change and will go wrong, both parties need the creativity and the drive to reach outside the bounds of the current agreement and find new ways to implement, extend or modify prior agreements—for mutual benefit.

Challenging? Yes. Impossible? No. These complex relationships represent golden opportunities when negotiated wisely. Purchasers and suppliers alike owe it to their shareholders to try.

Long viewed as a low-impact, low-dollar function, MRO management is increasingly recognized as an opportunity to lower costs and boost performance. Leading companies are taking a fresh approach, moving steadily toward an integrated approach to MRO that facilitates operational excellence and promotes the total cost of ownership. A new study sheds light on this shift.

THE MRO REVOLUTION: LEADERS, EVOLVERS AND TRAILERS

IN SUPPLY CHAIN CIRCLES, MRO MANAGEMENT HAS ALWAYS BEEN SOMETHING OF AN ORPHAN. The function has struggled to escape its back office image, and typically is characterized by fragmented decisions made by multiple individuals who represent multiple sites and business units. None of the parties involved has a full view of the MRO value chain, resulting in management practices that are well intended, but suboptimal. They manage MRO[1] independently, with little communication among them, and rely on data collected and stored in siloed systems, without the benefits of any strategies for process governance or unified data maintenance.

With few standard processes in place to manage MRO—how supplies are purchased, stocked, consumed and analyzed—and little or no focus on performance measurement, MRO managers' decisions tend to be based on subjective rationales expressed in statements such as: "I like that supplier," "I don't have the time to set up preferred suppliers," or "I have always bought parts that way."

By Steve Tracey, Kusumal Ruamsook, Lauren Bechtel and Carol Colgan

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Consequently, MRO management has been marked by signs rarely seen in supply chain activity of direct materials today: an expansive base of suppliers; minimal demand visibility; excess, obsolete and dormant inventory; and limited investment in both talent and information technology. If they've stopped to think about it at all, senior executives have tolerated such undesirability with rationales such as: "We have a hard time justifying MRO integration because we neither know what the actual MRO spend is, nor have an understanding of total cost of ownerships," and "MRO involves low-cost items with little potential for savings or value gained from investing in improvement."

That stance may once have been excusable but it certainly is not now. Costs associated with MRO are substantial, and rising; and the substandard management of MRO activities hurts performance in many unforeseen ways.

This article draws on recent research conducted by the Center for Supply Chain Research (CSCR) at the Smeal College of Business at The Pennsylvania State University to show how MRO management is changing for the better. The study combined quantitative data on 40 activities in the MRO value chain with qualitative findings to provide insights that the authors believe can be valuable for supply chain managers who are keen to professionalize and modernize their MRO operations. (See sidebar: About the research.)

First, though, it's important to do a reality check about MRO practices today.

The surprising costs of MRO management

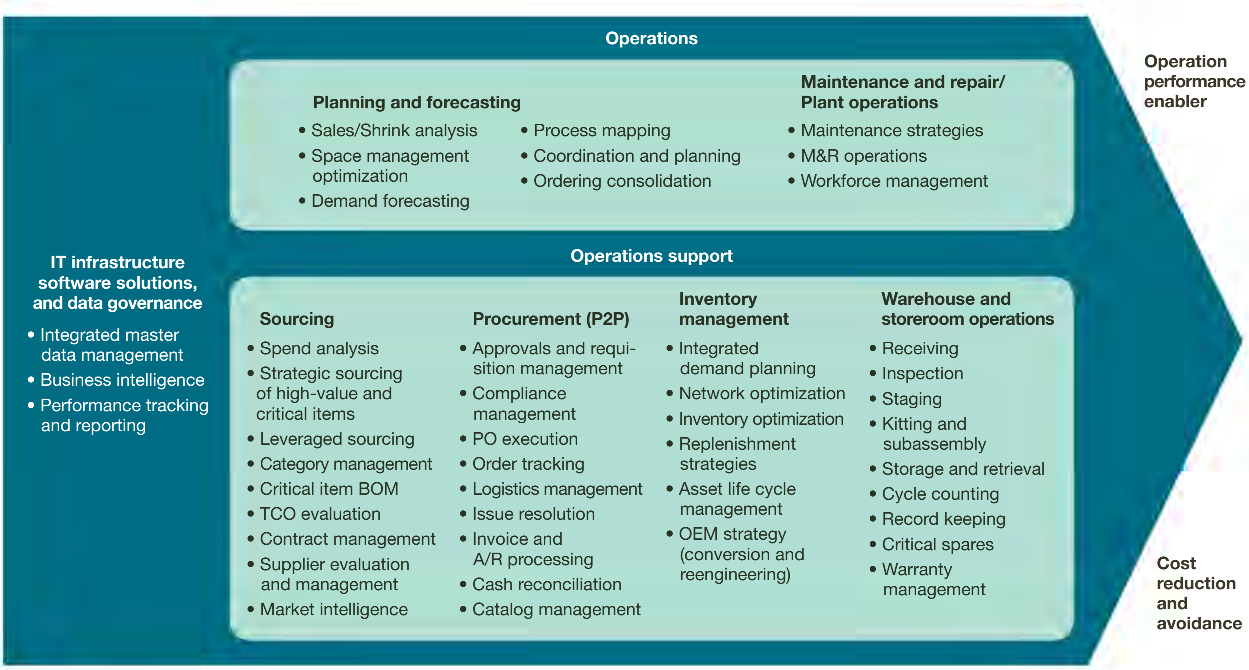
MRO management spans a host of activities across the MRO value chain (see Figure 1). Key management processes include identifying, sourcing, procuring, storing, record keeping and issuing the requisite MRO parts and tools to support operations activities. MRO management also requires the coordination of services such as outsourced procure-to-pay (P2P) processes, storeroom operations, inventory management and reliability. A company's maintenance strategies, demand planning and forecasting, IT infrastructure and applications and data governance are part of its MRO processes and support infrastructure.

Nowadays, aggregate activity across the MRO value chain accounts for 5% to 9% of total indirect spend in typical manufacturing companies, and as much as 10% to 20% for pharmaceutical manufacturers and utilities. That's a substantial increase compared to 20 years ago when MRO costs as a percentage of total indirect spend ranged between 3% and 12%.[2]

Furthermore, the MRO category has steadily grown to account for a larger percentage of total procurement expenditure, largely because continued increases in automation

FIGURE 1

The MRO value chain at a glance



Source: Center for Supply Chain Research, Smeal College of Business, PSU and complexity of capital equipment necessitate more repairs and maintenance. To put that in perspective, our experiences suggest that MRO, if captured accurately, can represent nearly 10% of a company's expenditure, with higher percentages in manufacturing industries.

Costs related to MRO purchasing are just as startling. The sporadic nature of MRO demand—involving low-value, high-volume items mixed with high-value, low-volume specialized items—leads to purchasing processes that are complex, time-consuming and highly transactional. Our experience suggests that MRO purchasing can make up 50% to 70% of a company's total buying transaction volume.

Moreover, companies with poorly managed MRO suffer from extra costs and inefficiencies that their managers may not recognize—notably the inefficiencies associated with searching catalogs, quoting and not rationalizing inventory. Too often, highly-paid maintenance technicians spend their time searching parts catalogs, getting quotes from suppliers and foraging for parts in the storeroom rather than working on repairs and planned maintenance activities. Working capital is unnecessarily tied up in inventory of unwanted, duplicate and obsolete items.

Adding to the difficulties, inadequate stocks of spares and consumables and supply disruptions of critical parts can often occur, resulting in the equipment asset being offline and production schedules being disrupted. And there are many knock-on effects such as excess labor costs due to unplanned shutdowns and/or overtime, scrap and defective product, lost sales and slipshod customer service. It is still very difficult to identify such intangible effects.

About the research

This article is based on a research study conducted by the Center for Supply Chain Research (CSCR) at the Smeal College of Business at The Pennsylvania State University, in collaboration with *Supply Chain Management Review*, and supported by the CSCR's corporate sponsors.

The study combined data collected from 171 online survey respondents with insights from the literature, the authors' experiences working with companies and interviews with subject matter experts on indirect spend and integrated MRO supply execution. The largest group of survey respondents was from the manufacturing sector (41%), followed by the transportation, warehousing and distribution sectors (16%), wholesalers (9%), and retail companies (8%). More than 10 different industries make up the remaining 26%.

Respondents represented both smaller businesses with less than $50 million in annual revenue (45%) and large companies with revenues of more than $1 billion (45%). Respondents' annual MRO spend is mainly less than $1 million (40%), with the next largest groups tied (14%) between the next lowest spending range of $1 million to $4 million, and the highest spending band of more than $20 million.

Positive signs of change

The good news is that in recent years, more and more companies have been improving their MRO practices. Faced with rising pressures to cut costs and do more with their existing resources, they are recognizing that they can turn MRO from a headache into an enabler of operational excellence that contributes to overall revenue and profitability. The evolution of sophisticated MRO tools and technologies (for example, integrated software, analytics and KPI dashboards) provides further opportunities for MRO improvements.

Leading companies are shifting away from the back-office mentality and toward integrated approaches that see and manage MRO as a true value chain. They emphasize best practices in areas such as process standardization, end-to-end alignment, outcome and reliability performance, performance measurement, and data-driven and intelligent-based decisions and planning. Based on the authors' collective experience, interviews with experts and insights from the literature,[3] we have identified discrete areas in which an integrated approach to MRO best practice is most apparent (see Table 1).

Effective MRO management: Evolution and evidence

To further explore the shift toward MRO best practice and validate our empirical findings that the shift is accelerating, the authors surveyed 171 practitioners across a wide range of industries and company sizes. Acknowledging that companies are at various stages of MRO management evolution, the research challenged respondents to evaluate their companies' operations according to the following characteristics of integrated MRO management:

1 Companies have established reliable strategies for their operations.
2 Companies make decisions with ROI in mind.
3 Companies make decisions with a payback period

TABLE 1

Comparing traditional and integrated MRO management approaches

MRO value chain elements	Traditional approach	Integrated approach
Requirement planning and forecasting	Fragmented planning based on limited inventory analysis	Data-driven, predictive planning aligned with maintenance and operation objectives
Sourcing	Price-focused sourcing approaches, with limited focus on measuring and monitoring compliance	Strategic sourcing approach based on comprehensive spend analysis, and supply segmentation, with focus on total cost of ownership
Procure-to-pay processes	No standardized processes, with limited or standalone use of e-business tools	Standardized processes across individual business units and sites, using integrated e-business tools with order tracking capability
Inventory planning and strategies	Limited use of inventory segmentation (e.g. ABC, criticality) analysis and inventory performance tracking	Inventory deployment and replenishment strategies devised based on inventory segmentation analysis, with emphasis on achieving performance metrics
Storeroom operations	Siloed operations with no standard work process, limited data control, and little or no technology investments	Standardized work process and policies, with technology enablers and close collaboration with M&R operations
Maintenance and repair operations	Reactive maintenance methods	Predictive/proactive/reliability centered maintenance (RCM)
IT infrastructure, software solutions, and data governance	Basic, disparate MRO data systems, with decentralized master data management and no or non-unified governance model	Best-in-class MRO data management (MDM) system supplemented by business intelligence tools, with unified master data and comprehensive governance model

Source: Center for Supply Chain Research, Smeal College of Business, PSU

in mind.

4 Companies use key performance indicators (KPIs) in evaluating suppliers/vendors.

The answers enabled the authors to classify respondents into three “MRO maturity” groups: We named them leaders, evolving and trailing. Most companies (75%) are indeed moving in the right direction along the maturity continuum, with the mainstream (55%) in an “evolving” stage and 20% far ahead in integrated MRO management. The remaining 25% have yet to shift from traditional, fragmented approaches. Thinking back 10 years ago and using the same MRO maturity criteria, we perceived that today’s leaders would have looked more like what we now call evolving, and a significant percent of today’s evolving companies would have resembled our current trailing group.

With a maturity classification system in place, we conducted an analysis to examine whether there are relationships between the maturity levels and approaches used in managing the 40 activities in the MRO value chain conceptualized in Figure 1. The analysis shows significant associations in 15 of the 40 activities, suggesting that there are indeed distinct patterns of activity that differentiate the three maturity groups (see Figure 2).

Further analysis, focused on these 15 activities, revealed that centralized in-house management is the most often adopted approach by all three maturity levels. A closer look at the data showed that the leader group manages MRO activities centrally and in-house more widely (78% of leaders do so) and more consistently across all 15 activities. (About 57% of the evolving group and 50% of the trailing group use centralized in-house approaches.)

It is worth noting that despite limited use of outsourcing of MRO management by all three groups, the leader and evolving groups are distinctive in terms of the scope of their outsourcing implementation. Outsourcing is used in 14 of the 15 activities by some respondents in these two groups; the leader group is the only one to outsource demand forecasting, most likely because of the need to access the specialized technology and skills required in that activity. By contrast, outsourcing is used in only five activities by the trailing group, including critical-item bill of materials (BOM), integrated demand planning, network optimization, master data management and business intelligence.

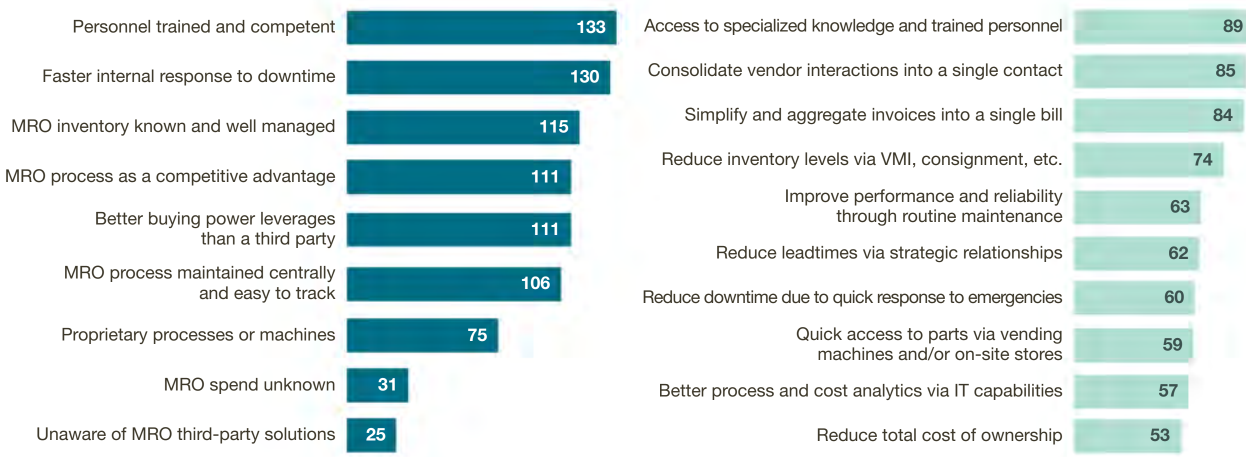
Respondents are divided fairly evenly between those that manage MRO using both in-house and outsourcing approaches (48%) and those that manage MRO entirely in-house (45%). The main reasons given for managing MRO internally are the existence of trained and competent personnel, faster internal response to downtime and the fact that MRO inventory is known and well-managed (see Figure 3). Interestingly, whether done in-house or outsourced, the top reason for taking either approach is the competence of the personnel employed.

The MRO maturity gaps

To determine where supply chain managers should put the most effort into moving along the MRO maturity curve, the study picked out two areas of divergence in the management

FIGURE 2

Reasons for managing MRO in-house vs. outsource



Source: Center for Supply Chain Research, Smeal College of Business, PSU

approach employed—the first in which the leader group is outpacing the field in the widespread use of the centralized in-house approach to MRO management, and the second showing the management area in which the trailing group is lagging furthest behind the field (see Figure 4).

Looking at those who use the centralized in-house approach, leaders use three areas more extensively than their peers: 83% of the leader group employs master data management, while only 56% and 54% of respondents in the evolving and trailing groups do so (27% and 29% gaps compared with leaders, respectively). The next largest gap is found in total cost of ownership (TCO) evaluation (26% and 37% gaps), followed by KPI and reporting (24% and 26% gaps).

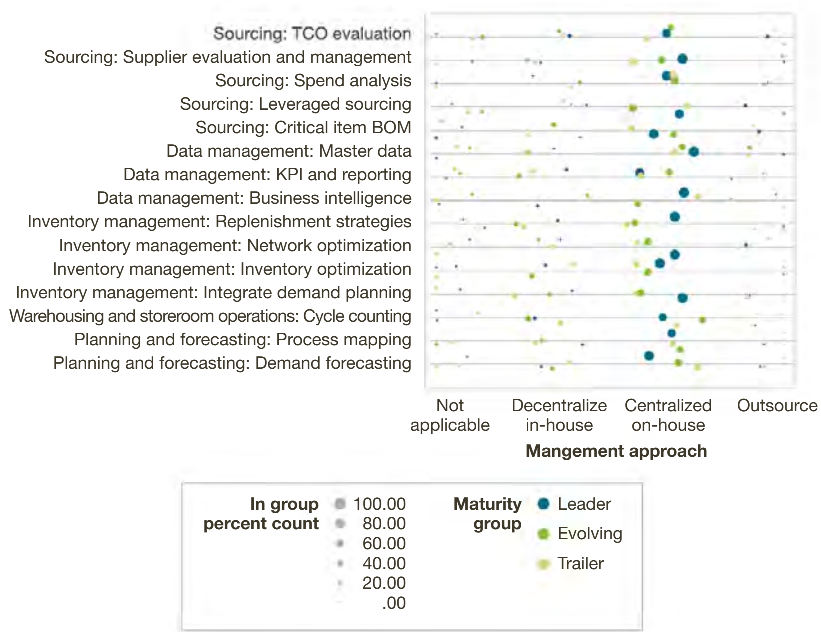
Looking at the other dimension—where trailing groups are furthest behind as gauged by lack of coherent management strategy—it is clear to see that a 32% gap with the leaders is in TCO evaluation (only 6% of leaders lack management strategies whereas 38% of trailing group companies do). There are also big gaps in network optimization and integrated demand planning.

Overall, with the exception of TCO evaluation, the trailing group is most deficient in MRO activities related primarily to inventory management, while the leader group is furthest ahead in activities that reflect its data-driven and performance-oriented characteristics.

In fact, based on our experience, leading companies

FIGURE 3

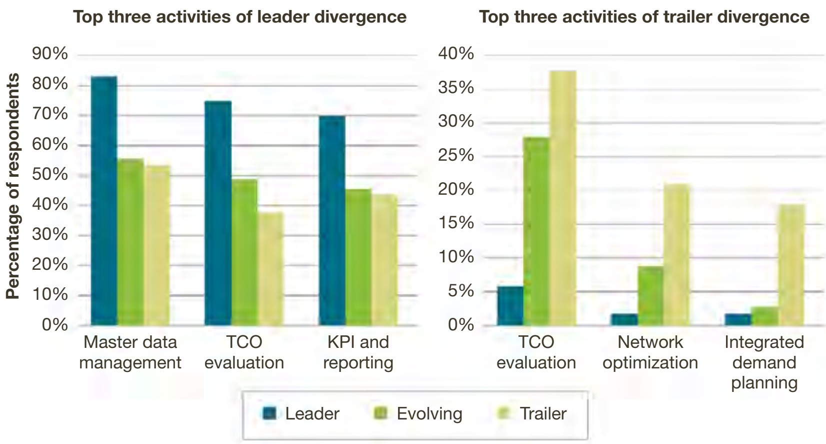
Management approaches used by the three maturity groups across 15 significant MRO activities



Source: Center for Supply Chain Research, Smeal College of Business, PSU

FIGURE 4

Top activities of divergence



Source: Center for Supply Chain Research, Smeal College of Business, PSU

took a pragmatic approach to setting MRO performance baselines and building usable internal data systems as far back as 20 years ago. Inventory and maintenance systems were next in line for improvement, involving systems clean-up and maintenance. Throughout, the importance of total cost became apparent as the leading companies recognized that the real issues that affect MRO best practice center on "process" rather than "piece price."

Key takeaways

So what can we conclude from this study? We envision three priority actions that can help both evolving and trailing groups advance along the continuum of MRO integration.

- **Centralize more MRO activities.** Most companies are already doing this to some extent, but they should expand the approach across a wider range of activities in the MRO value chain.
- **Organize all the relevant data.** Companies should focus on integrated master data management (MDM) with a comprehensive, unified governance model. Asset data should be collected and stored in a centralized data warehouse that is accessible to all business units and sites. MRO master catalogs and a centralized MRO catalog system should be developed for enterprise-wide use, leveraging industry-standard taxonomies, tools and knowledge bases. According to expert interviews, many of the leading MRO practitioners have invested in best-in-class MDM systems that link seamlessly to legacy systems (ERP/EAM/CMMS) and are supplemented by business intelligence tools.
- **Strive for data-driven and performance-oriented practices.** When companies have established an integrated MDM and governance structure, they should put their data to use to inform their MRO management decisions, focusing first on TCO evaluation.

We propose these two additional priorities for the trailing group:

1. **Get inventory in order.** Because inventory management is an area in which trailing companies are very far behind, here is what can be done to progress from traditional to integrated approach:
    - Adopt data-driven, predictive planning based on detailed analyses of inventory characteristics and requirements (for example, data on equipment bills of material and mean times between failure).
    - Align inventory planning with maintenance and operation objectives.
    - Devise strategies for inventory deployment and replenishment that cater to different MRO items, based on segmentation analysis (for example, by ABC, criticality, and/or consumption rates).
    - Optimize inventory networks to increase availability, focusing not only on returns on invested capital, but also on operations support using facility-to-facility inventory transfer capabilities.
    - Use scorecard to track KPIs (for example, stock-out frequency, fulfillment rate and percent of inactive inventory), and identify areas for improvements.
2. **Leverage third-party expertise.** Not all companies can train their teams to be MRO integration experts. Knowledgeable, experienced third parties can accelerate companies' progress along the MRO maturity continuum.

(Endnotes)

1 MRO is defined in this study as: "spare parts, materials, industrial supplies, and services used in production process that do not become part of or are central to the finished product, as well as those necessary to keep plant and facility assets operating safely at optimal levels of performance."

2 The authors acknowledge that 20 years ago, many companies lacked the internal systems to make vendor spend data readily available. The inability to cleanly capture spend data may be one of the reasons for such low percentages.

3 GEP (2015): The MRO Inventory Dilemma: A Two-Pronged Approach to Optimize Stock and Drive Savings. Global e-Procure (GEP) whitepaper; Paquin, R. (2015): Maintenance, Repair, and Operations (MRO): Turning Downtime to Dollars. Aberdeen Group Research Report, July 10; Sikich (2013): Get More with MRO: Maintenance and Repair Operations for Manufacturers." Sikich Blog, August 13; Venkatraman, R. (2014): MRO Strategies for Reliability Excellence. Hamiltonian Systems, Inc. whitepaper, August 27.

CHOICE

Supply chain managers are overwhelmed with choices and information. Too often the result isn't decisiveness, but gridlock. The answer: Put in place strong leadership that gets to the choices that drive supply chain excellence.

"Water, water every where, Nor any drop to drink."

From *The Rime Of The Ancient Mariner*

The old sailor telling his tale in Samuel Taylor Coleridge's poem has just returned from a long voyage. He recounts how he shot an albatross that was once viewed as a good omen for the voyage, and how he was then blamed by his crew when the winds turned against them and they were trapped on a ship going nowhere, depleting their supplies. They were surrounded by salt water, but neither he nor the rest of the crew had a drop of fresh water to drink. It became the albatross around his neck.

By James A. Tompkins

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OVERLOAD

In today's business world, those lines could be updated for any manager who, like the ancient mariner, is surrounded by data and information and choices to be made based on that information—in fact, there can be so many choices and so much information that it is difficult to move the ship forward. Think of it as "choice overload." As with the ancient mariner, the plethora of choices becomes an albatross around the manager's neck.

Who hasn't heard the story of the distribution or transportation manager who boldly went out on a limb to implement a new technology and became a hero, when it went well, or a zero when it failed?

While choice overload could apply to any functional area of an organization, I believe there is no area within product-based companies where this is more applicable than the supply chain. Managers are challenged every day to make the right decisions to get orders out the door, deal with the inevitable hiccups of late deliveries, inventory shortages and quality miscues all while coming up with new processes to enable new business strategies. Therefore, although this article has application across a business, the necessity for avoiding choice overload is greatest when it comes to making supply chain choices. For that reason, I think it is important that supply chain managers put in place a foundation of strong leadership that can cut through the choice overload and make the decisions that drive supply chain excellence. The following is a look at what I call the "cycle of choice overload" as well as recommendations for supply chain leaders who want to break the vicious cycle, and get the albatross off from around their necks.

The cycle of choice overload

The first time I wrote the introduction to this article it sounded like I was writing advertising for a new energy drink. The feeling was a never-ending string of questions like:

- Are you having a hard time keeping up with the pace of business?
- Has the rat race made you feel like a mouse?
- Is your job on a treadmill—you keep running faster but don't get anywhere?
- Has the vicious cycle of your daily routine worn you down to the point of inaction?
- When you see a hamster running in one of those wheels, do you empathize with the hamster?

It felt like I should answer those questions with a response like: "Buy the new miracle, vitamin-packed energy drink that will restore your energy and allow you to take control and win the gold medal in the rat race that is today's challenging business environment." The only problem with this is that there is no new energy drink to achieve these results. In fact, the reality is that you can't overcome feelings of being overwhelmed through an energy drink, but only by understanding the downward cycle of choice overload.

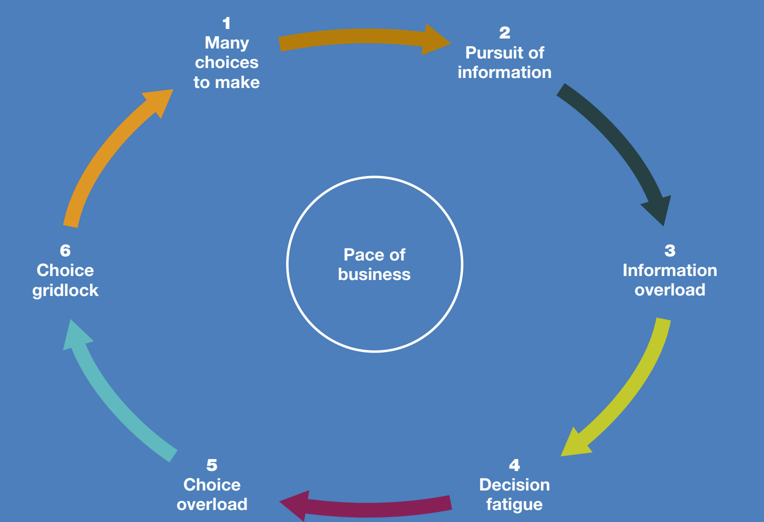
Let's start by taking a look at Figure 1, which illustrates the endless cycle of choice overload. The chart can be viewed from the perspective of an individual or an organization, but I'd like to consider the individual perspective.

Figure 1 begins with the "many choices to make," that is the hundreds of decisions that you, as a manager, must face and cope with in order to adapt to the accelerating pace of business and the resulting changes in the competitive landscape.

In step 1, you are faced with more choices than ever before. These could range from the simple buy versus make decision that might range from managing a process in house versus outsourcing it to a third-party logistics provider to automating a conventional

FIGURE 1

Choice overload



Source: Tompkins International

warehouse or creating new and innovative processes to deal with same-day shipping in the fast-changing world of e-commerce fulfillment.

Many of these decisions are make-or-break for your supply chain—and your career. Who hasn't heard the story of the distribution or transportation manager who boldly went out on a limb to implement a new technology and became a hero when it went well, or a zero when it failed? After all, there's a reason for the old saying: "No one ever got fired for buying IBM."

The fear, uncertainty and guilt that accompany a make-or-break career decision leads to step 2, "the pursuit of information." In an effort to assure yourself that you're making the right choice, you seek out more and more information. And, with more data being collected and analyzed from more nodes in the supply chain, managers have access to more data than ever before, leading them inexorably to step 3, "information overload." Yes, there is information, information everywhere, but without the right tools and analysis, no one can make sense of it all.

That gets us to step 4, "decision fatigue." This is where managers are exhausted from the consideration of the many options in front of them, which all seem equally good—or bad. It's like staring at the dozens of items on a take-out menu, all with appetizing descriptions. As a result, managers find themselves at step 5, "choice overload." Ultimately, just as we often ask the waiter to come back to the table time and time again before ordering, choice overload prevents managers from making choices in a timely fashion. Thus the choices that have yet to be made pile up on top of one another.

In step 6, "choice gridlock," decisions are postponed, nothing gets done and you may begin to empathize with the hamster. Ultimately, the cycle repeats itself and you are back at step 1, with a new set of choices to consider and even more information to work through.

While I just looked at this from the perspective of the individual manager, this never-ending spiral can happen just as well to an organization. The amount of frustration that results from the choice overload cycle is huge; without strong leadership in place, this cycle has been responsible for many organizations that fall behind their competitors because they were unable to keep pace with the demands of the market. The challenge for an organization, or a supply chain manager, is to define the kind of leadership response that is required to bust out of this vicious cycle; get back on top of choice overload; and raise the supply chain organization to a level of adaptation that results in success. Here are my step-by-step strong leadership responses to the cycle of choice overload.

Strong leadership for step 1: Many choices to make

Strong leadership will address "many choices to make" through prioritization. Now, some view prioritization as deciding which task is most important. Second, third and so on. While that is a form of prioritization, it is not what I mean by using prioritization as a strong leadership response. Instead, a strong leader prioritizes by eliminating the choices that are trivial and have no real impact on the path forward. Next, the strong leader makes "no-brainer" choices quickly and decisively. From there, the strong leader delegates low-impact choices to someone who can make a decision without consuming the time of people who are needed for more critical choices. By then, the strong leader can launch the more thoughtful task of deciding who should make the remaining important choices that will drive excellence.

Interestingly, by the time the trivial, no brainier, and low-impact choices are satisfied, the list of decisions that remain to be made is much shorter and manageable. Once it is pared down, choosing which individual or group of individuals should make which, the hard choices are much easier, as often more than half the original set of tasks has been eliminated. When making decisions about who should make choices, care must be taken to ensure that different perspectives and views are represented. Obviously, assigning four people who share the same view does not help come to the right decision, as you can end up with a group think response.

Once the correct people are assigned to make the important choices, the strong leader's role is reduced to managing timelines, participating in the establishment of criteria for the choices and ensuring that once closure is reached, the implementation of the choices takes place. If an individual is selected to participate in several choices, a strong leader will either alter assignments or prioritize the level of importance of the choices.

Strong leadership for step 2: Pursuit of information

As anyone who has spent hours of time Googling a topic on the Internet knows, there is an unbelievable amount of data available on almost any subject. It's easy to go down a rabbit hole following one link to another. Many people want to know it all: They have a desire to seek information that is interesting, but not really needed to make the assigned choices. Strong leadership, however, knows the difference between data and information. Indeed, a strong leader will make certain that only the information truly needed for the task at hand will be pursued. Lastly, a strong leader is certain to characterize the level of precision needed in the information being sought. The level of effort required to obtain the information that is really needed can easily approach a factor 10 times over the data sought by some managers in making choices.

Strong leadership for step 3: Information overload

The most frequent reason for "information overload" is weak leadership during step 1 (by not prioritizing choices) and step 2 (by pursuing too much data or irrelevant information). Strong leadership eliminates clutter and useless information and cuts to the core of the trends and data required to make choices. An additional factor here is the failure that often occurs when weak leaders try to force people to make decisions sooner than the right information is available upon which to make choices. This pressure is rarely productive and also rarely leads to sound decisions. Moreover, it often wastes a tremendous amount time and undercuts the ability for individuals or teams to make good choices.

Managers are challenged every day to make the right decisions to get orders out the door and deal with the inevitable hiccups while coming up with new processes to enable new business strategies.

Strong Leadership for step 4: Decision fatigue

Strong leadership minimizes "decision fatigue" by developing well defined and agreed upon decision criteria, choice deadlines, and the right focus while making choices. Strong leadership also makes sure that people are well informed about other choices that are being made within the organization.

That is because the consequences of one choice often have an impact on another choice being made elsewhere. Strong leaders also realize that when more collaboration is required to make a choice, more energy is also required. Therefore, to reduce decision fatigue, strong leaders must also only involve the people who should be involved. Finally, strong leadership minimizes second-guessing and encourages people to close out choices and move on; that includes choices in which they were involved and decisions made by others in the organization. Continual second-guessing or re-litigating choices that have already been made will significantly contribute to decision fatigue. It will also reduce the effectiveness of an organization's progress. If bad choices have been made, they should not be revisited or re-argued, but instead should be viewed as a new choice and begun anew.

Strong leadership will make sure that decision fatigue and choice overload do not lead to stagnation.

Strong leadership for step 5: Choice overload

Strong leadership will make sure that decision fatigue and choice overload do not lead to stagnation. Sometimes called "analysis paralysis," stagnation can spread choice overload like a virus. Combined with the pressure to make choices, stagnation can result in step 6, "choice gridlock." Strong leadership is needed to manage "choice overload" and to reduce the pressure and stress that so often leads to gridlock. Strong leadership will orchestrate a time out to reduce fatigue by making some no-brainer choices and utilize that momentum to get the organization moving forward again.

Strong leadership for step 6: Choice gridlock

Strong leadership must realize the criticality of choice gridlock and the urgency to eliminate it. Just working harder while maintaining the status quo is not enough; the organization needs a reset and everyone bogged down by the gridlock must be aware that it has happened. The organization of the choices and the responsibility of the choices must be dramatically changed. Fear of making bad choices must be eliminated and people must be made aware of the importance of getting closure.

Strong leadership makes it clear that not making a choice is a choice. In fact, procrastination is also a choice, one that leads to gridlock and that must be broken through. Procrastination, and the architecture or structure of choices, must be altered; meanwhile, new realistic deadlines must be established. Patience when facing choice gridlock is not strong leadership; rather, it encourages more procrastination.

Choices, choices every where

Organizations and individuals have a large number of choices to be made every day. Most are straightforward and can be made quickly. Many, however, are important and need to be made after considering many factors. The old adage "you make your choices and then your choices make you" is true. Due to the increasing pace of life and business, making timely choices is more important than ever.

Unfortunately, many of us are experiencing choice overload. The impacts of this are enormous—too often, overload begets gridlock and, like the ancient mariner, gridlock becomes an albatross around a manager's neck. It is only with strong leadership that choice overload can be eliminated and an orderly process of making high quality, timely choices may be restored.

Remember: The choice is yours.

Defining excellence in the advanced procurement organization

Many companies have little visibility into their external spend in a detailed and holistic manner; it is fragmented, managed in silos by disparate stakeholder groups, and under-leveraged as a result.

ByYves Thill and Jennifer Garlitz

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There are three principal value streams in managing a business comprised largely of all the goods and services that a company procures externally. Those are revenues, people (activities and costs), and "all the rest." For many industries, this external spend represents an astounding 40% to 70% of a company's total cost base. However, many companies have little visibility into their external spend in a detailed and holistic manner; it is fragmented, managed in silos by disparate stakeholder groups, and under-leveraged as a result.

This situation starkly contrasts with how leading procurement organizations go about managing spend. Our research shows that companies that excel in procurement value-add invest in a supply management capability that delivers more than double the performance of the average procurement function while earning the executive mandate to drive value beyond cost. This raises the following questions:

1 What does excellence look like for a world-class procurement organization?

2 As procurement functions become more advanced and the value expectation continues to increase, how does procurement best organize itself for continued success?

What does success look like for a world-class procurement organization?

Leading organizations boldly position procurement as an ongoing critical driver of enterprise value. They deliver higher performance and achieve a competitive advantage through long-term category strategies and extensive supplier partnerships. They continually invest in their team and capabilities to sustain efforts in the long term. In short, they achieve a significant durable supply advantage through developing a combination of category, supplier and team excellence. Figure 1 summarizes procurement leadership characteristics based on A.T. Kearney's recent Assessment of Excellence in Procurement study.

Category excellence. By using a full breadth of sourcing strategies and applying deep analytics and category insights, leaders generate more than twice the financial impact of typical companies. They have developed long-term category strategy playbooks and make comprehensive use of multiple strategic levers—from establishing deep transparency into all cost drivers to specification optimization and changing the nature of demand.

Supplier excellence. Procurement leaders have operationalized strategic supplier relationship management as their most important driver of future competitive advantage. These leaders harness the energy of their supply bases by segmenting and working with their suppliers in differentiated ways, including collaborating with select suppliers in strategic long-term partnerships focused on driving end-to-end cross-organization cost reduction, managing supply risks, and enabling growth through supplier-led innovation.

Team excellence. Procurement leaders proactively collaborate with business and functional partners to support broader enterprise objectives. They equip themselves with the talent, capabilities, processes and tools to develop high-performing teams that build business alignment and lead continuous improvement initiatives. Increasingly team excellence includes procurement being a "net importer and exporter" of talent where exceptional professionals are both "imported" from external sources, either from outside the company or from another part of the organization, as well as "exported" to other parts of the business where they continue to be procurement ambassadors as part of a defined career path option or a highly-respected company rotational program for high performers.

What is it worth? In A.T. Kearney's 2015 Return on Supply Management Assets (ROSMA) study, a metric which indicates the overall financial productivity of supply management assets (people, technology and other identifiable investments), top-quartile leaders report performance levels that deliver a minimum ROSMA of 7.5 and an average of 12.7, which is slightly higher than last year. This means that, on average, for every one dollar invested in their supply management assets, procurement leaders deliver more than $12.70 of value in return. They are also able to clearly articulate procurement's financial contribution and build status within the organization, compare and track performance, and identify priorities to generate value.

How does an advanced procurement function best organize for continued success?

Traditional category-led procurement organization models are primarily focused on annual sourcing cycles triggered by contract renewals, which can lead to overemphasizing short-term unit price reduction at the expense of longer-term supply strategies based on a total cost of ownership view.

Advanced procurement organizations balance the need for short-term savings with achieving long-term value beyond cost by collaborating across traditional intra- and inter-organizational boundaries.

On the one hand, this requires anchoring the procurement function on par with other business units, which gives the chief procurement officer a seat at the executive table and puts him or her in a better position to collaborate across the company. A.T. Kearney's 2014 Assessment of Excellence in Procurement (AEP) survey revealed that the number of CPOs reporting to the C-Suite has increased from 47% in 2008 to 59% in 2014 (among leading organizations, this number was 79% in 2014).

On the other hand, advanced procurement organizations have evolved from a category-led structure to one that is organized around skill clusters. This structure allows for deep forays into category value chains to unearth new value, fosters capability development within each cluster and enables flexible career paths and cross-training opportunities.

The advanced procurement organization's "front line" is the "strategic value capture team," a team of high-performing sourcing professionals who have extensive category experience in key strategic spend categories. They stay current on underlying key supply market dynamics and define

FIGURE 1

What does excellence look like today?

Procurement leadership characteristics

1 Category excellence
- **Visibility into more than 95% of annual spend at** the transaction level and **influencing more than 70%** of total spend and **actively addressing 75%** of this each year, **resulting in 6%** benefits on total spend
- **Strategic playbooks for key categories** to inform 3- to 5-year business plans

2 Supplier excellence
- Defined SRM process and team accountabilities, yielding greater than **95% compliance**
- Supplier segmentation that identifies the **top 1% for collaborative innovation** or extraordinary risk management
- At least one-third of procurement value stems from supplier relationship management

3 Team excellence
- **Seat at the executive leadership table** influencing enterprise strategy and pursuing both cost and value beyond cost objectives
- Centralized/center-led talented team with procurement and domain expertise; automated transactional activities, 75% of team **focuses on strategic efforts**
- **Performance management** vetted by CFO that informs business plans
- **Balanced scorecard** that measures cost reductions, value beyond cost, talent, and stakeholder satisfaction

Source: A.T. Kearney Assessment of Excellence in Procurement 2014-2015 study long-term category strategies articulated around an extended definition of value that supports the broader business objectives—for example, access to supplier-driven innovation to enhance top-line growth, cost of ownership optimization, supply risk management and enhancing corporate social responsibility.

The training ground for the front line is what we call the "e-factory team," a team of up-and-coming sourcing professionals who are focused on delivering value in spend categories that may not be as strategically important to the business as the categories covered by the strategic value capture team. E-factory team members leverage competitive supply markets through planned rapid sourcing events. They are masters in rapidly executing the sourcing process and continuously refining templates, cost models, automated solutions, eRFX and e-sourcing tools to operate in the most efficient and effective manner.

Both teams are supported by a procurement center of excellence (CoE). The CoE houses advanced analytics capabilities that provide both spend and sourcing analytics in support of the value capture teams as they assess multiple supply scenarios and quantify trade-offs. The CoE is also in charge of capturing and disseminating knowledge and best practices, training, and reporting. CoE professionals are experts in advanced analytics and project management.

Lastly, the field team drives rapid implementation of sourcing strategies across the organization. This cluster includes experts in operational procurement and implementation. They are often embedded within BUs or operations, and are masters at efficiently executing procurement-related implementation plans. They have strong interpersonal skills, knowledge of the organization, and deep process expertise to accelerate value-capture implementations.

Invest to lead

Leading companies invest in a supply management capability that delivers more than double the performance of the average procurement function while earning the executive mandate to drive value beyond cost, stretching the traditional role that procurement plays. Procurement collaborates with the business and acts as steward for the organization to drive enterprise-wide goals.

A SPECIAL SUPPLEMENT TO:
SUPPLY CHAIN MANAGEMENT REVIEW

Trucking TOP 50: Investing in the Present

What do the Top 50 Trucking companies have in common? Seasoned management teams backed up by solid operations—and they're not afraid to spend on staff and technology to stay on top.

The best trucking companies in America come in all shapes and sizes.

There's the $65 billion giant UPS, which delivers everything from envelopes to full truckload (TL) with a sizeable less-than-truckload (LTL) unit that ranks fifth on *Logistics Management*'s (*LM*) Top 25 LTL list. And there's the innovative LTL carrier Pitt Ohio (No. 17) that's rolling out customized solutions to shippers and teaming with other carriers in the Reliance Network to form an efficient long-haul national operation.

Then there are the privately held carriers such as New England Motor Freight (No. 18 LTL), run by the legendary Myron P. "Mike" Shevell, who has more than 60 years' experience in the industry. Another privately run exemplary company is Green Bay-based Schneider (No. 2 TL). Both NEMF and Schneider enjoy all the access they want to

By John D. Schulz, contributing editor


PROUDLY CELEBRATING
30 YEARS
of Service
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Top 25 less-than-truckload carriers: 2015 revenues

(Including fuel surcharges)

Rank	Carrier name	2014 Revenue ($ million)	2015 Revenue ($ million)	YoY % Change
1	FedEx Freight	$5,672	$5,745	1.3%
2	XPO Logistics	$3,632	$3,525	-3.0%
3	YRC Freight	$3,220	$3,033	-5.8%
4	Old Dominion Freight Line	$2,710	$2,893	6.8%
5	UPS Freight	$2,633	$2,479	-5.9%
6	Estes Express Lines	$2,043	$2,135	4.5%
7	ABF Freight System	$1,885	$1,870	-0.8%
8	YRC Regional	$1,832	$1,778	-3.0%
9	R+L Carriers*	$1,415	$1,429	0.9%
10	Saia Motor Freight Line	$1,272	$1,221	-4.0%
11	Southeastern Freight Lines*	$1,006	$1,031	2.5%
12	Averitt Express	$671	$702	4.6%
13	Central Transport	$667	$675	1.2%
14	Roadrunner Transportation	$577	$516	-10.5%
15	AAA Cooper	$508	$513	0.9%
16	Dayton Freight Lines*	$446	$462	3.8%
17	Pitt Ohio	$393	$396	0.8%
18	New England Motor Freight	$372	$388	4.3%
19	A. Duie Pyle	$282	$282	0.0%
20	Central Freight Lines*	$218	$216	-0.9%
21	Daylight Transport	$202	$192	-4.9%
22	Oak Harbor Freight Lines	$184	$191	3.8%
23	Ward Trucking	$153	$155	1.3%
24	Wilson Trucking	$148	$148	-0.5%
25	LME	$125	$120	-4.3%
TOTAL TOP 25 LTL CARRIERS		**$32,266**	**$32,096**	**-0.5%**

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

lending markets because of their long history as family-run companies with stable management teams and efficient operations.

Despite all the different shapes and sizes, analysts say that the common thread among these carriers—and all of *LM*'s annual listing of Top 50 trucking companies—is they have great senior management that operates with a solid vision of their market and customers.

"Having the right people who work together is the key," says Satish Jindel, principal of trucking analyst firm SJ Consulting, adding that continuity and retention of key people is another vital aspect. In short, most analysts

WHAT IF YOU COULD AVOID
COSTLY ___ AND
ACCESSORIAL
MAKE ___ MORE
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Top 25 truckload carriers: 2015 revenues
(Including fuel surcharges)

Rank	Carrier name	2013 Revenue ($ million)	2014 Revenue ($ million)	YoY % Change
1	Swift Transportation	$3,611	$3,512	-2.7%
2	Schneider National	$2,465	$2,380	-3.4%
3	J.B. Hunt Transport Services	$1,779	$1,837	3.2%
4	Landstar System*	$1,794	$1,697	-5.4%
5	Werner Enterprises	$1,683	$1,623	-3.5%
6	Prime**	$1,601	$1,559	-2.6%
7	U.S. Xpress Enterprises	$1,540	$1,343	-12.8%
8	CRST International	$1,174	$1,135	-3.3%
9	Crete Carrier Corp.	$1,034	$1,014	-1.9%
10	Knight Transportation	$892	$952	6.7%
11	C.R. England	$1,071	$924	-13.7%
12	Celadon Group**	$697	$870	24.8%
13	Roadrunner Transportation	$689	$811	17.7%
14	Ruan Transportation Management Services	$757	$770	1.7%
15	Heartland Express	$871	$736	-15.5%
16	Ryder Systems	$738	$734	-0.5%
17	Daseke	$532	$675	26.9%
18	Covenant Transportation Group	$649	$647	-0.4%
19	Cardinal Logistics*	$734	$630	-14.2%
20	Anderson Trucking Service	$634	$618	-2.5%
21	Stevens Transport	$635	$616	-3.0%
22	XPO Logistics	$632	$562	-11.0%
23	Universal Truckload Services*	$580	$524	-9.5%
24	Western Express	$540	$520	-3.8%
25	Marten Transport	$519	$517	-0.4%
TOTAL TOP 25 TRUCKLOAD CARRIERS		**$27,851**	**$27,207**	**-2.3%**

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

believe that effective trucking management teams must develop discipline within their organization to do good for employees and customers—and not solely to please Wall Street and shareholders. "Those people come and go," Jindel says. "Your employees and customers stay."

And it appears that most of the best companies in the market realize just that. "Employee engagement is important to the company," says James Welch, CEO of YRC Worldwide. "We believe our professional workforce and their experience should give us an advantage as we move forward."

While pay is obviously important, a clear operating strategy may be even more vital to top trucking companies.

In line with these goals, eligible Teamsters employees at the YRC Regionals—Holland, Reddway and New Penn—recently received a profit sharing bonus of 1% of their 2015 wages. “From what we can find, this is the first time in the history of our industry that a carrier has paid out a cash profit-sharing bonus to its unionized employees,” says Welch.

While pay is obviously important, a clear operating strategy may be even more vital to top trucking companies. Let’s take a look inside the strategies being employed by some of the Top 50 trucking companies and learn what makes them tick in this new era of heightened service expectations and ever-mounting regulation.

Staying on top

As vice chairman and CEO of perennial LTL leader Old Dominion Freight Line (ODFL), David Congdon presides over a multi-modal, $3 billion transportation giant. In fact, ODFL leads the LTL industry with a stunning 83.2 operating ratio (OR) in an era when a 90 OR is considered exceptional.

In the meantime, ODFL is operating profitably, with operating income rising 12.9% last year to $498 million. Last year in the fourth quarter, when most carriers were seeing income erosion due to a soft economic environment and declining fuel surcharges, ODFL set company records for operating income and earnings.

“We won additional market share in the fourth quarter due to increased demand for

While the push toward asset light moves forward, ArcBest has not forgotten training for its unionized employees.

our services," Congdon recently told analysts. "This value proposition continues to be critical for both our financial success and our ability to consistently outperform the growth and profitability of our industry."

ABF Freight System (No. 7 LTL) is the largest operating unit within ArcBest Corp. Now run by president and CEO Judy McReynolds, ArcBest has set out on a deliberate course to lessen its reliance on "asset heavy" units such as ABF in favor of "asset light" units such as Panther Expedited, ABF Logistics and FleetNet, its fleet maintenance unit.

In the 2015 fourth quarter, these asset light units accounted for 30% of ArcBest revenue. In 2009, unionized LTL carrier ABF captured as much as 93% of its parent company revenue. Based on these figures, it's becoming clear that there's a concerted effort to move away from the unionized unit to put more emphasis on the union-free businesses.

"Every day we find new ways to solve our customers' supply chain challenges with the array of services we offer," says McReynolds. "Our enterprise solutions group works to combine service offerings across ArcBest in a way that simplifies the experience of our customers. This group has been successful in gaining business that we would not have otherwise had."

But while the push toward asset light moves forward, ArcBest has not forgotten training for its unionized employees. ABF Freight recently placed 23rd among *Training* magazine's Training Top 125, a list that ranks excellence in

E-commerce & Trucking: The threat and promise lures truckers

Top trucking executives are watching UPS and FedEx feed off the e-commerce boom—and it has whet their appetites. After all, e-commerce helped fuel a 23% rise in fourth quarter net income to $1.4 billion for UPS while FedEx enjoyed similar growth during the Christmas season.

Amazon, the leading e-commerce marketer, is quietly testing ways of making deliveries outside these carriers. From independent drivers to drones, Amazon is building up its final-mile capabilities in what Baird analyst Colin Sebastian estimates could be a $400 billion market for e-commerce delivery, freight forwarding and contract logistics.

Top U.S. trucking executives badly want in that market.

"There are known players and the ones aspiring to be there," says Schneider COO Mark Rourke. "How does that change what we do? It affects everything from the impact to brick and mortar stores to final-mile delivery—and all those things are rapidly changing."

What some trucking executives see is a future with fewer 53-foot trailers powered by Class 8 cabs and more step vans, straight trucks and flexible vehicles.

XPO chairman and CEO Brad Jacobs, who engineered the $3 billion purchase of the former Con-way Inc. last fall, called e-commerce demand "very strong" for his group of companies. "This is very important to the LTL and last mile business," says Jacobs. "We spend a lot of time with our LTL customers, and they are very interested in linking up LTL with last mile operations."

Working toward that goal, XPO is offering pool distribution, retail replenishment and other "white glove" services to help lure e-commerce retailers. "We're innovating, asking customers what they want, jointly coming up with new solutions," Jacobs explains. "We're listening to our customers, understanding their complex supply chain needs and offering solutions that in some cases we are uniquely qualified to fulfill."

—John D. Schulz, contributing editor

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The current freight environment, according to Pitt Ohio (No. 17 LTL) president Chuck Hammel, is "tepid."

employer-sponsored training and development programs. ABF Freight appeared on the list for the seventh consecutive year.

"Training is firmly integrated into every aspect of our company," says Tim Thorne, president of ABF Freight. "That's particularly true of our Quality Process, which relies on continual training and improvement as we strive for error-free service for our customers."

Challenges ahead

The current freight environment, according to Pitt Ohio (No. 17 LTL) president Chuck Hammel, is "tepid." Hammel says demand is on par with capacity, but the overall U.S. economy often sends truckers mixed signals on how robust demand actually is. For that reason, Pitt Ohio has diversified away from being strictly a northeast regional carrier and offers a full menu of supply chain solutions—including long-haul LTL and other customized services.

Rick O'Dell, president of Saia (No. 10 LTL), calls the industrial economy "mixed." Others say demand ebbs and flows from week to week, as if the U.S. economy is unsure of itself.

So how do the best carriers plan for the future with such an opaque economic crystal ball? Let's examine what they're doing right now to plan for an uncertain future.

Naturally most trucking executives say that their business is best when there's a robust economy producing so many goods that freight is filling up their trucks. However, the 2016 U.S. economic forecast is not that good. Mark Rourke, executive vice president and COO of Schneider, says that the current economy "has a 2013 feel" to it. "It's not

robust, but it's not terrible by any stretch… it's kind of average," he adds.

In the truckload sector, the biggest challenge is finding drivers. According to American Trucking Associations estimates, there's currently a shortage of about 40,000. Noel Perry, senior consultant for FTR Consulting, predicts that figure could go as high as 200,000 in the next decade.

All this is raising the bar for shippers,

In the truckload sector, the biggest challenge is finding drivers. According to American Trucking Associations estimates, there's currently a shortage of about 40,000.

FTR Trucking Conditions Index taps the brakes on market growth

Signs of steady growth in the trucking sector may have proved to be premature based on the most recent edition of the Trucking Conditions Index (TCI) report from freight transportation forecasting firm FTR.

The TCI reflects tightening conditions for hauling capacity and is comprised of various metrics, including capacity, fuel, bankruptcies, cost of capital, and freight. According to FTR, a TCI reading above zero represents an adequate trucking environment, with readings above 10 indicating that volumes, prices, and margin are in a good range for carriers.

For January, the most recent month for which data is available, the TCI was 9.05, which was down from December's 10.88, but was up 2.24% from November. In describing current market conditions, FTR said that demand at current levels can be easily handled by current carrier capacity, with the caveat that it may not be lasting, due to what it called a "possible regulatory crisis" in 2018.

FTR added that it's forecasting a modest recovery from weak January truck loadings, which it said will be in line with modest freight growth

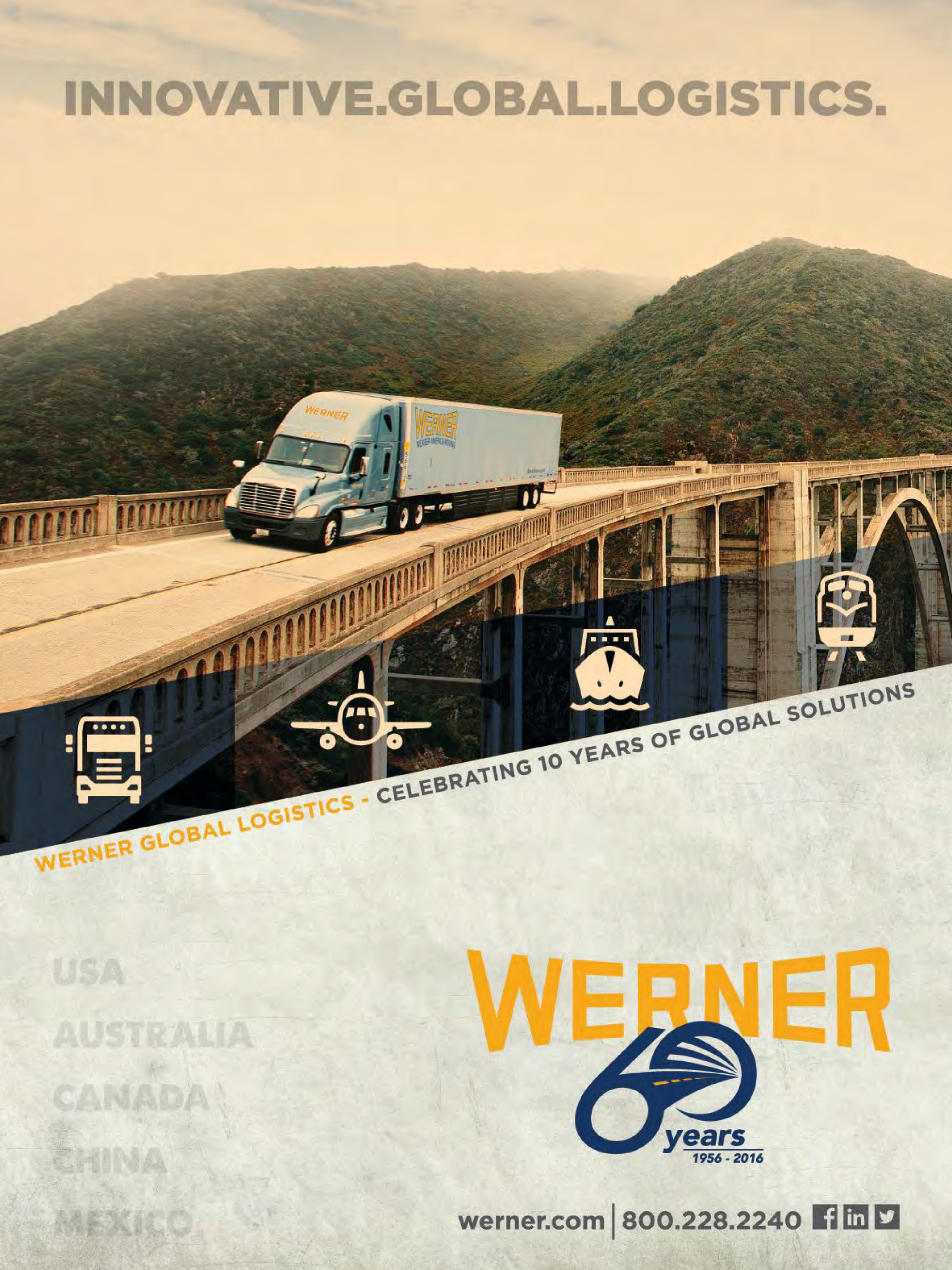
"Growth in the highly visible long-haul dry van segment has notably slowed and has actually been negative for the last year," said FTR chief operating officer Jonathan Starks. "The data that has come out of the spot market for the last year highlights those results with capacity much looser and rates down. However, the contract market has held up relatively well during that same stretch of time."

According to Starks, FTR is hearing of a much tougher negotiating environment for truckers heading into the spring freight uptick. "Headwinds to the recovery are building, and 2016 is not likely to be as strong a year for truck operators. After 2016, however, the situation could begin to reverse as carriers implement ELDs and speed limiters ahead of the mandatory dates set for late 2017 and early 2018."

The potential pending capacity shortfall, due to the ELD mandate, has been a major topic of discussion in trucking circles.

Many trucking observers maintain that the need for ELDs is obvious, with most explaining that the industry has been reliant on paper logs for far too long. And there could be economic benefits through ELD usage, as observers say it could likely reduce the effective number of miles a driver could log, further tightening trucking capacity at a time of limited driver supply, rising pay, and higher overall fleet costs.

—Jeff Berman, Group News Editor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YRC's Welch believes that the ELD requirement "may have a direct impact" on capacity—just how great an impact is under debate.

carriers say. Last year, carriers implored customers to become "shippers of choice"—making themselves more attractive to carriers, improving facilities, and gaining better respect for a truck driver's time in and out of their facility.

"The shipper community has been incredibly responsive, which is a good thing," says Rourke.

On top of the driver shortage, there's the seemingly ever-growing list of regulations, with the next regulatory burden on the industry coming in 2017—when the requirement of electronic logging devices (ELDs) hits the industry. Rourke says that this could potentially be the most disruptive force in the trucking industry since it was deregulated in 1980. Others agree.

YRC's Welch believes that the ELD requirement "may have a direct impact" on capacity—just how great an impact is under debate.

Estimates from technology experts and those carriers that already have installed the ELD units believe trucking will suffer between a 10% to 15% loss in productivity because capacity will shrink between 7% and 10% when installations are done industry wide.

But because ELDs are projected to eliminate HOS cheating, carriers are concerned that there may be need for additional drivers

UPS continues major natural gas-related transportation investments

Continuing its sustained push on the natural gas front, UPS said last month that it has invested $100 million towards building 12 new compressed natural gas (CNG) fueling stations and adding 380 new CNG trailers for its alternative fuel and advanced technology fleet.

"CNG is part of a broad investment in a variety of alternative fuel vehicles," said Mark Wallace, UPS senior vice president global engineering and sustainability. "Taken together, all of our alternative fuel vehicles represent 6% of the more than 100,000 UPS global fleet, and have driven a 10% annual reduction in use of conventional fuel."

UPS also noted that it's committed to meeting its goal of logging one billion miles with its alternative fuel and advanced technology fleet by the end of 2017, with a rolling laboratory approach used to determine the right alternative fuel solutions to meet the varied needs of route-specific driving environments.

According to UPS sustainability public relations manager Kristen Petrella, when the company makes the decision to deploy natural gas vehicles in a specific location, it evaluates the fuel infrastructure options.

"Each location is evaluated separately," Petrella explained. "The decision to build our own station on property is primarily due to the fact that we're deploying enough vehicles to fully utilize the station. Having our own station on site also ensures that we have complete and unfettered access to the station when needed, and with many of our natural gas trucks being dual utilized on more than one route per day, we often are limited in the amount of time we have to refuel between dispatches."

—Jeff Berman, Group News Editor

Most analysts and carrier executives say that shippers should plan for increases in their base rates in the 3% to 5% range.

and equipment. The American Trucking Associations and Truckload Carriers Association lobbied for this rule because they felt the industry was suffering a black eye from "bandit" carriers running over the legal number of hours allowed—11 hours a day, 60 hours in a seven-day period.

"Our goal is to be positioned for the future with an upgraded fleet, more modern and improved technology, and a more engaged workforce that understands that the better they perform the better the company performs—and the better they'll do financially," Welch said.

What about rates?

Drivers are scarce and are costing more, and there's a lid on capacity due to that fact. In the meantime, regulations are tightening, threatening even greater consolidation. So what logical conclusion is there for rates?

Most analysts and carrier executives say that shippers should plan for increases in their base rates in the 3% to 5% range. However, because of the drastic drop in fuel surcharges, overall transport costs may actually fall this year, causing carriers to be cautious in how they approach shippers come negotiation time.

Pricing is a matter of "finding the right balance with finding the right customers with the right mix of freight," says Rourke. Getting enough customers with sufficient freight

Spot market volume and rates remain in a seasonal pattern

Data issued by freight marketplace platform and information provider DAT in its most recent North American Freight Index showed that spot market volume and rates remained on a typical seasonal pattern.

Spot market volume dropped 7.9% in February, following a 9.1% January decline. While this volume level represents typical seasonal norms, DAT mentioned that lackluster harvests in California and Florida were also factors in lower volumes. The report added that a rebound is expected in March, which is typical, and often paced by incoming seasonal cargo, including spring fruit and vegetables, construction equipment and materials as well as various consumer items.

Based on equipment type, van freight availability fell 21% in February, with refrigerated—known as "reefer"—volume off 27% compared to January, and flatbed trailers up 26%. As for spot market rates, vans and reefers were down 6% and 3.5%, respectively, compared to January, with flatbeds down 1.2%.

On an annual basis, DAT said that overall spot market freight availability was off 37% in February, which was in line with the 35% decline in February. This represents the 14th straight month of annual declines, which it said is due to a meshing of tepid freight growth and abundant capacity.

DAT analyst Mark Montague recently said that current spot market spend is within 15% of historical norms. And with "disruption" currently absent, these rates are returning to a more normal level, while also carving out a new history in the form of an industrial-led recovery.

Lower spot market rates also served as a contributor to a decreased level of freight expenditures in the Cass Freight Index report that was released by Cass Information Systems late last month.

—Jeff Berman, Group News Editor


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XPO chairman and CEO Brad Jacobs says that carriers "have learned a lot since the last downturn" in 2008.

density in key lanes is the key to profitability, carrier executives say.

XPO chairman and CEO Brad Jacobs says that carriers "have learned a lot since the last downturn" in 2008. "They're matching capacity additions to demand, and as a result, pricing is very good and continues to be very good. It's a tale of two markets—volumes are consistently down and pricing has been consistently up. If

FMCSA brings carriers' "absolute measures" back into public view

The Federal Motor Carrier Safety Administration (FMCSA) last month reversed the changes made in December to its Compliance, Safety, and Accountability (CSA) program, as per the Fixing America's Surface Transportation (FAST) Act that called for changes to improve transparency in the FMCSA's oversight activity.

The five-year old CSA program was designed to weed out as many as 5%—or 150,000—of the nation's more than 3 million long-haul truck drivers that the feds believe are involved in a disproportionately high number of truck accidents and fatalities. CSA uses a complex scoring system to rate the nation's 700,000 DOT-registered interstate trucking entities on seven Behavior Analysis and Safety Improvement Categories, known as BASICs.

The seven BASICs are driving, fatigued driving, driver fitness, alcohol and drugs, vehicle maintenance, cargo security and crash history. Carriers are given "scores" in each category—higher the score, worse the performance. So-called "warning letters" go out to fleets with scores above 65—which means that only 35 percent of carriers in their class have worse scores. For hazmat carriers, the cutoff score is 60.

In December, FMCSA said that it was removing information previously available on the FMCSA's website related to freight carriers' compliance and safety performance until appropriate changes were made. This entailed removing information regarding carrier alerts or percentile ranks, or scores made publicly available until FMCSA completes it corrective action plan. Finally, percentile ranks and alerts—rates and absolute measures—shall remain publicly available.

Carriers will be able to access their respective data, including percentile ranks and alerts. Also, law enforcement officials will continue to be able to access scores and use them for enforcement prioritization, according to a summary from the American Trucking Associations last December.

In a statement issued last month, the FMCSA said that as per a mandate in the FAST Act that required it to keep carriers' absolute measures—which are generated directly from safety data and not based on relative comparison to other motor carriers—available to the public.

And it explained that the FAST Act prohibits the display of a carriers' relative percentile, leading it to remove the absolute measures to allow time to modify the Safety Measurement System (SMS) website to be compliant. "At this time, those modifications are complete, and the SMS Website is fully compliant with the FAST Act," stated FMCSA.

—Jeff Berman, Group News Editor

It's a tale of two markets—volumes are consistently down and pricing has been consistently up.

I had to pick, I'd choose the latter."

Jacobs says that shippers always want a fair price, and that's understandable. "For the most part, shippers understand capacity will tighten up again sooner or later. But they want quality capacity with stable carriers at a reasonable price—this allows them to hedge against eventual tight market later."

As fuel surcharges come down, Jacobs

ATA reports strong truck tonnage levels, but inventory issues remain intact

While truck tonnage volumes saw increases in February on an annual basis, the gains may not necessarily be commensurate with actual positive industry and economic momentum, according to the most recent data issued by the American Trucking Associations (ATA)

Seasonally-adjusted (SA) for-hire truck tonnage in February at 144.0 (2000=100) climbed to an all-time high and was 7.2% of a revised 0.3% January gain. To top it off, the month was up 8.6% annually, which far outpaced the 1.1% annual increase in January. On a year-to-date basis, SA tonnage is up 4.8 percent. ATA said this marks the largest monthly move for the index since January 2013 (11.4 percent) and the largest year-over-year increase since December 2013 (10.4 percent).

The ATA's not seasonally-adjusted (NSA) index, which represents the change in tonnage actually hauled by fleets before any seasonal adjustment, was 129 in February, topping January's 128.5 by 0.4 percent.

"While it's nice to see a strong February, I caution everyone not to read too much into it," said ATA chief economist Bob Costello. "The strength was mainly due to a weaker than average January, including bad winter storms, thus there was some catch-up going on in February."

Costello added that, normally, fleets report large declines in February tonnage, coming in the range of 5.4% to 6.7% over the last three years. So, the small increase yielded a big seasonally adjusted gain. "If March is strong, then I'll get more excited," he said. "However, I'm still concerned about the elevated inventories throughout the supply chain."

As previously reported, the inventory overhang continues to hinder freight transportation volumes and particularly impacts trucking as it moves roughly 70 percent of all U.S. freight. When inventory levels run too high, as they currently are now, it often results in transportation volumes seeing declines.

—Jeff Berman, Group News Editor

adds, that has taken pressure off customers' transportation budgets. Noting that fuel surcharges are way down, Jacobs says many carriers can expect their base rates to rise, but shippers are still getting a bargain oftentimes. "Net pricing is down," he says.

Pitt Ohio's Hammel agrees. "With the price of fuel continuing to fall, shippers are paying less for fuel surcharges, so giving carriers increases will still fall in line with their budgets."

Overall, the trucking industry is rather bullish on 2016. For example, Transport Capital Partners (TCP), which provides advisory services to trucking companies, does an annual survey of truckload executives. At the start of 2015, 79% of survey participants were looking forward to rate increases. At the start of this year, that number fell to 41%—the lowest percentage TCP recorded since 2009.

But even with carriers' rate expectations tempered, some 41% of those surveyed expected their freight revenue to rise this year. And 61% said that they planned to expand their fleets this year. "Any further tightening caused by a small increase in demand or driver shortages will have a proportionately greater impact on spot and contract rates," says Richard Mikes, a partner at TCP.

Saia's O'Dell adds that in the very short term, rates are difficult to predict. "But in the long term, in order to achieve an economic return on capital, rates will increase to compensate for continuing driver wage pressure, benefit costs and the substantial equipment and technology investments required to meet customer expectations."

The bottom line: The best trucking companies are spending much more to staff their operations and stay on top with technological and other improvements. However, keep in mind that margins at even the best companies are so thin that they have no choice but to try and pass these costs on to their customers.

—John D. Schulz is a contributing editor to SCMR

Cass Freight Index report shows mixed results

According to the most recent edition of the Cass Freight Index Report from Cass Information Systems, freight shipments and expenditures in February shot up from January while showing sequential annual declines.

Many freight transportation and logistics executives and analysts consider the Cass Freight Index to be the most accurate barometer of freight volumes and market conditions, with many analysts noting that the index sometimes leads the American Trucking Associations' (ATA) tonnage index to turning points in the market.

February shipments at 1.055 were up 8.3% compared to January's 0.974, which was revised, along with expenditures, to account for changes in the Cass client base. However, the number is down 2.6% annually.

Cass said that this shipment increase was expected, adding that it reversed four straight months of declines, which left the "starting point for 2016 significantly lower than in the last several years." And while February's shipments show growth, Cass said current economic conditions do not necessarily translate into a meaningful bounce back, with China's weakening economy reducing demand, a strong U.S. dollar, cautious consumer spending, and high inventories in the goods sectors.

On a modal basis, the Cass report observed that rail carloads continued to be hamstrung by declines in coal loadings, with intermodal volumes still sluggish due to a lull in manufacturing activity, even though trucking volumes were decent.

In her analysis of the Cass data, Rosalyn Wilson, senior business analyst with Parsons, took a cautious view, explaining that there are abundant opportunities for the economy to stumble in 2016, with sluggish economic indicators setting the scene for a sluggish first half of 2016.

"The goods sector is fast approaching the need to rationalize bloated inventories as it did midway through the recession," wrote Wilson. "Interest rates and warehousing costs are on the rise, increasing the cost of carrying that inventory. Following these trends, we should expect continued growth in March, although somewhat subdued compared to February."

—Jeff Berman, Group News Editor

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MODEX 2016: The Largest Show to date

With more than 850 exhibits, 100 informational seminars and 250,000 square feet of expo space, Modex 2016 offered the best in materials handling and supply chain technology and innovations.

By Bridget McCrea, contributing editor

At 10 a.m. on Monday, April 4, Gregg Goodner, president of MHI, welcomed attendees and exhibitors to Modex 2016, "the greatest supply chain show on earth." Co-located with Supply Chain & Transportation USA (SC&T), Modex offers the best in materials handling, logistics, manufacturing, assembly and distribution.

This year's installment of the show was the largest ever, according to Goodner, and encompassed more than 100 informational and educational seminars. The show's

Gregg Goodner, president of MHI and a Hytrol board member, cuts the ribbon to open Modex 2016.

Student Days and Young Professionals Network education track were both designed to help cultivate "the future of the material handling industry," he added.

Michael Köhler, VP of Reed Exhibitions USA, welcomed everyone to the show and said SC&T was pleased to once again partner with MHI to put on a show that includes innovative products, technologies and educational opportunities. "We're both proud and honored to be a part of this event," said Köhler.

This year's Modex expo featured 850 exhibits and a broad scope of educational content that included keynotes and show floor seminars. The combined event offered a broad scope of educational content and insights while also giving attendees a first-hand look at the newest innovations in supply chain technology and equipment. •

Think exponentially, Diamandis urged in Monday's keynote address

Entrepreneur and innovation expert Peter Diamandis urged attendees to design products and services with the rapid pace of change in mind and embrace technology disruption as opportunity in his Monday keynote.

By Roberto Michel, editor at large

Peter Diamandis, known as the founder of the Ansari XPRIZE project, an incentive competition that stimulated the growth of the private space flight industry, said technologies including sensors, robotics and artificial intelligence (AI) are improving at an exponential pace, underpinned by rapid advances in computing.

Companies need to break with the "linear thinking" that is hard wired in the human brain and design products or services that take advantage of rapid technology improvement, including 3D printing that will allow some products to be printed locally on demand, sensors, real-time positioning, and satellite imaging technologies that will offer "perfect knowledge" on the movement of goods or vehicles, and could be combined with AI to do things like figure out the best transportation options."The tools we have to change the world are extraordinary," Diamandis said.

Diamandis urged "moon shot" thinking in both business and philanthropy, looking at ways to make products or services exponentially better, not just incrementally better. "You have the ability to go 10 times bigger in your business, rather than just doing things 10% better or cheaper," he said. •

Peter Diamandis, chairman and CEO of the XPIZE Foundation, during Monday's keynote address.

Students, educators supplement classroom time with first-hand learning

Spanning two days this year, Modex 2016 Student Days welcomed students and faculty members from universities, community colleges, technical schools and high schools.

By Sara Pearson Specter, editor at large

This year, Modex 2016 Student Days welcomed students and faculty members from universities, community colleges, technical schools and high schools over the course of two days. On Wednesday and Thursday, the various groups participated in a series of programs related to supply chain, materials handling, logistics, engineering and industrial distribution.

During ProMat 2015, the event was expanded with the addition of a second day of off-site facility tours. This gave students a chance to see real-world materials handling technology applications at different distribution facilities. The umbrella event was christened "Student Days," and now includes one Classroom Day at the show and a second day of facility tours.

On Wednesday in the Georgia World Congress Center, students convened for the 13th consecutive installment of Classroom Day. The event was sponsored by MHI's College Industry Council on Material Handling Education (CICMHE) and Career & Technical Education (CTE) Program, in partnership with the Material Handling Education Foundation Inc. (MHEFI) and the Material Handling Equipment Distributors Association (MHEDA).

"The opportunity to spend time at the show offers students a better understanding of the latest industry developments," said Teresa Lopez, MHI's education coordinator. "They get a chance to see the wide variety of solutions that support the flow of materials throughout the supply chain, all in one place."

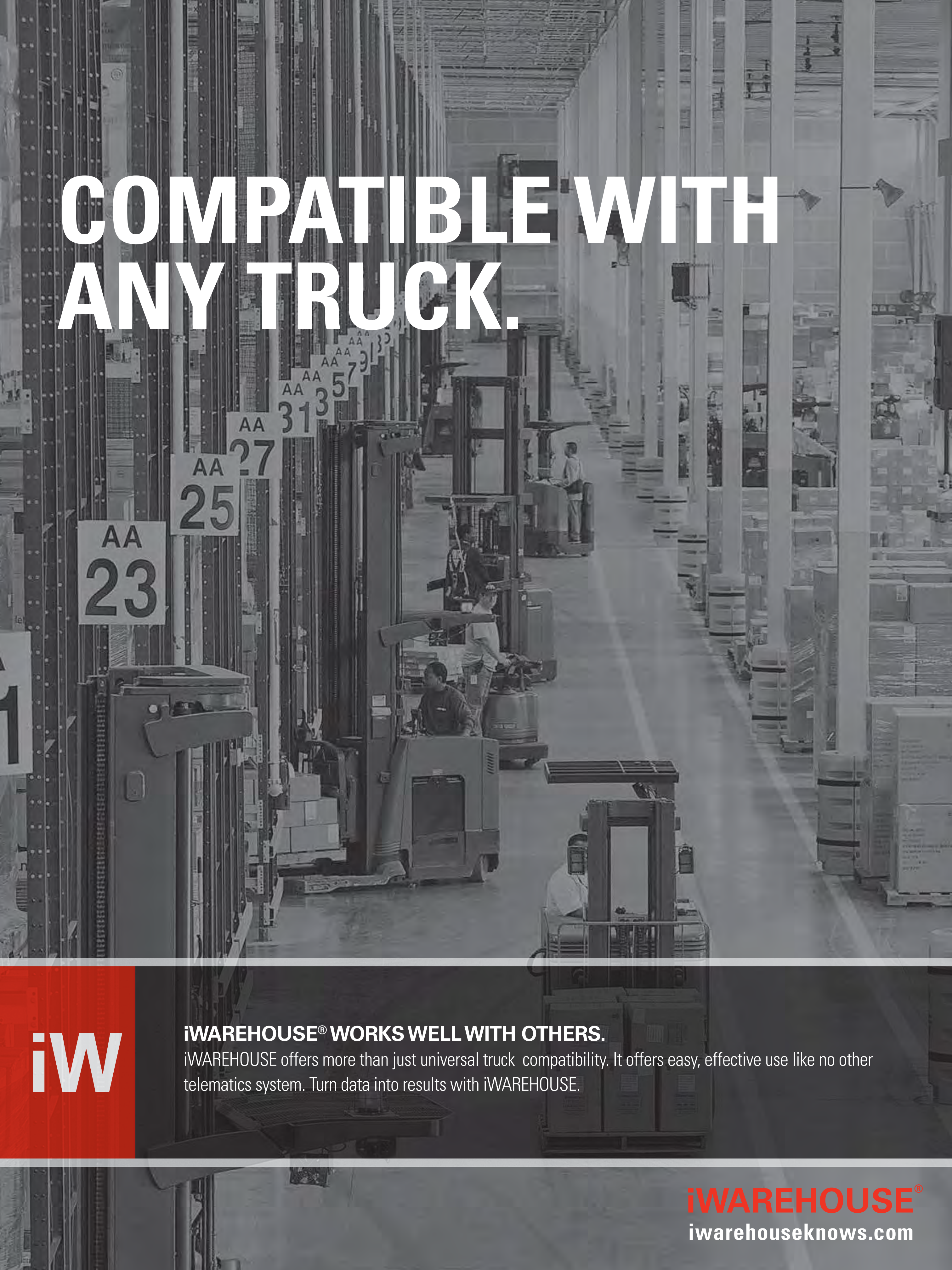
Classroom Day is so important to MHI's Board of Governors, added Lopez, that they set aside travel grants to be awarded among attending schools on a first-come/first-served basis. "Because of these grants, more than 200 students are expected to participate," she said. "We're excited to offer students and educators the chance to see our industry's solutions in action," Lopez concluded. "It puts the technologies they've seen on the show floor into a real world context." •

Tuesday's keynote presented connected supply chain benefits

The Internet of Things (IoT) has seen its share of hype, but along with other advanced technologies, it is entering a phase of practical productivity benefits that can be tapped by supply chains today, Cisco's Jack Allen said at Tuesday's keynote address.

The Internet of Things (IoT) has seen its share of hype, but along with other advanced technologies, it is entering a phase of practical productivity benefits that can be tapped by supply chains today, Cisco's Jack Allen said at Tuesday's keynote address.

Cisco Systems makes networking systems and equipment and, in managing its own supply chain, is leveraging technologies including IoT, sensors and vision picking in the warehouse to be more efficient and responsive, said Allen, who is senior director of global logistics and supply chain operations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Logistics is an information industry, Cisco's Jack Allen told the Tuesday keynote crowd.

for Cisco. Allen told attendees that their companies are better off being early adopters or at least "early maturity" adopters of new technologies like the IoT so that their supply chains function as "intelligent networks."

There will be a first mover advantage with supply chains that have their nodes interconnected, and make better use of technologies like sensors and the IoT, said Allen. Within Cisco's warehouse operations, it is using location and sensor technology to create what Allen called "presence" that can do things like automatically call up insights about the productivity of a line on a managers' mobile device the second they come near it. Cisco also is beginning to use vision-picking glasses, Allen said, that brought a 25% productivity benefit in pilot tests.

When interconnectivity is implemented across a supply chain, it's possible to do things like save big on logistics costs, or have an agile response in the face of a natural disaster, Allen said. Connecting plants and warehouses also reduces problem resolution by e-mail, because exception conditions are addressed before they escalate into problems. "We can make those emergency e-mails go away because my lines are connected, and my warehouses are connected," Allen said.

In closing, Allen said not to think about logistics as being only about moving goods and filling orders, but using information to improve performance and ultimately, profit. "Think about it as an information industry where you know how to monetize the information," he said. •

Intelligent electric forklift chargers, monitoring devices at AeroVironment

By Sara Pearson Specter, editor at large

Capable of charging any brand, type or voltage of materials handling battery, the new PosiCharge ProCore series is ideal for electric forklift fleets of all sizes, said Jonah Teeter-Balin, director of product marketing at AeroVironment during the first day of Modex. "ProCore continues our product line of intelligent, environmentally-friendly products that make our customers' lives simpler and easier," he said. "As the most efficient charger on the market, it recharges electric forklift batteries faster, saving money on electricity bills."

It's also the first line of chargers that can be configured and managed remotely with an iOS- or Android-compatible mobile device app, added Teeter-Balin.

"Operations and fleet managers no longer have to be right next to the charger to program it or see its data," he said. "It can also connect to our BatteryRx device that collects maintenance and utilization data for each battery to help users get better asset utilization and longer lifespan."

Also showcased is the built-in ConnectRx charger monitoring technology that detects cable pin connection abnormalities and alerts users to possible problems. "It prevents system failure and asset damage while protecting personnel," Teeter-Balin said. •


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The robots are here: now what?

By Roberto Michel, editor at large

Modex always delivers innovative new products, but at this year's event, robotics captured much of the attention, from prominent mention in MHI's industry report keynote, to new robotics vendors.

Robots in distribution centers (DCs) aren't new, but new vendors are coming on the scene, touting "mobile autonomous" technology, meaning that you don't need to install special infrastructure on floors or ceilings for the robots to be able to navigate. One new example along these lines is IAM Robotics, which can pick from existing rack and shelves using onboard 3D vision technology.

During Wednesday morning's keynote presentation discussing MHI's annual industry survey, the panelists repeatedly mentioned robotics as a technology that can help companies deal with business challenges, including the inability to find enough skilled workers, rising pay rates, and continuous pressure from customers to keep costs low and delivery turnaround fast.

So what are we to make of all this attention on robots at Modex? Are we at the crest of the usual hype cycle, focusing on robots because they are fun to talk and write about, but not likely to see much use anytime soon? I believe serious uptake for robots will happen rapidly in DCs, mainly because of the increasing labor pinch. As one keynote panelist, Todd Farwell, global resource deployment champion with Caterpillar, put it, simply adding more human labor to mounting operational pressures won't cut it. "We are really going to have to automate and use robotics, because if we try to do this in a warehouse-type setting with manual labor, it's going to take a legion of people," he said.

The question really isn't whether or not the robots are coming, because they're here. The question now turns to how to leverage robots. How can we integrate them with existing systems, or use them effectively alongside existing assets and resources, including human labor?

SHOW PRODUCTS

Tilt-tray and cross-belt sorters ideal for e-commerce fulfillment

Ideal for high-capacity unit sorting, IntelliSort tilt-tray and cross-belt sortation solutions handle a variety of product and packaging types with high speed and accuracy. Modular designs and flexible layout configurations enable the systems to scale with growing business requirements and permit easier integration into existing facilities. The sorters provide an effective means to handle fragile, high-friction or polybagged items, and they also offer a virtual sorter capability for dual-purpose operation to accommodate high-volume runs during peaks. Patented dynamic discharge compensation technology ensures precise diverts, maximizes chute density and minimizes jams, recirculations and manual touches. The supplier supports the equipment with services including installation, commissioning, training, maintenance, parts, assessments, modifications and 24/7 technical assistance. **Intelligrated, 866-936-7300, intelligrated.com.**

Mercurygate launches MercuryProcure, allowing shippers to negotiate bids with carriers

MercuryGate International Inc., a provider of transportation management solution (TMS) platforms launched MercuryProcure, a software tool aimed at helping shippers and 3PLs negotiate long-term contracts with carriers. This product allows users to make quick changes in business relationships and keep up with dynamic market changes, the company said. Users subscribe to MercuryProcure with a monthly subscription, then use it as a standalone or integrate it with a TMS installation to leverage the power of carrier rating, report on carrier performance, and use real-time shipment data to project accurate costs. **MercuryGate International, 919-573-0376, mercurygate.com.**

Rugged thermal printer series prints up to 6.5 inches wide

User-friendly and rugged, the new CLNX series wide web thermal printer outputs at up to 6.5 inches wide. Built with a full cast aluminum frame, the device is more durable than competitive models with bent frame and spot-welded construction. The printers accommodate 10-inch outer diameter and 1,968-foot ribbon length, incorporating an additional guide roller and oversized wind spindle synchronized with platen roller to reduce ribbon wrinkle. For easy media access, the printers feature 60-degree accessibility to the media path for quick, effortless loading and maintenance of print head and platen roller. A variety of standard connectivity options allow easier integration into existing application environments. **SATO America, 704-644-1650, satoamerica.com.**

Easily maneuver walkie pallet truck in tight areas

AC-equipped, the Model 8210 walkie pallet truck is easily maneuvered at slower, controlled speeds, allowing it to work in tight areas including trailers and lift gates. Onboard Click2Creep technology automatically reduces maximum travel speed while also providing a tighter turning radius for pin-wheeling or right-angle turning. For enhanced speed control and transitions, especially at low speed, the vehicle incorporates the supplier's ACR System technology and static torque control. Features include wear prevention on the underside of the forks, stainless steel undercarriage pins that prevent corrosion in wet applications, reflective materials for visibility in low-light applications, and an easy-to-access electric brake release. All electronics are IP65 protected against water and dust in extreme or wet conditions and during pressure washing. **The Raymond Corp., 800-235-7200, raymondcorp.com.**

Vision-enabled mobile terminal puts mobile devices to work across entire enterprise

The newly released MX-1000 by Cognex leverages the latest mobile device technology for your industrial barcode reading applications. The flexible design accepts a variety of both current and future generation mobile devices and augments their capability in a fully ruggedized housing, tough enough to stand up to the most challenging environments. The MX platform makes any supported mobile device ready to meet the challenges of the most demanding environments; it accepts a variety of Androild and iOS smarthpones; and is equipped with Cognex barcord reading alogorithms to read 1-D and 2-D label-based codes, as well as challenging 2-D DPM codes. **Cognex Corporation, 508-650-3000, cognex.com.**

UL-recognized lithium-ion battery pack

The MPB045VG walkie pallet truck is available with the first commercially available UL-recognized lithium-ion battery pack in the forklift. With an extended run time, excellent charging capabilities and small footprint, the new lithium-ion battery offers an efficient and productive power alternative for retail, beverage and food delivery applications. The option is designed to last up to five times longer than traditional lead acid batteries. The battery pack is maintenance free, meaning it does not require watering and doesn't contain acid. Designed with a shorter 6-inch battery compartment, the option reduces the overall turning radius of the truck, providing improved maneuverability in confined spaces and delivering up to a 10% improved head length. **Yale Materials Handling Corp., 800-233-9253, yale.com.**

Planning and implementing your automation needs, a seminar by Murata Machinery

Murata invited Modex 2016 attendees to learn how to help improve customer processes across the globe. Using real-world case studies, Murata's Mark Neuens discussed how to plan and implement automation needs. With constant updates and innovations within our industry, our warehouse and distribution centers are challenged to acquire the latest technology while at the same time reducing costs and increasing productivity. Session attendees heard about real world, cost-cutting examples; the latest technologies in automated materials handling including customer and equipment support; and how to maximize ROI through improvements in: quality control, productivity, flexibility, and labor saving techniques. **Murata Machinery USA, Inc., 800-428-8469, muratec-usa.com.**

Eliminate costly warehouse waste with mobile power technology, a seminar by Newcastle Systems

It's easy to underestimate how much excess worker motion, product transportation, touches, etc. can cost an organization said Kevin Ledversis, sales director for Newcastle Systems and John O'Kelly, president of Newcastle Systems, at their Modex 2016 seminar.

Bringing mobile power technology into the receiving, picking, shipping, and/or inventory management process can eliminate costly footsteps and create rapid and significant changes in volumes, accuracy and efficiency. Understanding the "where, why, and how" mobile power can help you obtain measurable productivity gains and significant cost savings without months of planning and implementation, they said. **Newcastle Systems, 781-935-3450, newcastlesys.com.**

New solutions from Sealed Air

See the latest innovations and talk to Sealed Air about how your company can benefit from our new packaging solutions. The FloWrap™ Automated Mailer System is a flexible and economical package, designed to protect durable items. It allows customers to create ready-to-ship mailers at a higher rate than manual packaging methods or existing automated systems. Facility managers in the e-commerce and apparel sectors benefit from simply placing their products on the conveyor belt. The FloWrap Automated Mailer System then finds the order, adds the shipping label and produces a ready-to-ship mailer. Also on display was the Bubble Wrap IB, a protective air-cellular solution that can be inflated on-demand in whatever quantity is required. Shipped flat, stored flat, and ready when you need it, Bubble Wrap IB can reduce the impact of freight costs and carry a significantly smaller carbon footprint. **Sealed Air Corporation, sealedair.com, 800-648-9093.**

Collaboration leads to clear benefits for procurement and product development

Suppliers can inform product development and the R&D group can help select the best suppliers.

By Becky Partida,
Senior Research Specialist – Supply Chain Management, APQC

To promote efficiency and effectiveness, organizations are encouraging collaboration among related functions within the enterprise. Two areas for which this makes sense is the research and development (R&D) or product engineering group and the procurement group. In product development, members of the procurement group can provide insight regarding the purchasing of product components. Some organizations are going a step further to involve select external partners as well. In fact, APQC's Open Standards Benchmarking data in product development indicates that 66% of organizations involve their suppliers in new product or service development, including product improvements and extensions. In turn, members of the R&D function can be involved in the selection of suppliers to ensure the best supply of components and materials.

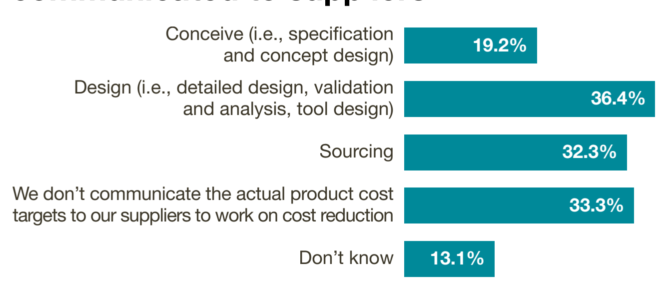
APQC's research indicates that organizations encouraging collaboration between the R&D function and suppliers can take advantage of benefits such as a reduction in the total cost to manufacture a product or easier sourcing of components. Involvement of the R&D function in supplier selection and appraisal can lead to lower procurement costs. However, these benefits may come at the expense of some aspects of procurement efficiency.

Supplier involvement in product development

The amount that organizations involve their suppliers in the product development process varies, with only about 31% of organizations having extensive participation of suppliers in these efforts. Those that do have extensive participation can create opportunities that are mutually beneficial. APQC has found that one way organizations accomplish this is by involving suppliers in the management of cost targets for new products and their components. Organizations communicate cost targets for products or components to their

FIGURE 1

Stage at which product cost targets communicated to suppliers



Source: APQC

suppliers at varying stages of the development process. As shown in Figure 1, a similar number of organizations communicate cost targets to suppliers during the design stage of product development as during the sourcing stage. Only about 19% of organizations communicate targets to suppliers during the earlier stages when product specifications and concept designs are developed, and about one-third of organizations do not communicate cost targets to their suppliers at all.

Organizations can benefit when suppliers are involved in the management of product cost targets beginning early in the product development process. Suppliers can provide the R&D team with input on whether the types and amounts of material needed to produce a product is achievable from a sourcing standpoint. They can also provide perspective on which countries a material can be sourced from and whether this would be impacted by the presence of trade agreements, as well as any duty rates associated with sourcing from particular countries. Supplier input can lead the R&D group to find alternative materials for a product or can spur the procurement group to carefully source a material to provide the best cost for production. It can also enable organizations to research the most reliable locations from which to source to ensure that production is not at risk of interruptions in supply.

Organizations benefit most when they communicate cost targets to suppliers during the product conception stage. At this early stage in the development of a product, components have not yet been finalized and it is easier for the R&D team to make changes to the product concept. Suppliers can work with members of the R&D team to obtain the best value for sourced materials. In fact, APQC's research indicates that organizations involving partners such as suppliers and service providers in the design and sourcing aspect of product development have more of their product development projects launched on budget. Supplier involvement allows organizations to make potential adjustments earlier in the development process when it is less costly, rather than later in the process when changes to design could lead to rework.

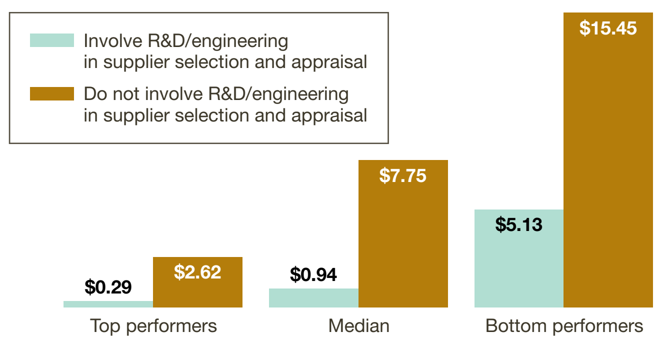
R&D involvement in supplier selection

Some organizations are further encouraging collaboration involving the R&D or product engineering group in the selection and appraisal of suppliers. The aim of this integration is to select suppliers that can provide the best value in sourcing components for products. According to APQC's Open Standards Benchmarking data in procurement, about 57% of responding organizations involve the R&D or engineering group in supplier selection and appraisal. The data also indicates that these organizations have some clear procurement advantages over organizations that do not encourage this involvement.

For example, at the median, organizations that include the R&D group in supplier selection and appraisal spend over $10.00 per $1,000 in purchases to perform the overall procurement process, whereas organizations that do not involve R&D spend just over $16.00 per $1,000 in purchases. This is due in part to the significantly lower cost these organizations accrue related specifically to appraising and developing suppliers. As shown in Figure 2, these organizations spend nearly $7.00 less per $1,000 in purchases to appraise and develop suppliers.

FIGURE 2

Total cost to appraise and develop suppliers per $1,000 purchases



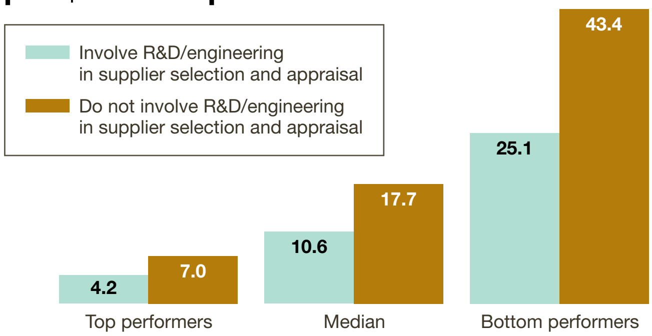
Source: APQC

Accordingly, organizations involving the R&D function in supplier selection and appraisal need fewer full-time equivalent employees (FTEs) for appraising and developing suppliers than organizations that do not. At the median, those that involve R&D need about seven fewer FTEs per $1 billion in purchases than their counterparts that do not involve R&D (Figure 3). It is possible that the appraisal process at these organizations takes less time and effort, which would mean that the staff needed to complete this activity is lower.

Organizations that involve the R&D group in supplier selection and appraisal have a higher percentage of their purchase value made from certified vendors. At the median, these organizations have 60% of their purchase value made from certified vendors, whereas organizations that

FIGURE 3

Number of FTEs for the process "appraise and develop suppliers" per $1 billion purchases



Source: APQC

do not involve the R&D group in supplier selection make only 35% of their purchase value from certified vendors. These results indicate that input from the R&D group can help an organization identify more suppliers that can align with organizational strategy and provide the best overall value. These suppliers may also provide superior service or be willing to work with sourcing organizations to determine mutually beneficial improvements to the sourcing process.

A disadvantage associated with involving the R&D group in supplier selection and appraisal is that organizations with this practice tend to have higher rates of maverick purchasing. At the median, they have 1% of their total purchases made via maverick buying, whereas organizations that do not involve the R&D group have only 0.6% of their total purchases made in this manner. Although this may not seem like a substantial portion of overall purchases made by an organization, any maverick purchasing can have a detrimental effect on the time needed to process purchase orders and the lead times for supplier deliveries.

Take steps to avoid maverick purchasing

The procurement and R&D functions of an organization can both benefit from an increase in collaboration. By allowing suppliers to inform the product development process through insight into the sourcing of components or materials for a product, organizations can make design adjustments or confirm choices that will ultimately benefit both the enterprise and its suppliers. The R&D group can also provide input on what the organization should desire in a supplier for its product components.

The downside of this collaboration is that it is associated with greater amounts of maverick purchasing. Because organizations that have adopted this level of collaboration tend to make more of their purchase value from certified vendors, it may be that staff members find their sourcing options too restrictive. Organizations wanting to increase collaboration among the R&D group, the procurement group, and suppliers should take steps to ensure that this does not result in adverse effects for other functions that could outweigh any potential benefits. Organizations can review purchasing processes and policies to make sure that they are user friendly for staff members in business units. This can encourage staff to make purchases from preferred vendors that have been vetted and selected through efforts from both the procurement and R&D groups.

About APQC

APQC helps organizations work smarter, faster, and with greater confidence. It is the world's foremost authority in benchmarking, best practices, process and performance improvement, and knowledge management. APQC's unique structure as a member-based nonprofit makes it a differentiator in the marketplace. APQC partners with more than 500 member organizations worldwide in all industries. With more than 40 years of experience, APQC remains the world's leader in transforming organizations. Visit us at apqc.org and learn how you can make best practices your practices.