MARCH/APRIL 2014

SUPPLYCHAIN
MANAGEMENT REVIEW

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It's all about optimization

I was talking to Jack Ampuja the other day about optimization. Jack is a member of our editorial advisory board. He's also a supply chain triple threat—he has deep industry experience as a practitioner at Fortune 500 companies, he is executive in residence at Niagara University, and he's the president of Supply Chain Optimizers, a consulting firm. In the latter role, Jack's focus is on packaging—not so much on the type of packaging materials used to ship product, but rather on designing the right size package for the products that are going into a shipping carton. The goal, as he explained it, isn't to get more weight or product into the carton, but to get more cartons on a pallet or into a shipping container. He referred to the end result as "squeezing the air out of the box" to increase shipping density. "When you optimize the carton, the benefits flow all through the supply chain," Jack said.

I hung up the phone with two thoughts. One was how broad is the breadth of topics that come under the supply chain umbrella these days. The other was about optimization. In the supply chain, we use phrases like efficiency, visibility, and driving cost out of the supply chain, but at the end of the day, what we really do is all about optimization.

Optimization also happens to be a theme in a number of the articles in this month's issue. Take our lead story by Jim Barnes, *The Myths and Truths About Inventory Optimization*. While retailers and distributors alike have a world of forecasting tools at their fingertips to optimize inventory, Barnes has another idea. He uses the experience of three retailers to illustrate how reshaping the flow and position of inventory delivers more effective results than forecasting alone. "Forecasting is a useful tool," Barnes told me. "But the combination of forecasting with the physical flow of inventory from source to consumption is optimal."

Supply chain optimization was also one of the benefits IBM realized after moving one of its supply chain management applications to the cloud. According to authors Thomas Ward and Vasanthi Gopal, IBM has saved some $50 million in warranty costs thanks to the real-time visibility it is getting from a cloud-based Quality Early Warning System. It also marks the first *How They Did It* feature in *SCMR*. *How They Did it* articles will take a case study approach to look at how leading companies are putting supply chain management into practice.

Finally, be sure to read Patrick Penfield's 8 *Transformative Steps for Supply Chain Sustainability*. A professor at Syracuse University, Penfield outlines the steps companies can take to successfully walk the path of supply chain sustainability—steps designed to reduce costs, through optimization, and help the environment.

I hope these pieces, along with this rest of this month's content, will help each of you optimize your supply chains.

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SUPPLYCHAIN
MANAGEMENT REVIEW

Photograph by
Martin Barraud

FEATURES

COMMENTARY

Are You Buying or Selling Customers?

When it comes to true customer profitability, most companies don't know whether they are making or losing money on a customer.

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

Are you losing money on some of your customers; possibly buying business by offering services such as complimentary co-managed inventory and Just-in-Time (JIT) replenishment programs, as well as free emergency shipments? I doubt most companies know the answer.

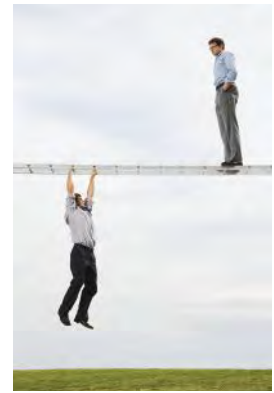### Experience with Customer Profitability

During my tenure in the field service division of a mini-computer company, our finance organization planned to conduct an analysis into the profitability of our service customers. However, prior to the advent of today's sophisticated Enterprise Resource Planning (ERP) systems, these analyses were difficult to do and had serious shortcomings when it came to estimating customer and product level costs. Finance knew that it would be a long and arduous process, so it decided to pilot the concept with our largest customer.

This customer provided "first call and remote support" for its computer users, and then relied upon our division to follow-up by dispatching field service technicians to conduct remedial and preventive maintenance services. This made estimating costs a hard part of the profitability analysis, yet necessary because the customer's billings were heavily discounted to compensate it for its "first call and remote support."

After many months, the finance department estimated that we were losing money on the customer. Rather than trying to address whether or not there was any merit to the pilot analysis, our executives merrily dismissed it as a worthless exercise and

finance stopped work on the analysis.

I believed the analysis was reasonable and could have been revised to make it credible. However, no one wanted to face up to the fact that our aggressive selling and marketing efforts could lead to losing money on any customers. My beliefs were predicated on knowing that rarely did anyone have to really cost-justify negotiated discounts. For the most part, discounts were justified essentially on maintaining and enhancing revenues.

Maximizing revenue was the primary goal of the marketing and sales departments of the division, while supply-side service operations were goaled on minimizing costs and inventories, while maximizing customer satisfaction. As in most companies back then, marketing and sales' demand creation and demand shaping decisions were made in isolation, without regard to supply chain operations. Sales and operations planning (S&OP) processes were not prevalent so demand-side activities often disrupted supply operations, making them less efficient.

"True" Customer Profitability Required

I suspect companies today are still trying to gauge "true" customer profitability. (Indeed, there might be quite a few suppliers losing money on their Wal-Mart business, but would never want to have to come to grips with doing anything about it.) Yet having an analysis of "true" customer profitability would go a long way toward helping their sales and marketing managers make more profitable demand shaping decisions during customer negotiations, as well as during S&OP meetings.

Exhibit 1 depicts a *Customer Profitability Model* that I will describe going from left to right, following the flow of information needed to estimate true profitability. *Customer Cost-to-Serve* is the most important, yet hardest to estimate, because accountants don't track costs at the detail level required. Many costs are tracked as aggregates, and breaking them down by customer is not an easy task, so estimation techniques must be developed that utilize the data available from standard accounting systems. On the other hand, Net Revenues are easier because customer level data are readily available from Account Receivable records.

EXHIBIT 1

A Customer Profitability Model
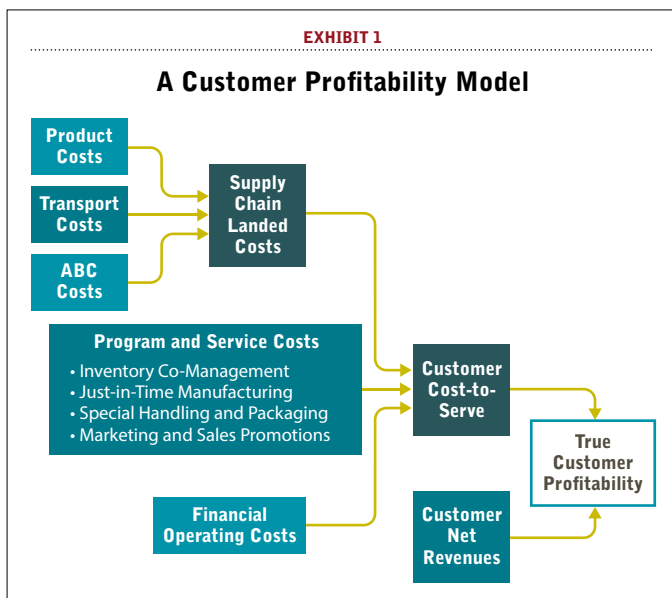
Supply Chain Landed Costs is the first of the three components of Customer Cost-to-Serve. Landed costs are detailed because they involve calculating the costs to get products delivered to customer locations. They include the costs to source, make, transport, handle, store, and deliver products to a customer's door. Product Costs are the costs to source and make products, and these are usually tracked in standard-cost accounting systems that are part of ERP systems.

Transport Costs includes inbound, inter-facility, and customer delivery costs and can be easily gotten from these systems, supplemented by data from specialized Transportation Management Systems. However, these costs are not typically tracked by customer so Activity-Based Costing (ABC) methods have been developed. ABC methods are especially needed to breakdown various logistics costs, such as warehouse receiving, storing, maintaining, picking, packing, and shipping goods to fill external customer orders as well

as internal orders.

Cost-to-Serve also involves estimating a second component, Program & Service Costs. It also needs to be estimated at the customer level, yet not routinely tracked at that level. Customer programs might include supply chain programs such Inventory Co-Management programs (e.g., Vendor Managed Inventory [VMI] and Collaborative Planning, Forecasting, and Replenishment [CPFR]), and Just-in-Time Manufacturing programs. *Customer Program & Service Costs* also include the costs incurred to do any special handling and packaging demanded by customers.

Marketing & Sales Promotion Costs include the costs of promotions, new product launches, and trade marketing and co-marketing programs. For example, the "true" cost of running a promotional campaign or a new product launch needs to incorporate any manufacturing costs incrementally incurred by any extraneous plant setups and changeovers needed to support these programs, as well as labor overtime costs needed to produce the large amounts of product distributed, in advance.

The third component of Customer Cost-to-Serve is *Financial Operating Costs*. These include any financial capital costs incurred to carry inventories from before a customer shipment and until a customer payment is received. Other operating costs include those incurred by an Accounts Receivable department to invoice and collect payments as well.

Customer Net Revenues are also needed for estimating *True Customer Profitability*. These are based on customer invoices that reflect the various discounts given to a customer during sales negotiations. In addition, however, some customers take advantage of discounts for early payment, and these too should be applied in deriving Net Revenues.

The *Customer Profitability Model* described above (while complicated to implement) provides a truer view of customer profitability than that which might be gleaned from standard accounting systems alone. While it may take a significant amount of time and resources to implement, the model can be the underlying basis for a decision support system needed by demand-side managers to make more profitable demand-shaping decisions. Supply chain managers should help implement these types of systems at their companies to help maximize profits rather than just maximizing revenues—which marketing and sales managers will naturally do if they don't have a clue about customers' true profitability. ⨀

BY PATRICK BURNSON

Tracking Climate Change: A New Supply Chain Challenge

A new study by Accenture and CDP shows companies are increasingly aware of climate risk in their supply chains. But spending on emissions reductions is going down.

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

DOES REGULATORY UNCERTAINTY discourage corporate investment in sustainable supply chains? When it comes to addressing climate risk, a new study suggests that the answer is yes. According to recently published research by Accenture and CDP, companies are increasingly recognizing climate risk in their supply chains. But investment in emissions reductions programs is down.

CDP is an international, not-for-profit organization providing a global system for companies and cities to measure, disclose, manage, and share vital environmental information. According to the report, *Collaborative Action on Climate Risk*, more companies than ever are reporting on their emissions reduction programs and there are clear financial benefits from investments in sustainability measures. But there are also challenges to taking action.

"This report establishes that although companies recognize that climate and water risks are on the rise, a mixed regulatory regime is making decisive action difficult," says Paul Simpson, CDP's chief executive officer. "However, growing participation in our supply chain program and the positive reception to Action Exchange demonstrates that businesses want to leverage their relationships with their suppliers to realize opportunities and minimize climate and water-related risks. "

Simpson adds that when governments introduce "a more realistic" global price on carbon, supply chain managers may expect significantly more investment in emissions reduc-

tions from their corporations.

At present, however, average monetary savings from these efforts have fallen 44 percent in the past 12 months. The report points to an ever widening gap—highlighted last year—between measures taken by large corporations who are members of CDP's supply chain program and those by suppliers. The research is based on information from 2,868 companies, including some of the world's largest corporations. It reflects a rise in participation of more than a fifth since last year. These produced 14 percent of 2013's global industrial emissions.

The 64 CDP supply chain members behind the request to this supply chain represent a combined annual spending power of almost $1.15 trillion. Almost three quarters of companies identified a current or future risk related to climate change, according to the report, while 56 percent of companies said that consumers

EXHIBIT 1

Companies Identify Changing Consumer Behavior as the Biggest Opportunity from Climate Change
(Top 3 Drivers of Climate Change Opportunity)

% of Companies Identifying Opportunity Driver

56%	7%	5%
Changing Consumer Behavior	Fluctuating Socioeconomic Conditions	Increasing Humanitarian Demands

Source: Accenture/CDP

**Strong Majority of Suppliers Report
Support of Policy Initiatives**

Energy Efficiency

Support	**81%**
Support with Minor Exceptions	**14%**
Neutral	**2%**
Support with Major Exceptions	**2%**
Undecided	**1%**

Mandatory Carbon Reporting

Support	**67%**
Support with Minor Exceptions	**19%**
Neutral	**11%**
Support with Major Exceptions	**2%**
Undecided	**1%**

Clean Energy Generation

Support	**81%**
Support with Minor Exceptions	**12%**
Neutral	**1%**
Support with Major Exceptions	**5%**
Oppose	**1%**

Cap and Trade

Support	**43%**
Support with Minor Exceptions	**33%**
Neutral	**10%**
Support with Major Exceptions	**9%**
Oppose	**5%**

Source: Accenture/CDP

are becoming more receptive to low-carbon products and services. (Exhibit 1.)

Regulatory uncertainty is making companies cautious about investing in emissions reductions and supply chain sustainability. Ninety percent of companies that identify a current or future risk cited regulatory risk as a barrier to investment. Investment in emissions reductions programs has declined in the past year and is shorter term in focus, according to respondents. Seven out of 10 sectors report investment falling from earlier years. Shorter pay-back initiatives (less than three years) are on the rise with these almost doubling between 2011 and 2013. The average sum invested per reporting company has dropped 22 percent since last year.

To address policy uncertainty, the survey asked which policy programs would be most supported by business-

es. Of the companies reporting engagement with policy makers, support was strongest for policies promoting energy efficiency and clean energy generation—supported by 81 percent of responses. Mandatory carbon reporting was supported by 67 percent, but cap and trade programs received the unqualified support of just 43 percent of responses. (Exhibit 2.)

The report reveals that the most important determinant of improved emissions reduction performance is collaboration across the supply chain. And, companies that engage with two or more suppliers, customers, or other partners are more than twice as likely to see a financial return from their emissions reduction investments and to reduce emissions.

Analysis by CDP and Accenture shows that companies are often misdirecting their emissions reduction efforts with investments that are not closely correlated with proven emissions or monetary savings. Suppliers and member companies are at odds: Suppliers identified process emission reduction and product design as the most promising collaborative approaches; member companies, on the other hand, favor behavioral change initiatives and transportation and fleet investments.

To address this, a new CDP supply chain initiative has been launched to incentivize suppliers: Action Exchange2 will drive targeted action on the most cost effective emissions reductions. Companies that have already joined the initiative and are asking their suppliers to participate include Bank of America, L'Oreal, Philips, and Wal-Mart, with significant returns anticipated.

Questioned for the first time by CDP on water risk, suppliers recognize the need for a broader view of supply chain sustainability, with linkages made between water and carbon emissions. More than half the companies cite water scarcity as the greatest water-related concern.

"This report provides clear evidence that those who are most transparent about their climate change risks are more likely to achieve the greatest emissions reductions," says Gary Hanifan, Accenture's global sustainability lead for supply chain. "And they are also more likely to enjoy monetary savings as a result of their responses to climate change risks. Hanifan notes, however, that the return on investment by the most "proactive companies" will not reach its full potential unless those companies can encourage their suppliers to follow their lead.

The good news in the interim is that a "control tower" approach to supply chain sustainability may be an option.

Hanifan told *Global Links* that this could give companies greater visibility into their supply chain as an outcome of the digital technology revolution that is transforming businesses today as analytical advances convert supply chain data into information. ⚭

Do You Have the Right Partners in Innovation?

By María Jesús Sáenz and Luis Herrero

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One way to identify, develop, and implement the innovations that enable supply chains to maintain high performance levels is to partner with suppliers. But how do you identify suppliers that are capable of such collaborations and possess the creative horsepower needed to push the envelope? Supplier choice is routinely based on factors such as cost, volume, and location, but the ability to engage on supply chain innovation projects is gaining in strategic importance. This is particularly the case in dynamic markets characterized by rapid technological change and shorter product life cycles that increase operational uncertainty and complexity.

Research completed at the Zaragoza Logistics Center, Spain, the European member of the MIT Global Scale Network, identifies the factors that companies need to consider when evaluating suppliers as collaborative partners in critical areas such as innovation. The research findings were validated in a study carried out for Luis Herrero's Ph.D. dissertation, advised by Prof. Maria Jesus Saenz. The study analyzed strategic supplier relationships at the European company Leroy Merlin, the third-largest do-it-yourself retail chain in the world, with annual revenue of more than 15 billion euros and 65,000 employees. The researchers analyzed data on 148 companies for the study.

Three Dimensions

There are three main components or dimensions of a supplier's profile that shape its effectiveness as a collaborative partner for innovation. The dimensions are interrelated, and drive both the operational and strategic performance of the relationship (see Exhibit 1).

1. The Technical Dimension. This dimension pertains to the compatibility of the supplier's IT systems and technical resources in areas such as demand forecasting, customer service, and inventory management. Supply chain managers often focus on this dimension initially because it is relatively easy to evaluate and implement.

2. The Learning Dimension. The supplier's ability to recognize the value of new knowledge from the other partner and then to assimilate and apply it for the benefit of the supply chain relationship is covered by this dimension. This ability is called Absorptive Capacity (AC). AC can be evaluated when choosing a collaborative partner by assessing the number of innovative ideas that the company has analyzed and implemented as part of its supply chain relationships. A vendor company that is resistant to new ideas and inept at realizing change will not be an effective partner.

3. The Organizational/Cultural Dimension. Is the supplier a good fit in terms of its organizational structure and corporate culture? Do the partners share the common goals, norms, and values that are essential to establishing a mutually beneficial partnership? Depending on the context of the relationship, how compatible the two organizations are in terms of fair dealing norms such as transparency in sharing production and scheduling data, flexibility, mutuality, or openness, can definitively help working relationships to endure. Additionally, senior management needs to participate in and support the strategic relationship, even assuming that innovations can fail in the short term.

As mentioned, these three interrelated dimensions shape a supplier's ability to create and foster new ideas, and to translate them into innovations that improve supply chain performance. Surprisingly, the research study shows that the technical dimension has the least impact on overall performance, while the learning and organizational culture dimensions show stronger links.

Take, for example, a successful collaboration between Leroy Merlin and a supplier of ceramics. The shared "technological sophistication" norm gave the collaborators confidence that new ideas would be technically feasible. Once the ideas were

explored and accepted, the shared "transparency" norm aided in internalizing them by removing ambiguity about their respective roles, responsibilities, and capabilities.

The important lesson here is that supply chain managers who focus primarily on a supplier's technical competence need to readjust their approach to finding collaborative partners in innovation. First, they should select those partners that are culturally compatible (like-minded when it comes to values such as flexibility and fairness with a similar business philosophy). Next, select partners with the ability and willingness to learn, and want to create synergies.

Delivering Innovation

When supply chain partners are attuned in this way they are much more effective at discovering and applying innovations that enhance competitiveness.

For example, Leroy Merlin identified a new way to display a flooring product in its stores by introducing smaller rolling formats. The innovation would boost sales and facilitate the distribution and handling of the product. The retailer proposed the idea to the supplier, which agreed to explore the concept in collaboration with Leroy Merlin. Both organizations supported multi-disciplinary cooperation, and respective departments were open to new ideas. This compatibility provided a solid platform for the flow of ideas and the development and implementation of the new type of display.

The project's success took both partners by surprise. Sales of the product increased by 18 percent, a dramatic improvement given that average sales growth for other comparable products averaged 3 percent without the benefit of the new formats. "We have been growing together spectacularly with this product," said the supplier.

Another example at Leroy Merlin involved the implementation of a cross-channel sales strategy that encompassed both store and e-commerce distribution fulfillment models. The retailer has been working to transform its business model to combine these channels, and some suppliers are part of the project. Certain partners, such as a manufacturer of equipment machine tools and a curtain maker, were selected to test different supply chain fulfillment processes.

Leroy Merlin and its chosen suppliers combined their supply chains, interchanged key information (orders, inventories), and used their infrastructures (DCs and transportation networks). One of the tests was to use the complete joint distribution center network to deliver the products. The partners also explored ways to manage orders. Deliveries were dispatched from either the suppliers' or the retailers' DCs depending on a combination of lead time and cost.

The retailer commented on the project during a recent meeting with Tier 1 and Tier 2 suppliers. "The idea was simple, but not easy to implement. The supply chain processes are horizontal but the operation and management is, in practice, vertical, and divided between separate entities depending on each company, supplier, or retailer. One key factor was the openness of our suppliers to explore and experiment with the different alternatives," said the company.

The Right Match

Engaging with core suppliers to develop supply chain innovations is increasingly important, especially when competing in highly dynamic markets.

However, leading suppliers or collaborators that are a good technical match are not necessarily effective partners in innovation. Supply chain managers tend to focus too much on the operational and technical capabilities of suppliers when developing these partnerships.

The model described here helps companies to choose the right partners and maximize their chances of developing the innovations that will help them maintain their competitive position. Along the way, they will align and enhance the learning process and improve their ability to drive innovations to successful exploitation. The right integration of the three components will bring opportunities for improving the operational and strategic performance of supply chains in dynamic markets. ∞

EXHIBIT 1

Supply Chain Collaboration for Innovation

Strategic Performance

Operational Performance

Supply Chain Collaboration for Innovation

Technical Dimension
• Continuous Improvement Techniques
• Demand Management Techniques

Learning Dimension
• Exploration
• Assimilation
• Exploitation

Organizational Culture Dimension
• Organizational Compatibility
• Management Commitment
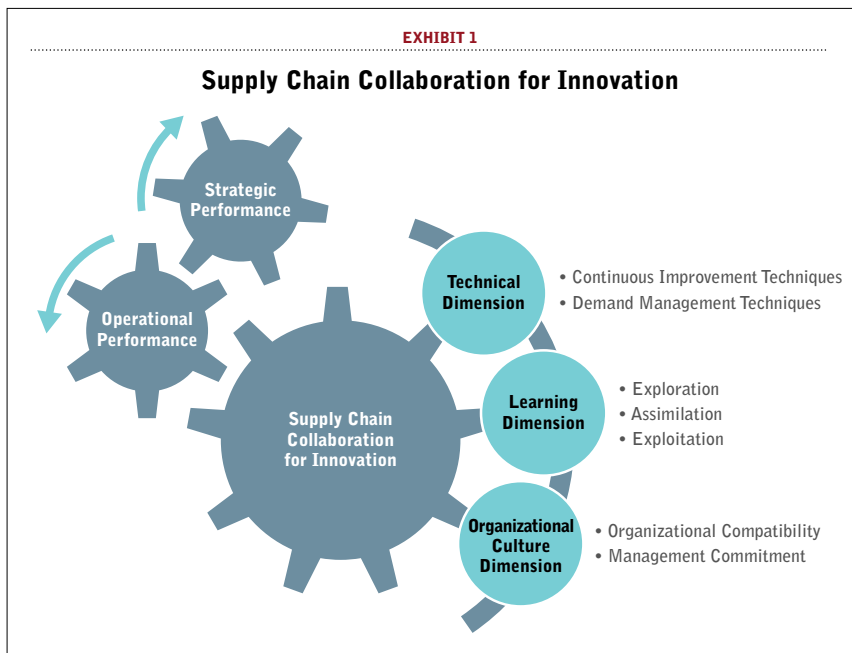
The Myths and Truths About Inventory Optimization

Retailers and distributors alike have attempted to solve their inventory challenges by using forecasting tools to determine what to buy and when to buy it. A better approach is to change the flow of inventory by reducing cycle times, more effective inventory positioning, and synchronizing supply chains based on the variability of demand.

…and why the right processes make all of the difference

By Jim Barnes

We all dream of a perfect world. For supply chain managers charged with optimizing inventory, especially in the retail industry, Supply Chain Utopia might be a make-to-order environment where a customer walks into a store or visits a Web site to purchase a new shirt to go with a stylish summer outfit. In a matter of minutes, a seamstress turns out a beautiful blue cotton shirt in just the right size. A few minutes later, the shirt is boxed in tissue paper and handed to the happy customer or dropped off at a parcel carrier for the last mile delivery. In Supply Chain Utopia, retailers would always have ample capacity, raw materials, and labor to meet periods of average and peak demand. Inventory optimization would be taught in The History Of Supply Chain 101; inventory managers would bore their grandchildren with stories about distribution centers, stocking points, and back of the store storage rooms from the good old days.

Unfortunately, Supply Chain Utopia is a myth. The truth of today's competitive markets is that customers want instant purchase gratification while lead times for incoming merchandise can be 20 days to 180 days. That especially holds true for retailers at all stages of the transformation from single channels of business, such as a brick and mortar or catalog retailer, to multi- and omni-channel retailing from stores, catalogs, the Web, and other mediums. But, it also holds true for industrial distributors and manufacturers competing on a greater depth of product, drop shipments, and higher levels of customer service.

This does not mean we should stop developing demand driven retail or distribution supply chain strategies with the concept of buy one and stock (replenish) one. In the meantime, however, most retailers and distributors will struggle to have the right SKU at the right place, in the right quantity, and at the right time to meet the demands of their customers.

Jim Barnes is the President and CEO of enVista, a supply chain consulting and IT services firm. He has spent 22 years deploying supply chain solutions and synchronizing material and information flow for Fortune 500 companies. He can be reached at jbarnes@envistacorp.com. For more information, visit www. envistacorp.com.

Jorg Greuel

To that end, many supply chain managers rely on expensive forecasting tools to optimize inventory across their networks. We believe there is another approach: By changing the flow of inventory from source to consumption through reduced cycle times, inventory positioning, and synchronizing supply chains based upon demand variability, managers can reduce their inventory levels without expensive forecasting tools, especially as the target fill rate increases. At the least, optimizing inventory flow and positioning in combination with forecasting can deliver better results than relying on forecasting alone. In this article, we will highlight three retailers with varying levels of inventory challenges and the steps they took toward inventory optimization. In the process, we will call out many of the common myths and related truths on the subject of inventory optimization.

Forecasting and Inventory Positioning

Myth: Forecasting alone can solve the challenges that retailers face to service their customers.

Truth: Prior to implementing any forecasting solution, reduce the total cycle times and minimize variability between supply and demand points. Retailers and distributors alike require an optimal supply chain network, in combination with positioning inventory in the correct location.

Inventory is by far one of the largest components of working capital for most retailers and distributors. To meet mounting consumer expectations, both have attempted to solve inventory challenges by utilizing forecasting software to help determine what to buy and when to buy it. Retailers do need some level of forecasting due to the number of factors that affect their ability to time demand with supply and to allocate the right inventory—the right SKU—to the correct store location. We call that SKU LOC. As retailers expand, adding more store locations while increasing the number of SKUs they offer customers, the number of SKU LOC permutations increases.

To make the right allocations, forecasting solutions evaluate a number of variables, including supply lead time and variability, purchase order review periods, demand variability, lead times from the DC to the store, safety stock percentage, in stock percentage, minimum presentation quantity, and shelf holding power. Each of these variables affects the amount of inventory in the supply chain. But which variable or combinations of variables has the greatest impact on inventory? How does dependent or independent demand variability affect inventory in combination with inventory positioning? And, how does a retailer avoid over allocating or allocating to the wrong stores in order to minimize markdowns, lost gross margin, and transfers between stores?

Myth: Positioning inventory as far forward in a retailer's

supply chain (stores) is the optimal solution.

Truth: Over allocating inventory to stores increases markdowns, lost gross margin, and transfers between stores.

While some level of forecasting is required, forecasting alone won't deliver all of the answers. Instead, retailers and distributors can enhance their ability to improve inventory turns, and reduce working capital while improving service, through careful inventory positioning, changing flow paths, and allocation strategies designed to improve the velocity of capital. Inventory positioning is not a new concept; however, few retailers and distributors utilize inventory positioning, multiple flow paths, and network design as a means to optimize inventory and improve service to their customers.

Let's look at how three growing retailers, representing a variety of go-to-market strategies, optimized their inventory by reducing cycle times, inventory positioning, and synchronizing their supply chains based upon demand variability.

Retailer A is national lifestyle and specialty retailer with 300 stores and 9,000 SKUs. Its stores are served from two DCs. A Pennsylvania DC serves the East Coast while a second facility in Utah serves the western half of the country. It rarely runs promotions and those are primarily aimed at its e-commerce customers. The heaviest traffic occurs on the weekends, with Friday, Saturday, and Sunday accounting for 57 percent of the retailer's sales. Ninety percent of its supply base is located in the U.S., with a small percentage located in Europe and Asia. A third of its revenue comes from private labeled merchandise. (See Table 1.)

Retailer A was challenged by a number of supply and demand variables. Each store carries the full 9,000 SKUs; however, stocking volume levels vary according to the size of the store, its geographic location, and its revenue. In all, there are 2.7 million possible SKU LOC combinations for allocating inventory. Demand for any one SKU is relatively light compared to fast-moving CPG products: A high volume SKU sells just one unit every three weeks, and a typical product lifecycle lasts over a year. Once a new SKU is introduced to the market and allocated to the stores, 100 percent of the new SKU is placed on replenishment.

Prior to an optimization initiative, the inventory flow through the network resembled a pure distributor, not a retailer. The retailer did not pre-allocate inventory prior to receipt. Instead, new receipts were allocated evenly between stores, which were treated equally, no matter where they were located or regardless of demand for a SKU in that store. When a SKU was received in a distribution center, it was put away into storage before it was allocated, picked, packed, and shipped to a store. Each store received only one shipment per week with the exception of stores in New York City, Los Angeles, and San Francisco. Purchase

THIS IS A $12 MILLION SPRING.

EVEN SMALL PARTS CAN CAUSE BIG PROBLEMS WHEN YOUR SUPPLY CHAIN IS INEFFICIENT.

Too many of one part. Not enough of another. How do you manage a supply chain you can't even see? The answer: logistics from UPS. Our technology saves time and money by giving you a 360° view of everything in the pipeline — including the status of air, ocean and freight shipments, or the whereabouts of a critical component half a world away.

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WE ♥ LOGISTICS®

Retailer A:
Improving In-Stock Percentages at the Store

Attributes	Retailer A National Lifestyle Specialty Retailer
Locations	300 stores
SKUs	9,000
SKU/Location Combos	2.7M
Promotions	Only and rarely for e-commerce
Supply Chain Network	2 DCs (East and West Coasts)
% Revenue from Private Labels	30%
Supply Base	90% in U.S., remainder from Europe and Asia

Source: enVista

orders were reviewed once a month for 250 vendors.

The retailer's biggest challenge was lost sales due to out of stocks. Its in-stock position was less than 91 percent at the store and less than 70 percent at the DC. An item that was out of stock at the store was even more likely to be out of stock at the DC, meaning little chance of replenishment.

Synchronizing Supply With Demand

Retailer A had one goal: Improve in-stock percentage to the store. Retailer A's number one goal was to synchronize supply with demand to decrease its out of stock position at the shelf. Doing so would improve sales, reduce the amount of safety stock maintained in the back room, and reduce the labor associated with cycle counting and replenishing the shelves. It achieved this through three steps.

Truth: Increasing purchase order frequency will improve the flow of inventory from supplier to DC, resulting in improved fill percentage and downstream distribution center in-stock percentage. The consequence is increased inbound transportation.

1) At the start of this project, the average supplier's fill rate was 84 percent. This was partially due to the fact that suppliers received purchase orders in the third week of the month and were expected to ship an order during the first week of the next month. Many suppliers were not in a position to fulfill 100 percent of the order in weeks three and four. To address this imbalance, Retailer A increased its purchase order frequency from once a month to weekly for high volume suppliers, and to twice a month for the remaining vendors. By moving to weekly and bi-weekly re-ordering, the fill rate increased from 84 percent to 93 percent. Increased purchase order frequency directly increased the distribution center in-stock percentage from 70 percent to 88 percent.

Truth: Increasing order delivery frequency reduces cycle time from DC to store, improving the flow of inventory and in-stock percentage. The consequence is increased outbound transportation.

2) Retailer A also increased its order frequency by volume group to reduce the average replenishment cycle time from nine days to five and a half days. That allowed 65 percent of the stores to sell a unit over the weekend and have a replacement on the shelf by the next Friday, in time for busy weekend traffic. Retailer A's in-stock percentage improved from 91 percent to 96.3 percent, improving comparable sales by 2 percent. The retailer reduced operational payroll by $2.9 million by improving its shipment to shelf percentage from 55 percent to 94 percent. That eliminated the need to maintain safety stock in the back stock rooms and the need to allocate labor to cycle count extra inventory that was not required.

Truth: Retailers must align and design inventory flow paths to match seasonal and promotional demands—by doing so, they reduce cycle time and improve speed to market.

3) Prior to this project, Retailer A had a 100 percent post allocation inventory strategy: All new receipts were received and putaway into storage before they were allocated, picked, packed, and shipped via LTL carriers. However, as a result of analyzing inventory flow, Retailer A realized that the demand for some SKUs was predictable. That led to a new model, where 15 percent of SKUs were pre-allocated—or put-to-stores. Newly received inventory was processed at receiving and flowed through the facility to a parcel carrier. On average, Retailer A reduced four days of cycle time for new SKUs utilizing a put-to-store distribution flow and a change in carrier modes. In addition, Retailer A reduced DC labor by utilizing the pre-allocation put-to-store process. The change in allocation strategy and carrier mode allowed Retailer A to be the first to market with its fashion-oriented merchandise, driving improved sales.

When the initiative was complete, Retailer A optimized inventory by increasing the velocity of inventory through the supply chain. It is important to note that the retailer made no changes to its physical distribution locations. Rather, it focused on synchronizing inventory flow based upon demand patterns. This was accomplished by reducing cycle time from suppliers, increasing purchase order frequency, and reducing cycle time in its DCs and the cycle time from DC to Store. In-stock percentages and comparable sales increased while safety stock inventory levels decreased.

Retailer B is a national tire and automotive parts chain. It stocks 800 SKUs in each of its 750 stores. That creates 600,000 possible STORE LOC permutations when it comes to allocating inventory. Like many tire and parts retailers, it uses radio, e-mail, and newspaper circular ads

to promote sales. Twenty percent of its revenue comes from private label products. Prior to an inventory optimization project, it operated a network of four distribution centers; 60 percent of its supply base is domestic with the remainder coming from Europe and Asia. (See Table 2.)

A number of factors impeded Retailer B's ability to optimize inventory. Beyond market constraints related to the industry, it was hampered with a demand pattern called "intermittent demand," or "sporadic demand." (See Exhibit 1.)

Intermittent demands patterns occur with slow-moving items that are purchased infrequently and in variable quantities. An item purchased this month may not be purchased again for another three months. Plotted on a chart, intermittent demand will have a number of zero demand periods. Yet, to meet customer demand, the retailer must always keep some level of inventory in stock.

Determining the right stocking level for SKUs with intermittent demand is difficult with traditional forecasting techniques because conventional technologies look for predictable demand patterns with trends or seasonality. Intermittent demand, however, is characterized by the number of zero demand periods that are not easy to predict. When a traditional forecasting tool sees those periods of zero demand, it assumes there must be an error. That results in inaccurate forecasts and either stock outs or too much inventory.

Myth: Extra inventory equals better service. In many cases, it can negatively affect sales by over-allocating inventory to the wrong store.

With 800 tire SKUs and 750 locations, equating to 600,000 SKU and location combinations, the ability to accurately forecast at the store level became very difficult. In order to meet forecasted consumer demand, the retailer over stocked inventory at all stores (cycle and safety stock). This was compounded by the fact that the retailer replenished the stores just once a week, regardless of store volume. The existing inventory management approach created less than desirable store inventory turns and increased working capital to manage the retailer's intermittent demand patterns.

Excess inventory was also an issue at the four DCs. In addition to stocking excess inventory at the stores to cover demand variability, the retailer was stocking at the DCs to compensate for supply variability. Excess inventory across the supply chain was compounded by the fact that the retailer was making forward buying decisions to protect it from pricing volatility by its supply base:

Retailer B had one goal: Reduce inventory working capital in its supply chain, while improving service.

To reduce its investment in inventory at both the stores and the DC's while dealing with intermittent demand, Retailer B took several steps, including a redesign of its supply chain network.

1) Retailer B's first step was to evaluate its supply chain network while simultaneously evaluating demand patterns. Retailer B moved from a four DC, single-tiered network strategy to a multi-echelon tiered network that included two cross-dock facilities and 31 spoke locations. (See Exhibit 2.) The change to the physical distribution network allowed the retailer to improve forecasting accuracy

TABLE 2

Retailer B:
Reducing Inventory Working Capital While Improving Service

Attributes	Retailer B National Tire and Automotive Parts
Locations	750 stores
SKUs	800 SKUs/store
SKU/Location Combos	600,000
Promotions	Heavy use of promos (circular ads, radio, e-mail)
Supply Chain Network	4 DCs
% Revenue from Private Labels	20%
Supply Base	60% in U.S., remainder from Europe and Asia

Source: enVista

EXHIBIT 1

Intermittent Demand

Source: enVista

by aggregating store level demand from 750 locations to 31 distribution locations (spokes). That allowed the retailer to reduce safety stock in the stores by 20 percent.

Like Retailer A, Retailer B increased its order delivery frequency from one time to five times per week for many store locations. The ability to sell a SKU and have it available on the shelf within 24 hours (leveraging a pull system) allowed the retailer to reduce inventory in the stores.

Truth: An optimal supply chain network design, in combination with inventory flow path analysis, will reduce inventory working capital. It is very important when evaluating intermittent demand patterns to look at demand patterns by store and not the aggregate demand patterns for all stores.

2) The retailer determined the coefficient of variance (CV) for each SKU and store location combination (Exhibit 3). The CV analysis determined the unique physical distribution flows for each item, and defined which SKU LOCs required inventory forward in the supply chain (store or spoke) and which SKUs could be moved back in the supply chain (spoke and DC). By positioning inventory closer to where it was in demand, while increasing store shipment frequency, the retailer witnessed a 4.15 percent to 9.72 percent increase in comparative sales, compared to the non-test stores in the same geography.

Truth: CV analysis is used to help determine inventory

flow paths (push vs. pull) and inventory positioning. Each SKU, or category of SKUs, requires unique physical distribution flows in order to optimize inventory and improve service levels.

3) Retailer B utilized economic order quantities for each item at all of the stores. With the introduction of hubs and spokes in the network, inventory that was less frequently demanded could now be held at the DC, shipped to the spokes, and then pulled from the spokes to the stores when a purchase was made, versus pushing and cross docking tires with a low CV (Exhibit 4). The economic order quantities were adjusted by product-location combination, because every item demand varied from store to store. This solution increased inventory turns at the stores by 60 percent and contributed to a one-time working capital reduction of $24.6 million, as well as reducing annual carrying cost by $35.9 million over a period of five years.

Truth: First optimize inventory flows paths based upon supply and demand variability, and then develop your physical distribution and transportation network.

Retailer C operates 350 general merchandise and pharmacy locations, stocking as many as 25,000 SKUs per store. That equates to 8.75 million possible SKU LOCs across the chain. In addition to relying heavily on newspaper circular ads and radio and television promotions, the retailer recently developed an e-commerce

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EXHIBIT 2

Multi-Echelon Tiered Network

Source: enVista

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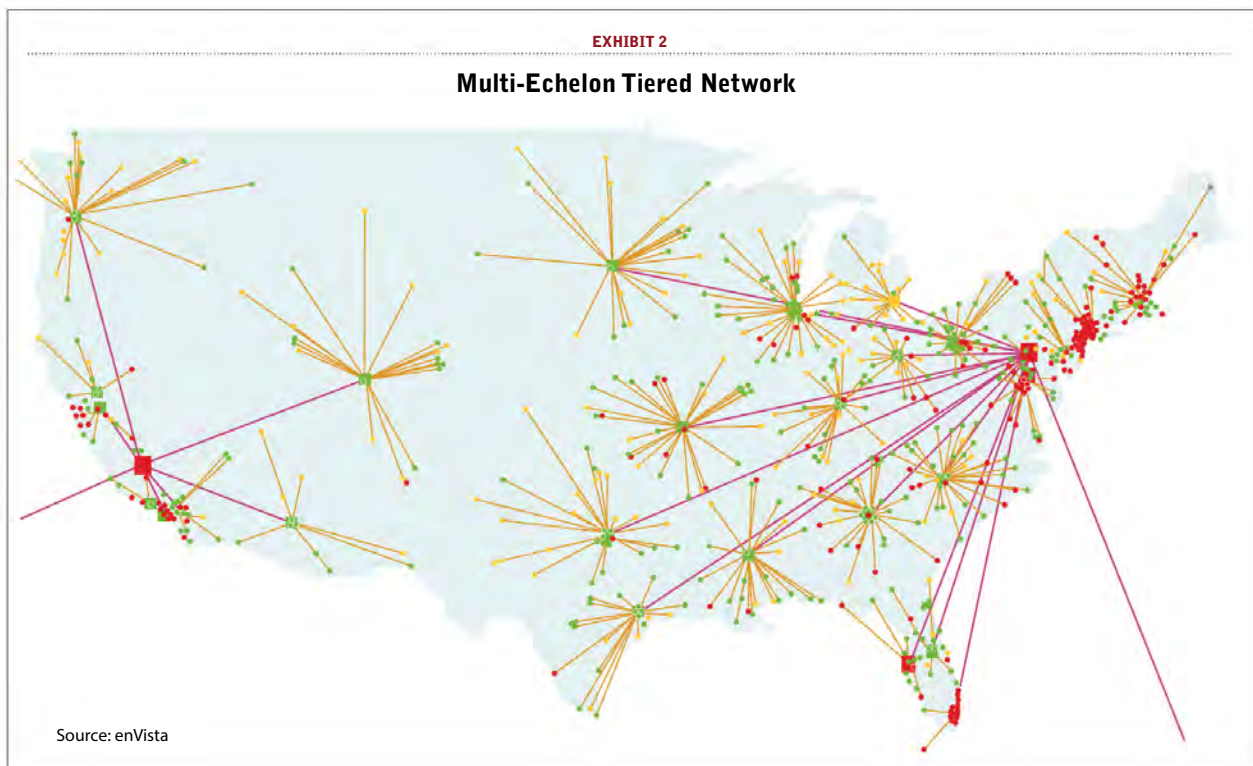
strategy to promote sales. Less than 10 percent of its revenue is derived from sales of private label merchandise. (See Table 3.)

It operated an extensive network of regional DCs, managing inventory from a supply base that is primarily located in the U.S., with 20 percent of its suppliers located in Asia.

Retailer C was challenged by multiple store formats, a very large SKU assortment, slow inventory turns, and physical distribution constraints that forced it to push inventory out to the stores—100 percent of its inventory was pre-allocated before it was received at a DC.

As a result, a lot of emphasis was placed on improving forecast accuracy and allocating the correct inventory to the correct store. The retailer sourced the majority of its general merchandise from domestic suppliers with a 25 day average lead time from the time of purchase to the time the product was delivered to a flow-through DC. The retailer utilized a rolling six week forecast and evaluated buys by category on a bi-weekly and monthly basis. Large volume stores were replenished twice a week while smaller stores received a weekly replenishment. Company-wide, inventory turns were less than three times a year.

By pushing inventory out to the stores, Retailer C generally sported an in-stock percentage of nearly 98 percent. The challenge with a 100 percent pre-allocation, or push, inventory flow model was that if the forecast was incorrect at the time inventory was pushed to the store, there was no room on the shelves. While the in-stock percentage looked

EXHIBIT 3

CV Analysis for SKU and Store Location

Source: enVista
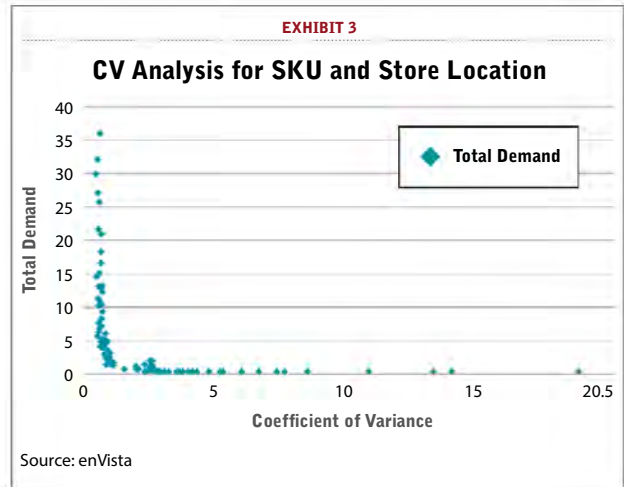
good on the shelf, inventory piled up in a back stock room, which required additional store operational labor to receive, put away, replenish, and cycle count.

Retailer C had one goal: Develop a demand-driven supply chain. With inventory turns at less than three times per year and back stock rooms overflowing with inventory, Retailer C took steps to synchronize its supply with demand and develop a demand-driven supply chain.

1) Retailer C's physical distribution network consisted of four regional DCs, geographically located to manage and optimize transportation costs. However, the DCs were designed as 100 percent flow-through distribution

EXHIBIT 4

Hubs and Spokes in the Network

Source: enVista
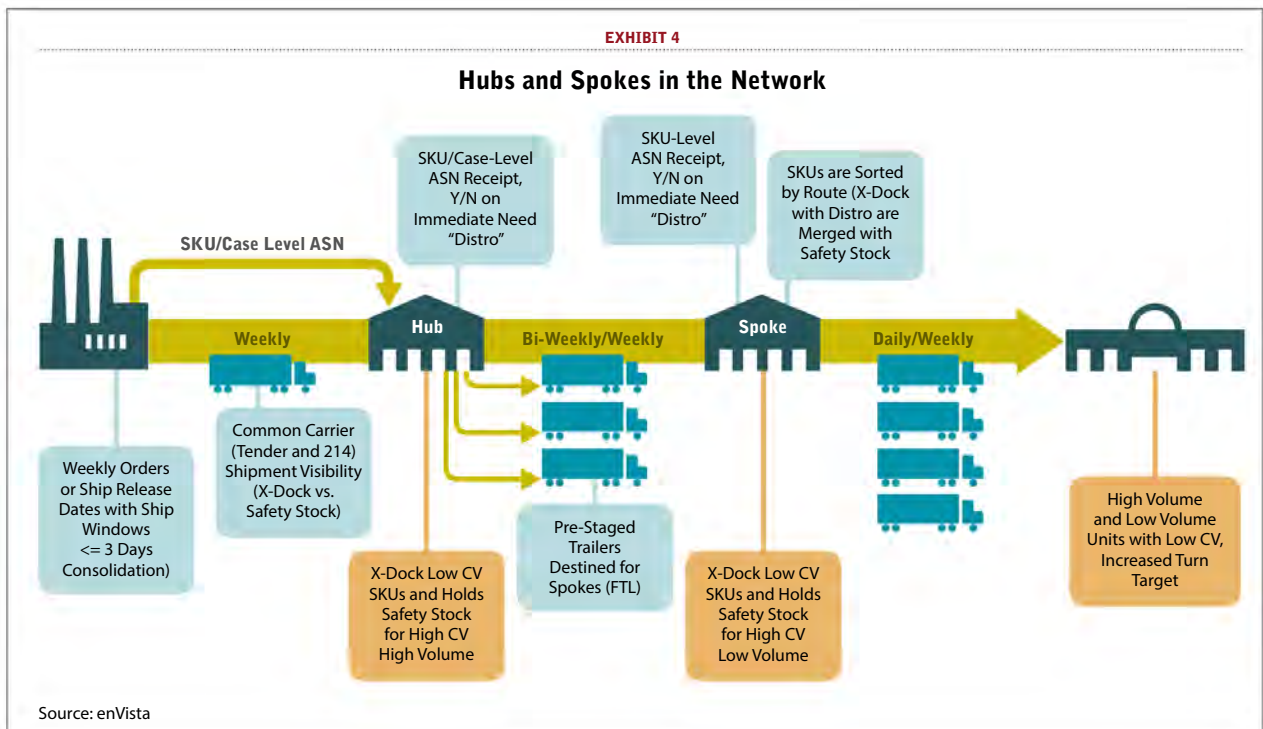
Retailer C:
Developing a Demand-Driven Supply Chain

Attributes	Retailer C General Merchandise and Pharmacy
Locations	350 stores
SKUs	25,000 SKUs/store
SKU/Location Combos	8.75M
Promotions	Recently developed e-commerce strategy. Heavy promos (circular ads, local TV/radio)
Supply Chain Network	Regional DCs
% Revenue from Private Labels	<10%
Supply Base	80% in U.S., remainder from Asia

Source: enVista

centers—they had no reserve storage areas to hold buffer inventory. Like Retailer B, Retailer C completed a CV analysis to understand the demand variability by SKU and product category. The CVs for over 30,000 SKUs were greater than a 2.0 value. That meant the SKUs had a tremendous amount of variability within a season and post season. Inventory management was also challenged because Retailer C is highly promotional, but most inventory has a six week lead time. That required moving the retailer's inventory closer to its demand points. This necessitated a change from a 100 percent flow-through model to 20 percent flow-through and 80 percent pull. The physical layouts of the retailer's facilities had to be changed to support a pull inventory flow (Exhibit 5).

Truth: Inventory positioning has the largest impact on optimizing inventory for retailers and distributors.

2) Retailer C's leadership realized that if they wanted to reduce company-wide inventory, they needed to evaluate their store planogram and visual merchandising strategy. Retailer C looked at SKUs that were double and triple-faced and determined the correlation between excess inventory and their planogram strategy. By reducing SKU faces, Retailer C could reduce excess inventory (safety stock), which allowed the retailer to increase its assortment without increasing its inventory investment. The retailer could now add 10,000 additional SKUs (increasing the size of the assortment). The exercise revealed that the retailer's visual merchandise strategy (depth of shelves), store planograms, and minimum presentation quantities had a negative impact on inventory working capital.

Truth: Space optimization, SKU assortments, and inventory flows must be aligned in order to reduce total inventory in the supply chain.

3) By involving cross functional groups and completing detailed Value Stream Maps, the merchants, buyers, allocators, distribution, transportation, and finance functional teams understood how lead time, supply time, and supply and demand variability affected overall inventory performance. By mapping decision points, systems configuration, and system policies, Retailer C determined that processes and their supporting systems were not aligned. For example, all stores' lead times from DC to the stores were set to the longest lead time—seven days—while many stores' lead times were less than three days. This equated to four to five extra days of safety stock. In fact, Retailer C's replenishment system actually supported lead time from DC to store, but had not been configured to reflect the actual lead time.

Truth: Functions within organizations become silos, however, items and inventory cut across organizations horizontally. It is important that all functional teams understand the flow of inventory and how the decisions they make affect inventory performance.

No Silver Bullet

Looking over these three examples, it is clear there is no silver bullet that will optimize a retailer's or distributor's inventory—no one truth—including costly forecasting systems. However, there are methods and processes that retailers and distributors can use to develop and ensure a demand-driven supply chain. Inventory optimization is a derivative of a sound supply chain process design, controls, and measurements. Inventory is decreased by reducing lead times, inventory positioning, and synchronizing supply and demand order and delivery frequencies to meet the needs of customers.

The starting point is often with simple inventory flows and value stream maps across the supply chain. ∞

EXHIBIT 5

Pull Inventory Flow

Driver	Impact to Inventory Safety Stock	Driver Suggest by
Reduce Forecast Error	<1%	Management
Longer Lead Times to Customer	<1%	Management
Inventory Positioning	20%-30%	Global Optimization
Synchronization	0-19%	Global Optimization
Change Shipment Frequency	5%-10%	Global Optimization
Changing Transit Times	5%-10%	Global Optimization

Source: enVista

Transformative Steps for Supply Chain Sustainability

Sustainability is entrenched in the lexicon of *Fortune 500* companies. While many organizations are using sustainability throughout their business, questions remain: What business benefits do we receive by being sustainable? Can we use the sustainable supply chain to mitigate the impacts of negative business disruptions? Let's look at the challenges facing sustainable solutions in the next 10 years along with eight steps companies can take to successfully walk the path of supply chain sustainability.

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By Patrick Penfield

During the past eight years, I have studied and helped companies move down the path to supply chain sustainability. The supply chain process for any company transforming to sustainability is one that evolves over time and has to work within the existing corporate operational structure. This transformation is not easy and requires financial justification for many of the proposed sustainability changes.

The biggest obstacle many supply chain leaders face is providing a favorable return on investment (ROI). In today's world, corporations and organizations are still incentivized with making an organization as profitable and as efficient as possible. This is the basis of corporate success and the rules to which we must adhere in order to change our supply chains. Thankfully, many companies have seen a favorable ROI when working on supply chain sustainability projects. The goal for many supply chain change agents is to prove that sustainability will reduce costs and help the environment. Many companies and organizations are already moving down this path. But how do you do it? What steps should an organization take to transform its supply chain in order to successfully walk the path of supply chain sustainability?

Based on my research at the Whitman School of Management and consultations with organizations, there are a number of supply chain issues business will contend with in the coming years along with eight steps companies can take to successfully walk toward supply chain sustainability.

Illustration by Gary Waters

Business Today

Business is living in a dynamic time period; one of unprecedented growth and innovation throughout the world. Commerce between countries is increasing at exponential rates. New markets and products are changing the footprint of how we do business. Business opportunities abound like we have never seen before. Adaptable companies are reaping the rewards of their flexibility.

At the same time, the world's resources are continuously being depleted and used faster than ever before. Countries such as China are taking unconventional steps to acquire and develop new sources of energy. Fresh water is becoming scarce while raw materials and regulations are becoming more costly. Natural disasters and extreme weather events are stretching global supply chains to their limits as business interruptions continue to affect profitability.

Sustainability has now become entrenched in the lexicon of *Fortune 500* companies. Many organizations have embraced sustainability and have instituted changes to their corporate organizational structures to utilize sustainability throughout their businesses. Still, questions remain: What business benefits do we receive by being sustainable? How do we change the corporate culture and implant sustainability into everything we do as a company? Can we use the sustainable supply chain to mitigate the impacts of negative business disruptions? Are there steps we can take to make our company more sustainable? Should the focus be on Net Gain versus Net Zero with regard to business's impact on the environment?

Supply Chain Issues in the Next Century

Companies have been and continue to invest in infrastructure, technology, transportation, process innovations, and new facilities throughout the world. The supply chain is becoming the competitive advantage for many industries. For those reasons, one of the most important questions facing business is whether we can build a supply chain to be flexible enough to face all issues in the future. And, if so, what problems related to sustainability might affect the supply chain in the next 10 years? Here are several examples.

Energy. One area that could affect supply chains adversely is the lack of energy sources. Energy is the most important resource to grow any economy. Countries like China are taking the necessary steps to secure and grow their energy stockpiles. In 2013, according to the *Wall Street Journal*, China's top three oil companies—China National Petroleum Corp., China Petrochemical Corp., or Sinpoec Group, and Cnooc Ltd.—spent $32 billion on conventional oil and gas asset acquisitions overseas. The chart above from the U.S. Energy Information Administration shows that our dependence on fossil fuels will continue to rise (Exhibit 1). Renewable energy will only make up 11 percent of the total energy consumed. Recent natural gas discoveries in the U.S. and improvements in hydraulic fracturing technology and horizontal drilling may even drive the non-renewable energy dependence higher. These natural gas discoveries could change the focus of U.S. companies on sustainable energy sources such as wind and solar due to natural gas resources being so plentiful and inexpensive.
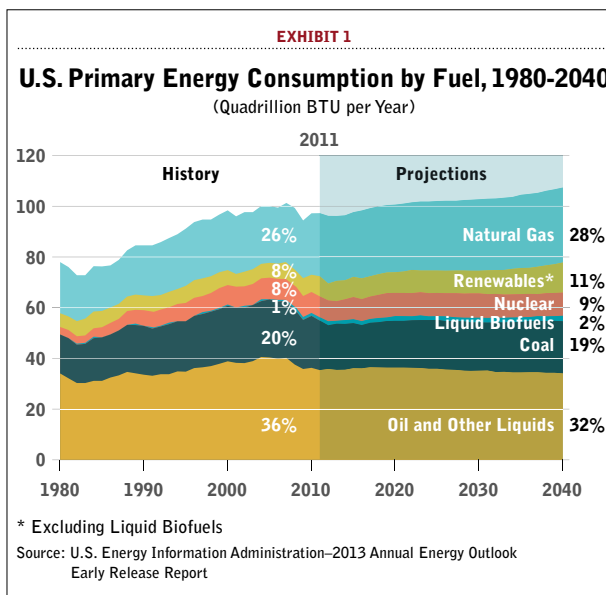
Water. Fresh water is important to the health and prosperity of all nations and a key resource in most supply chains. It is an integral ingredient in farming; without it we will struggle to grow enough food to feed our populations. In the early part of 2014, many areas within the Western U.S. are seeing extreme drought conditions. In California, where much of the U.S. produce is grown, the Department of Water Resources reports that the state is enduring its worst drought in the past 100 years. Many countries around the world are similarly reporting some type of drought conditions. In *The Natural Advantage of Nations*, authors Hargroves and Smith claim that water should be considered nature's gold. Less than 2.5 percent of the water in the world is considered fresh water and by the year 2025 two-thirds of the world's population will be affected by water shortages. In 10 years, water could be as costly as oil.

Costs. Organizations will continue to see a rise in resource and regulation costs. In *World Population Prospects: The 2004 Revision*, the United Nations estimated that the world's population will grow from 6 billion to 9 billion people by 2050—this in turn will drive consumption. In *Natural Capitalism*, published in 1999,

the authors claim that: "Humankind has inherited a 3.8 billion year store of natural capital (water, minerals, oil, trees, fish, soil, and air). At present rates of use and degradation, there will be little left by the end of the next century." We are using these natural resources at a pace where they cannot regenerate or be replaced. Unfortunately these natural resource costs will rise due to the lack of supply and increased demand. Regulation costs will continue to grow in the U.S. According to Sam Batkins of the American Action Forum, "the federal government imposed an estimated $216 billion in regulatory costs on the economy last year, nearly double its previous record."

Natural Disasters /Extreme Weather. Weather throughout the world is changing: We see more natural disasters and extreme weather events than ever before. Hurricanes, tornados, typhoons, tsunamis, earthquakes, and extreme heat and cold befall with far greater occurrence. In 2012 alone, the U.S. suffered 11 extreme weather events that caused at least $1 billion in damage, according to the website ScienceDaily. Scientists believe that these new weather patterns will exist for the foreseeable future. The World Economic Forum listed climate change and extreme weather events as the top two categories within environmental risk issues affecting the world.

Industrial Revolution and the Supply Chain Process

The Industrial Revolution was one of the greatest periods in human history. It changed the way we manufactured items by utilizing machines and equipment to mass produce goods. Unfortunately, the single greatest flaw of the Industrial Revolution was the lack of hindsight given to the disposal of waste generated by supply chain processes or of products when they were no longer usable. The U.S. became a disposable society, one in which we still live today. Waste continues to be disposed of in landfills or lakes and rivers. However, we have the capabilities to recycle, remanufacture, and even reclaim certain products. Laws and regulations have passed that limit what we dispose of from a waste and hazardous material standpoint. These changes have indeed helped, but we continue to pollute on an unprecedented scale. In order to reduce the costs to business, most nations often ignore or allow environmental indiscretions. We sacrifice tomorrow for today—as a result, future generations will be forced to deal with our mistakes unless we can start transforming our supply chains to assist the environment.

The Transformation to Sustainability

One of the takeaways from our research and work with corporations is that there are best practices and steps companies can take to move toward supply chain sustainability. We have identified eight important steps that can lead to supply chain sustainability transformation.

Step 1: Leadership. The first area of focus for any supply chain sustainability transformation is leadership. Leadership within an organization will drive behavior. Unfortunately, in today's world, we have trained our leaders to focus on short-term profits and to conduct business from a disposable perspective. The incentive structure for most executives is based on financial metrics without regard to the consequences of their actions—especially if they are within the parameters of the legal system. These incentive plans are driving many of the issues we face. In order to transform supply chains, we must change the mindset and incentive plans of business leaders. We must teach our presidents and CEOs why sustainability is such a tectonic piece of today's business world and that it makes financial sense, especially for the future. Incentivizing executives to change the supply chain to be more sustainable will increase the pace of change within organizations. Reducing costs and improving our environmental footprint are a powerful combination and one that many leaders should encourage and embrace.

Step 2: Sustainability Education. The second step to instituting supply chain sustainability within a corporation is to educate employees on what sustainability initiatives can do for their company and their environment. Many organizations are inviting speakers or are holding conferences and workshops on ways to achieve sustainability. Universities, including Syracuse University, have certificate programs in sustainability (http://partnersforsustainability.org/curriculum). There are countless books on sustainability, such as *The Ecology of Commerce* by Paul Hawkens, *Biomimicry* by Janine Benyus, and *Making Sustainability Work* by Marc Epstein, to name a few. These are powerful advocates for sustainability change. Another learning tool many organizations are utilizing is to benchmark other organization; a great way to increase knowledge on sustainability.

Two years ago, I completed a supply chain sustainability consulting project with Exxaro, a South African mining company with $7 billion in revenue. Exxaro was in the beginning throes of a supply chain

sustainability program within its organization. Several of its executives traveled to the U.S. to learn more about supply chain sustainability. During their stay, we visited with supply chain leaders across the country within many different companies, on a quest to learn about their plans and progress towards supply chain sustainability.

Step 3. Change Agents. Any large initiative needs a focal point to drive the change. A senior executive must be responsible for instituting sustainability within an organization. Depending on the size of the company, some choose vice presidents to assume the leadership role for sustainability while large corporations may create a Chief Sustainability Officer (CSO) position. These executives are responsible for driving sustainability efforts throughout the organization. The vice president or CSO should appoint a high-level supply chain manager to become the supply chain sustainability change agent. This individual will initiate the sustainability transformation within the supply chain organization. This should be the change agent's full-time role, especially in the beginning stages of such an endeavor.

Step 4: Sustainability Measures. In order to develop a plan to transform the supply chain, an assessment should be conducted on the existing supply chain. Areas in which to focus during the assessment include: water usage, energy usage, energy efficiency, renewable energy sources, waste to landfills, waste recycled, end of life products recycled, emissions, emissions reductions, effluent waste, and the organization's carbon footprint. This audit must be performed at the beginning of the transformation in order to get a baseline measure on current processes. The baseline measures will help your company develop the needed sustainability goals to improve your processes.
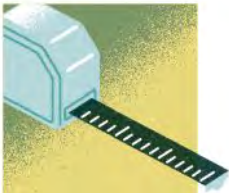
Step 5: Green Goals. The audit results should help determine goals and objectives for a company's sustainability efforts. The goals should be realistic and make sense for improving processes. Once the goals are in place, measures need to be set to deter-

mine effectiveness in meeting objectives. These sustainability measures should be communicated throughout the organization. For example, Interface, the world's largest designer and maker of carpet tile, shows the progress it is making toward sustainability efforts via its website. Measuring objectives will indeed drive results. Once a measure is reached, the bar must be raised in order to reach a new level within the sustainability efforts.

One major goal that many companies aspire to reach is Net Zero waste. Net Zero waste is defined as reusing all products as much as possible, ensuring no waste is sent to landfills, and having no impact on the environment. One of the keys to developing a Net Zero waste environment is to have processes that can feed off of each other and use each other's by-products. These symbiotic relationships are where we see supply chains moving in to the future.

Step 6: Sustainability Actions. In order to meet our goals, we must take action on the path to sustainability. The actions we should take are: change or improve old processes/products and design for the environment. Improving or changing processes can be an arduous task. Many companies focus their efforts on areas that can offer the biggest benefit for their sustainability initiative, including an analysis of the waste generated and the amount of hazardous materials used in operations and processes. Eliminating these types of wastes can be daunting at times. Although the up-front cost may seem expensive, many companies are looking at the total cost of ownership for the whole system. Whole system thinking is an approach many sustainability experts ascribe when looking at processes. Storing, handling, disposal, and special management of hazardous materials and waste are usually costs buried within a company's expenses. Many times, eliminating hazardous materials and waste can show a significant savings throughout the organization.

Companies are using Six Sigma and Lean projects as change tools for removal of waste. Once the actions have been completed, then another measure should be taken to see if there has been any improvement within the process. The process then starts over again until all waste is removed from the supply chain system.

The second action to be taken is to design for the environment. Design for the environment considers and reviews all of the aspects and attributes that go into producing new products. The goal is to develop a product or process that does no harm to the environment. It entails using

non-hazardous materials, creating no waste within the process, and developing a recycling system for products that reach their end-of-life. This is a massive undertaking and a learning curve for many design processes within companies.

The biggest impediment to this new design process is the "built-in" product obsolescence most companies have ingrained within their product sales strategies. Companies like Apple, one of the largest in the world, build obsolescence into their products as a strategy to enable revenue streams in the future. With more than 387 million iPhones sold between 2010 and 2013, Apple's sales model is dependent upon releasing a new iPhone every year. In a resource constrained world, a product obsolescence strategy may become an issue.

Improving old products and processes and implementing a design for environment strategy must be done in concert in order to institute a sustainable supply chain. This plan is key to allowing companies to reduce costs and increase margins. Earlier in this article, I discussed the fact that resources are slowly diminishing. In the future, end-of-life products will become the new raw material or revenue stream for most organizations. By-products from our processes will also be another revenue opportunity for organizations. As an example, Forbes reports that General Motors is seeing a $1 billion revenue stream by recycling waste. Organizations need to look at waste as a potential revenue stream versus an expense. Improving or changing processes can be an arduous task and one that will require a lot of effort and work but the revenue stream could be substantial.

Step 7: Monitor Sustainability Actions and Corrective Action. Once the actions have taken place, it is imperative that companies measure their results. These measures are important in understanding progress toward sustainability. Many companies use "dashboard" software to review their metrics. Making the data available for employees to see is a great way to make these initiatives transparent. If the actions are not meeting the stated goals, then the sustainability change agents should reevaluate the goals to see if they were unrealistic or if the action is not working. The group may adjust the metric or try a different action.

It is important to note that sometimes sustainability initiatives may affect business adversely. Frito-Lay changed to a sustainable package for its Sun Chips snack brand. The bag was 100 percent compostable and a sustainable innovation for the snack industry. Unfortunately, the bag made a very loud noise when you attempted to get chips or close the bag. Many consumers were upset about the noise, which led to an 11 percent decline in sales over 52 weeks. According to news reports, Frito-Lay was forced to go back to the original packaging because of the loss of sales.

Step 8: Continuous Improvement. One of the hardest issues many people have is keeping up with all of the sustainability innovations that happen on a daily basis. As sustainability leaders, we need to take the time to review what other organizations are doing and determine if those sustainability innovations would work for our companies.

When I toured the many different organizations within the United States with my friends at Exxaro, we were intrigued by what companies were doing to obtain sustainability. The knowledge gained on that trip inspired the executives at Exxaro to ponder the ways in which they could incorporate these innovations into their organization. The focus for all companies should be on continuous improvement. I believe the supply chain of the future will be Net Gain—whatever they do is actually beneficial to the environment. Whatever water they bring into their factories goes out of the facility purer. Emissions released by organizations will be cleaner than the air outside the facility. Products that are produced by these companies will have value once they are end-of-life and be key ingredients for products of the future. If you think about that, wouldn't our environment change for the better?

In the end, transforming to a sustainable supply chain is no simple task. We will see more challenges affecting our supply chains in the future. All of the research done on sustainable supply chains proves that companies can see a financial advantage once they start pursuing sustainability initiatives. In today's competitive world, this is how supply chains will survive and flourish in the future.

Having a sustainable supply chain is a necessity in today's world. We have hundreds of years of environmental waste for which to make up. The time to make a change for the sustainable future is now. ∞

How They Did it: Moving IBM's Smarter Supply Chain to the Cloud

In the next five years, cloud computing will dramatically affect supply chains globally. Those that have already moved to the cloud are more agile, collaborate better with suppliers and business partners, and provide more end-to-end visibility, all at a lower technology cost. Paired with analytics, the cloud delivers powerful tools for supply chain decision making. At IBM, the Integrated Supply Chain (ISC) team is applying cloud computing and analytics to derive real business benefits across the company. The result so far has been an estimated savings of $50 million in hard warranty costs. Here's how they did it and what they learned.

By Thomas Ward and Vasanthi Gopal

These days, it is hard to avoid the mention of cloud computing during any ordinary work week. And with good reason: "Cloud," as it is referred to, is rapidly becoming a valued means of storing, sharing, and retrieving all kinds of data at faster speeds and with far lower fixed costs than ever before. It was only a matter of time before cloud would be seen as a potential solution for some of the complex challenges that supply chain managers face in today's non-stop global economy.

So what does the cloud-driven supply chain look like in practice? How are its advantages actually playing out? And what are some of the challenges and risks along the way?

IBM's Integrated Supply Chain (ISC) organization has some answers. In 2012, ISC began taking to the cloud its Quality Early Warning System (QEWS), an innovative solution developed by IBM to identify potential quality defects in its end-to-end hardware supply chain processes. In addition to saving IBM an estimated $50 million in warranty costs, QEWS is an important step in IBM's shift from descriptive, or reactive, analytics to predictive analytics.

The group's experience with cloud computing thus far has proved to be promising. The results provide ample justification for continued investment in cloud, particularly in terms of managing time and project commitments. This article shares some of what IBM has learned to date, gives candid disclosures about some of the pitfalls, and points to the next steps in moving more of IBM's supply chain to the cloud.

IBM's Supply Chain Imperative

Delivering information technology hardware, software, and services to over 170 countries, IBM generated 2013 revenues of almost $100 billion with net income of $18 billion. But like other Fortune 500 organizations, IBM is in white-hot competition for market share and client relevance. Every efficiency gain matters; every opportunity to shift costs from fixed to variable is of great interest; every technology model that improves collaboration and reduces cycle time is of enormous value. "We can make ourselves a

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Steven Puetzer

successful company," Ginni Rometty, IBM's chief executive said recently. "But to be the world's most essential company? Others confer that on us. We will have to earn that."

Pivotal to IBM's effectiveness is its ISC organization, whose 20,000-plus employees in 70 countries manage more than $33 billion in annual spend for IBM and work with more than 19,000 suppliers worldwide, all connected online. The ISC owns and manages IBM's end-to-end supply chain processes. This includes all of its supplier-facing source-to-payment processes and its client-facing opportunity-to-order-to-cash interactions, along with the conventional plan-to-deliver activities. It should come as no surprise that the ISC relies heavily on its IT prowess; more than 93 percent of supplier invoices are transacted electronically; and it has more than 30 analytics applications that are used to improve its global end-to-end operations.

The ISC's leadership team had been well aware of cloud computing's potential for years; after all, IBM has been a leading cloud proponent for a long time. (The enterprise has been growing its overall cloud revenues sharply in recent years; indeed, IBM reported 2013 cloud revenues of more than $4 billion—a 69 percent increase over 2012.) But cloud's value to ISC became clear in the fourth quarter of 2011 when Tim Humphrey, ISC's director of strategy and innovation, identified it as a key enabler for IBM's overall supply chain strategy—notably for increasing supply chain agility. Crucially, cloud would realign ISC's strategy with IBM's overall corporate strategy, which was already tightly tied to cloud computing.

The organization's consequent cloud strategy was developed and reviewed by Tom Ward (co-author of this article and ISC's supply chain cloud strategist), and approved by Fran O'Sullivan, IBM's chief supply chain officer and her senior supply chain executive team. The strategy was established by conducting over 40 interviews across IBM's supply chain, with executives in the office of its chief infor-

mation officer, and with its Global Technology Services' executive teams. In addition, available industry research was evaluated to identify the intersection between cloud and the supply chain.

The primary benefits of cloud were already well understood by the team. These were anchored in the definition of cloud from the National Institute of Standards and Technology (NIST). (See sidebar Cloud Made Clear.) ISC leaders knew it would provide faster access to IT resources and the elastic capacity needed to make IBM's supply chain more agile. They were familiar with the ways in which cloud service providers could speed up "time to value" in terms of clients' access to the cloud. They knew that the cloud can open up multi-enterprise collaboration among suppliers, clients, and business partners, boosting supply chain efficiency. (In a traditional IT environment, server utilization is typically 15 percent to 25 percent, whereas in the cloud, it can be more than 65 percent.) And they understood that improved visibility of key data would make supply chains more responsive.

The question was, where, across all of IBM's far-flung supply chain operations, could cloud be piloted to best effect? The ISC's leaders pinpointed three areas in which cloud could make big contributions:

1. reducing the cycle time for on-boarding clients to the cloud;

2. trimming cycle times for delivery and set-up of cloud infrastructure for IBM's and its clients' data centers;

3. and showcasing the migration of IBM internal supply chain applications to the cloud.

Shortlisting Applications for The Cloud

With those objectives in mind, Tom Ward and other ISC leaders began to map out a supply chain cloud deployment plan in mid-2012. At least 12 of IBM's existing supply chain applications were identified as strong candidates to migrate to the cloud—applications ranging from Web

Cloud Made Clear

Cloud computing has been compared to renting a car versus owning a car. Under a car rental agreement, the renter pays for the use of the car on a consumption basis: A renter is charged by the day or by the mile driven. The car is rented from a fleet of cars of different sizes, makes, and models. The renter can readily opt for an "upgrade" car if he or she needs more capacity or speed.

The National Institute of Standards

and Technology (NIST)* defines "cloud" as follows: Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

The fundamental benefits of cloud

computing are ease of use and speed of provisioning. It is important to note that cloud is not a "technology," like networking or server storage; it is a usage model. It is based on a pool of network, compute, storage, and application resources. Treating all the resources in the data center as a pool enables users to more accurately quantify the business value of cloud computing as a solution at each stage of implementation.

order invoicing, and online travel reservations to critical parts management tools. The evaluation process mapped the cloud's desirable characteristics (as defined by NIST and ISC) to the fit with each application. This assessment was based on a supply chain application running on an Infrastructure as a Service (IaaS) environment. (See Exhibit 1.)

To launch the initiative, the ISC cloud team began to identify and assemble professionals from across the company who could help drive the cloud pilot program. As part of IBM's global technical talent development program, three ISC employees from India, Chile, and Spain worked with Ward and IBM distinguished engineer Pascal Durazzi to identify and evaluate candidate applications. By 2013, three new staff members—including co-author Vasanthi Gopal, an IBM IT architect—had joined the team to drive ISC's cloud application migration.

Importantly, the cloud strategy effort required no full-time employees. Ward has been allocating approximately 30 percent of his working week to the project; Gopal commits one day a week as part of her own ongoing training and development initiative at IBM. All in all, the ISC's cloud strategy initiative has required the equivalent of perhaps one full-time person thus far. Additionally, the team took five key steps:

1. evaluating the cost for migration and on-going operations;

2. comparing cloud-based costs to the business-as-usual environment;

3. completing a security risk assessment in order to mitigate any security exposures;

4. completion of a client enablement questionnaire to activate the service and provision the client's initial resource;

5. and last but by no means least, the detailed planning for deployment of the application's migration to the cloud.

QEWS Gets the Green Light

The team selected a quality management solution, Quality Early Warning System (QEWS), for the pilot. Developed in-house by IBM, QEWS has been in use in IBM's Server and Storage manufacturing operations worldwide since 2008. Its advanced analytics help detect emerging negative trends in supply chain quality early in the process.

The tool monitors and analyzes data that was already available in IBM's information repository, such as full field performance data, manufacturing and test performance data, and supplier quality performance data. When an outlier is identified, QEWS proactively sends an alert to the appropriate manager, who can evaluate and confirm that there is a potential quality related defect and initiate

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EXHIBIT 1

Evaluating the "fit" of the product quality application with the cloud

Cloud Computing Characteristic	Description and IaaS* Migration Assessment	QEWS** IaaS
Multi-Tenant	The services are architected such that several customers share the underlying infrastructure resources, without compromising the privacy and security of any single customer's data.	
Elastic	The service delivery infrastructure can expand and contract automatically based on capacity needs.	
On-Demand	All cloud services are available over the Internet and can be consumed as and when needed.	
Flexible Pricing/ Usage Metered	Resource usage can be monitored, controlled, and reported providing transparency for both the provider and consumer. Billing may be based on actual usage.	
Self Service/ Location Independent	All services are simple and easy to use and can be provisioned directly by the user from a user interface (UI) or an application programming interface (API).	
Speed/Time to Value	Supply Chain delivers integrated solutions for cloud, enabling rapid time to value for client access to the cloud.	
Multi-Enterprise Collaboration	Cloud Computing provides Interoperability of supply chain end-to-end business processes and technology. Smarter Supply Chain Analytics is another key enabler to Collaboration.	
Visibility	Transparent Supply Chain operations are managed through real-time, cloud based data and analytics to provide broad visibility.	

No Capability   Limited Capability   Base Capability   Strong Capability   Industry Leading Capability

National Institute of Standards and Technology (NIST) Cloud Definitions

IBM Supply Chain Showcase Attributes

* Iaas = Infrastructure as a Service   **QEWS = Quality Early Warning System

Source: IBM

the necessary remediation.

Specifically, QEWS provides an alternative to the current standard in quality—statistical process control (SPC)—which is prone to many false alarms and is reactive rather than predictive. QEWS' "smart" infrastructure automatically detects defect trends typically before they are triggered by traditional, industry standard SPC techniques. Using this predictive approach to quality management, IBM can identify and resolve potential problems six to eight weeks or more earlier than with traditional SPC at any stage of the supply chain process. (See Exhibit 2.)

The result: QEWS minimizes manufacturing rework, delayed product shipments, warranty claims in recall of defective products—all of which can and do contribute to lost time, higher costs, and lower client satisfaction. QEWS can mitigate these problems while lowering costs, improving productivity, and enhancing brand value.

Benefits to date at IBM include savings of $50 million in hard warranty costs since 2008, plus soft savings and benefits. In 2012, QEWS was recognized by *InformationWeek* as a leading innovation. And it was a finalist in the technology category of the Institute for Supply Management's (ISM) 2013 awards. Perhaps more importantly, QEWS illustrates IBM's shift from descriptive to predictive analytics. It is one of over 30 supply chain analytics solutions currently in use.

The application was recommended for the pilot program by Donnie Haye, ISC's vice president of analytics, solutions, and acquisitions. Haye based her recommendation on the fact that the QEWS sits at the intersection of business analytics and the cloud across IBM's suppliers, its clients, and IBM itself. Analytics help unearth insights that inform business decisions and can be used to automate and optimize business processes. Cloud is a key enabler for integrating analytics applications and

providing visibility across the supply chain.

Moreover, QEWS was already gaining interest as a "showcase" application, for demonstration to IBM's clients; moving it to the cloud could make it easier to use in future collaborations with clients, suppliers, and business partners. The application can be used across many of IBM's clients' manufacturing industries, from automobile to electronics. The advantage of having QEWS in the cloud is that it makes it easier and faster to integrate with a client's IT infrastructure. The client portal can be customized, and the user can choose the type of data to be displayed.

The Migration Begins

In February 2013, the push to put the QEWS application on the cloud began in earnest. By March 2013, the ISC cloud team was focused firmly on technology questions, such as deciding which cloud infrastructure to select. Some platforms, such as OpenStack, CloudStack, and Cloud Foundry, are gaining popularity, but no single standard has been widely adopted yet. (IBM supports infrastructure as a service (IaaS) on OpenStack and platform as a service (PaaS) on Cloud Foundry.) The ISC team decided to migrate QEWS to IBM Cloud Managed Services (CMS). The team secured funds from the group's "Smarter ISC Fund"—leveraging an internal source for financing innovation projects—in order to use the IaaS layer.

IBM Cloud Managed Services (CMS) was chosen for several reasons. CMS includes both the System x (Wintel) and Power System (AIX) IBM servers. The Power System provided for enterprise level application support. And CMS offered software and service options (operating system, middleware including Websphere, installation, and support). Crucially, from IBM's standpoint, CMS can be readily scaled and applied by any company that manufactures and sells physical products, ranging from heavy industrial equipment to medical devices, globally. That is true for a private cloud environment or for one in a hybrid cloud, shared with other companies.

By April, the emphasis had shifted to security. Given the sensitivity of supply chain data, which regularly includes clients' names and delivery addresses, details of suppliers' pricing, and terms and conditions, it is easy to understand why ISC executives such as Haye were anxious to confirm that the cloud offering would be secure enough to prevent Client A from seeing Client B's data or IBM's own data.

Moreover, QEWS encompasses an abundance of quality performance data and information about supply chain risks. And since QEWS is an enterprise level IBM application, and is therefore tightly integrated with many other company wide operations and processes, the security review required significant work. IBM has robust policies

EXHIBIT 2

Selection Rationale: QEWS Helps Resolve Problems Weeks Earlier Than SPC Can Do
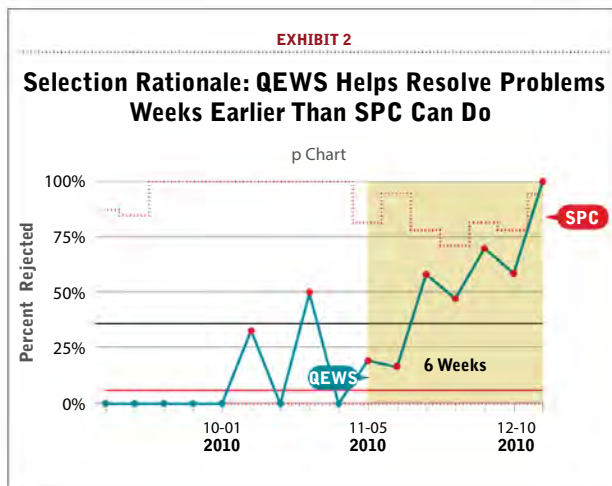
and practices around information security management, which supply chain applications such as QEWS must comply with globally. Another benefit of using the CMS cloud was that it is compliant with IBM's stringent corporate requirements for security management.

By September 2013, the ISC team's activities had begun to pivot toward IT migration—that is, how to actually load the supply chain software into the cloud. The migration of QEWS to CMS took longer than expected; Ward's team—and the ISC executives—had hoped it would take weeks, but in fact it took several months. What was not immediately obvious was the difference between applications that are "cloud native"—developed on the cloud—and those that are not. To strengthen the security around QEWS on the cloud, the team accounted for the fact that QEWS was already plumbed in tightly to a wide range of existing data sources.

Lessons Learned

Cloud computing is a flexible and powerful technology model—one that can quickly eliminate the constraints imposed by traditional computing. The ability to access huge volumes of computing power, to dial up or dial down usage as needed, and to choose between private, public, or hybrid versions of the cloud has shown IBM's ISC group that the cloud is of real and enduring business value.

ISC's early forays into harnessing cloud for the supply chain has given its leaders every confidence that the technology model can prove valuable in many other applications beyond QEWS. As such, authors Ward and Gopal and their colleagues began migrating a second application toward the end of 2013—an application that suppliers will be able to access.

Work is well under way to move other ISC applications into the cloud. The ISC cloud team is presently evaluating three other applications to migrate to the cloud, one of which shares QEWS' development and test environment. This has allowed the team to very quickly provision and dedicate new servers to the new application—in days, not weeks. The CMS-based infrastructure is now being opened up to the developers of the new application so they can install and test it in the enterprise level cloud environment. Once it has been demonstrated that this second application can run on the cloud, the ISC team can then scale up the platform to put another mission critical application into production on the cloud.

The ISC cloud team is presently evaluating three other applications to migrate to the cloud, one of which shares QEWS' development and test environment. This has allowed the team to very quickly provision and dedicate new servers to the new application—in days, not weeks.

As a result of its efforts, the ISC team has learned a lot in a short time. One important takeaway from the longer than expected migration of QEWS is that ideally, such applications should be built on the cloud in the first place rather than trying to retrofit them onto the IaaS layer. Another lesson: Cloud deployments can be surprisingly low cost. In 2013, Ward and his team used only 70 percent of the money allocated for the cloud platform.

Another positive surprise: Now that the infrastructure has been installed, it has proved extremely facile to onboard other clients. As noted earlier, the QEWS solution is of practical importance outside of IBM. Since going live, ISC has begun work with major automotive industry clients to use QEWS in their manufacturing processes. The cloud deployment provides a straightforward way for IBM to demonstrate the benefits it has realized and it enables clients to quickly use their own data to realize QEWS advantages. A client can rapidly access QEWS online, download its own data, and run its own analysis.

What is perhaps most interesting is the speed with which new applications can be brought online now that the team has properly mapped out the cloud infrastructure. Essentially, new applications can be ported over to the cloud in just a few weeks, whereas the QEWS application took six months to reach that stage.

At the time of this writing, cloud's element of speed was evident in the ISC group's entry in an internal competition at IBM. The contest—a fun way to spur excellence in internal communications and to help convey cloud's proliferation within IBM—involves all of IBM's cloud teams voting on the best way that such messages are communicated. The imagery used on the ISC group's entry—racing aircraft, with the tagline "expect the unexpected—faster with analytics"—amply sums up how cloud computing is helping IBM's supply chain speed into the future. ∞

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* The National Institute of Standards and Technology (1) defined Cloud Computing Characteristics are outlined in this document: http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf

Do You Really Need to Replace Your WMS?

By Ian Hobkirk

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Structural changes to supply chains and demand patterns have created a host of new process requirements for distribution centers. Yet despite the benefits of upgrading to more modern supply chain software, many firms have resisted the call to upgrade or replace their warehouse management systems. We look at the reasons that firms have avoided a WMS upgrade and some of the creative alternatives delivering value in today's supply chains.

Picture this: One day, you see your neighbor Bob carrying in a bunch of packages that UPS has just delivered to his house. Bob has always been a bit of an odd fellow. For one thing, he's the only person you know who still heats his house with coal. One cold morning, he's outside shoveling coal into an ancient hopper before the sun comes up. When you ask him what all the packages are for, he explains that it is so expensive and risky to replace his coal heating system, that he's purchased a bunch of space heaters, electric blankets, and cashmere scarves to keep his family warm through the winter.

Sound a little crazy? Perhaps. But the situation is analogous to something that has been occurring in American distribution centers for years as companies go to great lengths to avoid replacing their aging warehouse management software (WMS) systems.

Structural changes to supply chains and demand patterns over the last two decades have created a host of new process requirements for distribution centers. Many companies' WMS systems have failed to keep abreast of these new requirements, creating operational inefficiencies that eat away at corporate profits. Despite the benefits of upgrading to more modern supply chain software, many firms have resisted the call, and instead have sought less expansive solutions to address their needs. However, several technological advances, which have roots in the 1990s, have finally come of age and are offering alternatives to wholesale platform replacements.

Factors Driving Upgrades

Over the last 12 months, Commonwealth Supply Chain Advisors has conducted an ongoing poll of distribution companies in an effort to understand what factors are driving companies to upgrade

Functionality Needs: A Tale of Two Companies

Functionality gaps are the top reason companies cite when asked why they are considering a WMS replacement. But the specific functionality in question varies widely based on the company's present WMS maturity level. Companies can be divided into two basic classes here: Firms that already have a mature WMS in place cite the need for slotting, labor management, and pick wave planning, while companies without a WMS are struggling just to achieve basic transaction conformation (Exhibit 1).

Class A: Software From The Last Century

When Fortune 500 companies began broadly implementing WMS systems in the 1990s, supply chains were very different than they are today. The standard features available in the software back then mirrored those supply chain requirements. Consider some of the characteristics of their WMS software, or, alternatively to find some kind of a workaround. We have interviewed numerous companies at all three major stages of the supply chain: manufacturing, wholesale distribution, and retail.

Our interviews have encompassed both large and small companies, and companies with a variety of current WMS solutions ranging from large best-of-breed solutions to basic, internally developed systems. Based on our research, Commonwealth has identified three primary drivers of technology replacement:

- Functionality Needs
- IT Simplification
- Changes to the ERP Landscape

Let's look at each in more detail.

EXHIBIT 1

Functionality Drivers by WMS Maturity Level

Class A	Class B
Companies that already have a moderately robust WMS	Companies that have little or no WMS capabilities
1 Voice Directed Warehousing	1 Real-Time Transaction Confirmation
2 Slotting	2 More Sophisticated Pick Processes
3 Labor Management	3 Directed Put-Away
4 More Sophisticated Pick Process	4 Receiving Improvements
5 Pick Wave Planning	5 Slotting
6 Lot Control Issues	6 Improvement Integration to MHE
7 Task Interleaving	
8 Cartonization	

Source: Commonwealth Supply Chain Advisors, 2014

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the supply chain of the mid-1990s (see Exhibit 2):

• Fewer channels. The dominant sales channels for companies manufacturing consumer goods were retail and wholesale. Amazon.com had just been founded and was still limited largely to books and CDs. This meant that warehouses were primarily picking full cases of product and shipping to stores or other distribution centers via truckload or LTL shipments. Overall "cost per piece" was low, and pick methodologies did not need to be as complex. Additionally, inventory could be stored in simple tiered models, with a single, fixed primary pick location for each SKU with additional overstock locations.

• Fewer retail compliance requirements. Retailers were just beginning to discover the value of compliance programs with their vendors, and WMS systems were not well tuned to accommodate these requirements.

• Fewer security threats. In the pre-9/11 era, there was less need for visibility, traceability, and lot control in the distribution center.

• Less competitive service level environment. Retailers required less time-specific deliveries, and consumers had far more modest expectations for when they would receive catalog merchandise.

• Slower rate of SKU proliferation. Craft beers, flavored water, and organic pet food weren't on the radar.

• More regional rather than global supply chains. The major shift of U.S. manufacturing to the Pacific Rim was just starting to occur. Trading partner collaboration was simpler.

These macro level socioeconomic changes have transformed the way that distribution operations need to work, and the support they require from their software systems. Yet, many large companies are still operating on software systems that were purchased more than 10 years ago and only sporadically upgraded in the intervening years. These companies have to deal with the present reality of business conditions, but must rely on software from the last century. The situation isn't that different from Bob: His old coal furnace does keep the pipes from freezing, but his reluctance to upgrade has left him several generations behind in technology and efficiency.

Class B: Tied to Paper

On the other side of the spectrum are companies that aren't burdened with legacy systems—in fact, they aren't burdened with any systems at all. A surprising number of companies that have experienced rapid growth still do not have a true WMS in their distribution centers—one that features real-time inventory control, system-directed workflows with mobile devices, and automatic data capture. Instead, these companies operate with paper-based picking instructions, spreadsheets to track bin locations, and manually keying confirmations back into the ERP system.

This phenomenon is not limited to Tier 3 and Tier 4 organizations or mom and pop operations. There are a surprising number of companies in the $100 million dollar revenue range that still operate this way, including some household name retailers. They seem to be able to fill orders on time and with sufficient accuracy, but often at the cost of significant amounts of manual labor to muscle the shipments out the door.

Not surprisingly, these companies have a more modest wish list than the previous group: They would happily settle for things like real-time transaction confirmation and system-directed put-away.

Let's take a more in-depth look at what specific functionality is pushing companies to upgrade or replace their WMS systems.

Functionality Overview: Inventory and Transactional Control

The Inventory and Transactional Control category is one that is near and dear to the hearts of Class B companies. By far, the most important feature they are looking for is Real-Time Transaction Confirmation—that is the simple ability to confirm that a system-directed task like picking or put-away has been completed correctly. This is generally done via a bar code scan of either a bin label or product label. Using automatic data capture for confirmation eliminates the need for paper logs, for clerks to enter the logged data into the software system, or for armies of "checkers" to manually

EXHIBIT 2

Supply Chain Transformation Over Two Decades

Supply Chain Aspect	1994	2014	Implications for the Distribution Center
Sales Channels	Few	Omni-Channel	More need for piece picking, complex pick methodologies, etc.
Retail Compliance	Loose	Stringent	More need for compliance labeling, ASNs, routing, and scheduling of shipments
Security Threats	Low	High	Increased need for lot control, country of origin tracking, etc.
Service Level Expectations	Modest	High	Pressure to turn around orders quickly
SKU Proliferation	Low	High	Increased need for re-slotting
Supply Chain Network	Regional	Global	Need for advanced trading partner collaboration tools

Source: Commonwealth Supply Chain Advisors, 2014

verify that the proper goods have been picked.

There are other aspects of Inventory and Transaction control that are also on the minds of supply chain executives. As traceability throughout the supply chain becomes more important, the ability to use a bar code scanner to capture lengthy lot numbers during a number of warehousing operations will become more and more important.

End users tell us that being tied to paper for confirmation is labor intensive. "We have to confirm a SKU number and lot number lot every time we touch a product," says Dennis Agan, facility manager for Agreliant, one of the largest agricultural seed distributors in the U.S. "We can't afford to have mistakes so we have people checking every outbound order before it ships. We get the accuracy, but it drives up our labor costs significantly."

Companies working with multiple pack sizes—master packs, inner packs, and each-level units—tell Commonwealth that they also struggle with manual conversions in the warehouse. "It's become cumbersome to deal with our various pack-size issues, in all areas of our operation—purchasing, sales, customer service, receiving, and picking," says Bob Gormley, director of operations for Phillips Pet Supply.

Another item on companies' wish lists is having fewer "location limitations." Many older, legacy WMS systems only allow a SKU to have one fixed forward pick location. This can be very limiting if companies want to have separate pick bins for cases and eaches, have the same fast moving item spread out to multiple bins to avoid congestion, or use a dynamic forward pick location system to streamline replenishment. This fundamental weakness in the way the WMS thinks about locations can be very difficult to change, even with extensive software modifications.

Functionality Overview: Receiving and Put-Away

On the inbound side, having more sophisticated directed put-away was high on the functionality wish list for many companies interviewed as part of this project. Receiving and put-away are simple if every SKU has a fixed home location. But it quickly gets complicated: What happens if the SKU resides in more than one bin? Where does the new product get put-away? What if there isn't room in one of the current bins for the new product? How can FIFO rotation be maintained? Questions like these—and many, many more—make it challenging to execute the put-away process without the benefit of enabling software.

Functionality Overview: Picking, Order Management, and Shipping

The need for more sophisticated pick processes featured prominently on the wish lists of both Class A and Class B companies. Paper-based warehouses often have a significant need to cluster pick effectively. Transitioning from discrete order picking to cluster picking is one of the biggest single warehouse efficiency gains that a company can ever make. Simply put, it can enable a worker to pick 10 orders in a single trip through the warehouse rather than 10 trips, drastically reducing walking. WMS is a major enabling technology that makes cluster picking possible.

A related methodology, batch-picking, is also facilitated with a modern WMS. Batch picking involves picking the entire amount of a SKU required for multiple orders at once, and then separating the batch into individual orders in a secondary step. WMS systems direct which SKUs are to be picked, how to stage them, and then step the workers through a "put to order" process to ensure accuracy and speed.

Other key outbound capabilities enabled by a modern WMS are zone picking, tandem picking, and cartonization (picking items directly to the shipping container).

Functionality Overview: High Performance Warehousing

A handful of additional functionality items can be considered "high performance warehousing," and may only have applicability in operations with certain volume levels or complexity levels.

Slotting improvements are likely on the wish list of every warehouse manager, but only require complex solutions in certain circumstances. Simple operations with few changes in SKU demand patterns can often slot their distribution centers using spreadsheet-based tools. However, for operations with extreme seasonality, high rates of new product introductions, or fashion-based distribution, slotting becomes a more frequent and complex requirement. These companies require the sort of dynamic, integrated slotting module which is available from a top tier WMS provider, or from a handful of best-of-breed slotting developers.

Labor management is similarly on the minds of many operations managers. In operations with a high level of transaction uniformity (i.e. every pick is a case pick at the floor level), it may be possible to set some credible performance targets for picking based on past history, and to hold workers accountable for reaching these levels. However, the rise of multi-channel commerce has created distribution centers in which picking can

involve pieces, cases, and pallets, along with a number of different pick methodologies under one roof. In this environment, it is impossible to hold workers accountable to performance targets when each workflow differs so vastly from the others. Labor management software (LMS), either as a stand-alone system or as a module of WMS, can help implement engineered labor standards which calculate a specific target time for every task in the warehouse every day. This technology is used to successfully implement incentive-based pay systems even in complex warehouses with unionized workforces.

Improved integration to materials handling systems is another wish list item for many high-performance warehouses. In facilities with conveyor-based picking systems, this functionality can include improved zone-routing to ensure that cartons are only sent to zones where there are picks required, and the capability to induct new orders at multiple points in the system. Another key feature that can be enabled by WMS is the ability to confirm on a line-by-line basis whether all of the required picks in a certain zone have been made before an order is routed to shipping. Without this feature, the conveyor control software (CCS) can track whether a carton has made stops at all of the required zones, but cannot determine if all of the picks in those zones have been made. Closer integration with the WMS can make this a level of accuracy possible.

IT Simplification

In addition to functionality requirements, the need for IT simplification is another major factor behind the desire to upgrade or replace WMS systems. The levels of IT complexity that exist at many companies today can be attributed to four factors:

Macroeconomic changes. For the most part, companies have responded to macroeconomic changes in a piecemeal fashion, implementing individual software "fixes," small software sub-systems, and manual workarounds as needs arise.

This approach leads to an incredibly complex array of software systems at many companies, with applications such as WMS, TMS, ERP, POS, OMS, EDI, LMS, SCV, WCS, and RFID all stitched together in ways that no one person at the company can easily explain.

M&A activity. Many large companies that have made mergers or acquisitions have found it simpler to leave the new company's existing supply chain applications in place. For evidence, just look at the large number of companies that run different WMS systems and even ERP systems in different facilities or business divisions.

Multi-channel silos. As multi-channel commerce began developing in the late 1990s, WMS providers emerged with strengths in specific channels. Many companies, for example, implemented one WMS to manage a retail distribution center and a different one to manage their e-commerce DCs. Many WMS providers have now developed strong capabilities across multiple channels, but the siloed software infrastructure still exists among their customers.

Regionalization. Many global enterprises have implemented different WMS and ERP solutions in each region, often based on the strengths of one provider's service and support in one region over another. Additionally, many enterprises have the same "brands" of software around the world, but have upgraded inconsistently, leaving different regions on vastly different versions of the same software.

When combined, these factors have created a patchwork quilt of supply chain software applications, and have swelled the ranks of the internal IT departments required to maintain these disparate ecosystems. This situation has led many companies to contemplate massive ERP or WMS replacement initiatives in an effort to simplify the architecture, reduce support costs, and to make it easier to upgrade software in the future.

Changes to ERP Landscape

A final factor leading companies to contemplate WMS upgrades or replacements involves changes which have been driven by the software providers themselves. For nearly three decades, the ERP vs. best-of-breed debate has raged in the business community. Is it better to have a single ERP system controlling most major applications at a business, or is it better to have a number of best-of-breed solutions each managing what it does best? Proponents of the ERP solution tout the simpler interfaces and smaller IT footprint, while best-of-breed advocates cite the improved functionality available from having applications that are truly specialized.

In the last five years, the lines have blurred. Oracle and SAP have both released new versions of their WMS that are significantly more functional than their predecessors. While still not on a par with best-of-breed solutions, ERP WMS systems are at last closing the gap. This has caused many user companies to revisit the debate, and in some cases to make changes to their software roadmaps.

Why Companies Avoid Upgrades

So, with all of these compelling reasons to upgrade a WMS, one might expect nearly every distribution operation to be engaged in some form of upgrade or

software replacement to take advantage of new features and simplified IT infrastructure. This is not the case. While many WMS companies are in fact reporting strong sales as the U.S. economy rebounds, the vast majority of distribution operations are not engaged in any major WMS replacement projects at the present time. Why is there so much reluctance to replace software in the face of so many apparent benefits?

Commonwealth's research suggests that the major factor holding companies back from undertaking WMS projects is fear of implementation issues that will outweigh all of the hoped for benefits (Exhibit 3).

"There is a general feeling that these projects take twice as long as proposed, the cost will probably double, and there will be major service disruptions along the way," says the vice president of engineering at a wholesale distribution company with $5 billion dollars in annual revenue. "There are plenty of stories out there of companies that struggled with these projects."

Why is it that WMS software at times seems so much harder to implement than even ERP systems? Five major factors contribute to a disproportionate number of problems with WMS software:
- lack of true process standardization in distribution,
- multiple exceptions to the rule in the warehouse,
- less business savvy users,
- materials handling interface requirements, and
- high rate of simultaneous active transaction volume.

These inherent challenges with implementing distribution software often result in cost overruns, resource monopolization, and risk of operational disruption.
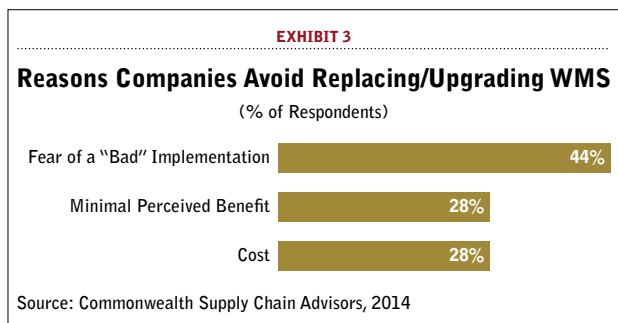
To be sure, it is certainly possible to succeed with WMS replacements and upgrades, as numerous companies can attest. In fact, it is nearly impossible to run a warehouse that is both accurate and cost efficient without some form of WMS.

However, many companies still respond to these pressures like our long-suffering neighbor Bob, unwilling to replace an outdated heating system, even as ice crystals are forming on his television.

In the next section, we'll learn about a few technologies that fall into the category of "space heaters and scarves" that can offer alternatives to full scale software upgrades.

Alternatives to Upgrades
Voice comes of age. One of the biggest alternative strategies in use today involves voice technology in the warehouse. The primary driver behind speech-based warehousing in the past was the prospect of allowing workers to operate in a hands-free environment, especially in full-case picking operations, where picking

EXHIBIT 3

Reasons Companies Avoid Replacing/Upgrading WMS

(% of Respondents)

Fear of a "Bad" Implementation	44%
Minimal Perceived Benefit	28%
Cost	28%

Source: Commonwealth Supply Chain Advisors, 2014

involved lifting heavy, awkward items. Not having to juggle a piece of paper or a handheld computer can significantly boost pick rates.

That was then. Our unscientific survey of recent voice adopters reveals a startling reason why voice technology is in vogue at the moment. Rather than adopting voice for the traditional reasons—hands-free operation—more and more companies are implementing it for three side benefits that voice software offers: more flexibility, less risk, and less cost than legacy software systems.

More flexibility. Voice software is often more flexible and easy to adapt. Most of the voice software systems today have been written in the last ten years, many of them utilizing the principles of Service Oriented Architecture (SOA). Companies like Voxware and Lucas Systems recognized early on that speech hardware would quickly become a commodity, and focused their development efforts on creating software that could extend the functionality of the underlying WMS system, rather than just speech-enabling WMS instructions. The result has been software that plugs functional gaps and is easily configured by the user to create new workflows. For many companies, this stands in stark contrast with their aging legacy WMS systems that cannot be easily modified.

Less risk. Voice deployments can be done in a piecemeal fashion—adding layers of software on top of legacy WMS systems to address a few functionality areas. If the voice deployment fails, the underlying WMS hasn't really been affected and the operation can continue as before. Thus, voice deployments are less risky than a wholesale WMS upgrade or replacement.

Less cost. Even if a user has been on an annual maintenance agreement and can avoid new license fees, the professional services fees for a full scale WMS upgrade can be very high. To date, voice vendors still have a "new kid on the block" mentality and continue to offer attractive pricing levels in an effort to build their client base. Voice vendors also seem more willing to quote fixed costs for deployment and

to stand behind those costs, within reason.

While deploying a voice system can plug many of the functionality gaps in an operation, it actually increases the amount of IT complexity in the organization. There is another software application to be supported, and another set of interfaces to be maintained. So, it could be said that deploying voice purely to avoid a major WMS upgrade may be a short or mid-term strategy, with a larger, enterprise level software project still looming on the horizon at a future date. But, as seen from the experiences of companies we surveyed, voice deployments can provide a swift, tangible ROI that will improve a company's profit margins until the larger project occurs.

The WCS allows orders to be grouped together such that the cluster of orders can all be fulfilled with picks from a relatively small geographic area, greatly reducing walking and improving efficiency.

That brings us back to our neighbor Bob, with his assortment of stay warm alternatives. A few pertinent questions can be raised as we compare his situation to companies implementing voice as an alternative to a new WMS. Is voice technology like a space heater—it fills an immediate need but winds up being more costly in the long run when you add everything up? This author predicts that 10 years from now, the companies above will look back on their experience with voice and say it was more like the cashmere scarf: marketed for style, but bought for warmth; a simple device that got the job done without breaking the bank.

Now, let's talk about the electric blanket.

Another Alternative: WCS. Warehouse Control Software (WCS) supports large material handling systems, providing a single communication platform to conveyors, carousels, scanners, printers, and other devices. WCS systems have largely been developed by material handling manufactures or systems integrators. Some are little more than development platforms, with each installation differing vastly from the others. Some providers, however, have developed WCS systems that are true applications, with a common underlying source-code from one deployment to the next and regular enhancements and upgrades.

However, some of today's WCS systems are exceeding their original mandates of communicating with material handling systems, and, like voice systems, are being deployed to achieve functionality that is too challenging or risky to develop in the company's WMS. Some of the newer WCS systems have also been developed with flexible architecture, and can be used to fill gaps without the resource drain and risk of a wholesale platform replacement.

Take for example the experience of Regis Corporation, a leader in the hair care industry. The company runs two distribution centers in Chattanooga, Tenn. and Salt Lake City, Utah to service its 9,700-plus retail locations worldwide. Regis uses a conveyor-based picking system with zone-routing, and has a legacy WMS system that is no longer supported or enhanced by the original provider. The WMS had two limitations that were creating problems in the operation. To begin with, an order had to start being picked in the first zone where picks existed. When there was heavy demand for a certain SKU, nearly all of the orders in the wave had to start in the same zone. That approach flooded the zone and created a bottleneck. Secondly, it was not possible to group orders for cluster picking by SKU or zone commonality. As a result, pickers would travel excessive distances in order to pick all of the items for a group of very disparate orders.

Modifying the WMS to fix these issues was not practical given the amount of coding that was required. Instead, Regis turned to its WCS provider, Invata Intralogistics. Invata's FastTrack WCS was about to be deployed to manage a pick-to-light system in the facility. It was discovered that the WCS could also address the two functionality issues listed above relatively easily. "We're going to use the WCS to allow orders to start in any zone we want," says Jeff Crowell, Regis's logistics project manager. "This will balance out and level-load the volumes in the pick module [a continuous loop conveyor design allows the orders to loop back and enter any upstream zones where picks exist]."

Additionally, the WCS allows orders to be grouped together such that the cluster of orders can all be fulfilled with picks from a relatively small geographic area, greatly reducing walking and improving efficiency. The result is quicker turn around and better service to Regis's local salons and their guests. These changes are in the process of being developed and implemented and are expected to dramatically improve the operation. "This was certainly a lot easier than trying to modify our WMS to make these changes," says Crowell.

How Sustainable is The Trend?

It is reasonable to expect that the David and Goliath situation that has driven voice providers to be so accommodating to user requests will cease at some point? There are already reports of some of voice providers being spread extremely thin as they simultaneously support multiple implementations with a limited staff of technical resources. Voice developers have, by and large, not developed the integration partner networks that WMS provides have, and so have fewer choices to supplement their resources when times get busy. So, the next few years could see voice providers taking on more overhead to support growth, and being less willing to guarantee the cost of implementations. While this trend may take some of the punch out of the strong voice headlines that are making news today, the underlying business case for voice deployment as outlined in this article will likely still exist.

The same question can be asked of WCS providers. As noted previously, most of these developers are primarily in the business of selling materials handling equipment. The 2000s were littered with failed initiatives by WCS providers to re-brand their software as WMS, some of them rather high profile. Many of the providers realized that their core, profitable business was selling equipment, and that trying to sell and support a "real" WMS added a layer of resources and cost to their organization that they were not willing to bear. Still, examples like that of Regis are compelling. If a WCS provider is content to use their software to manage materials handling equipment, and occasionally to stray into new areas and fill some functionality gaps outside of the conveyor system, this may be a sustainable model for both provider and user.

Looking Forward

The broad lesson to be learned here is that while enterprise level software initiatives have value, they can be long and expensive, and companies should take advantage of some of these interim steps along the way to address specific operational issues with smart use of technology. Both voice and WCS are mature products that fill a specific need. Both can be effectively adapted to fill peripheral functionality needs in a distribution operation and shorten the time to value.
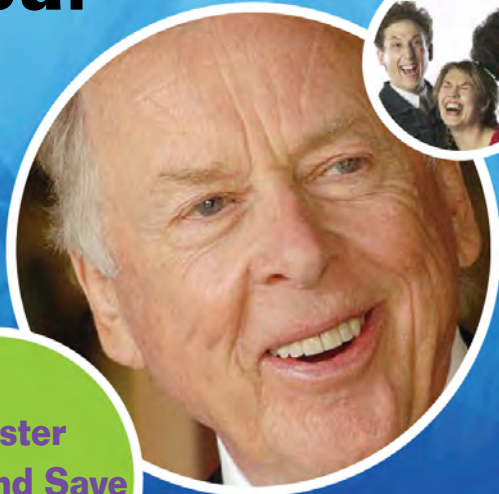
And what of good neighbor Bob? The author admits that the analogy isn't a perfect one. In reality, Bob's wife would have moved in with her sister a long time ago, and taken the kids with her. ∞

Global Supply Chains:

Illustration by Katie Edwards

When Uncertainty is a
CERTAIN FACTOR

By Larry Lapide

Predicting the future is never easy, but MIT attempted to do just that when its *Supply Chain 2020 Project* identified six major trends that supply networks will have to cope with in the years ahead.

"The future ain't what it used to be." That somewhat nonsensical quote from the former New York Yankee baseball player Yogi Berra was the whimsical, yet apropos tagline for the MIT Supply Chain 2020 (SC2020) Project. I managed the project's launch in 2004, and it continues today, focusing on what excellent supply chains would look like 10 to 15 years in the future.

Having come from a largely consulting background prior to joining MIT's Center for Transportation & Logistics, I initially thought that successful supply chains in the future would leverage best practice trends that I had been seeing over the past five to 10 years, such as Just-in-Time (JIT) and lean operations as well as supply chain visibility and collaboration. After peeking into the future for a while, I realized these trends were based upon where the world had been recently moving, not necessarily on where it might be in the future. And, these so-called best practices might be rendered useless. I came to realize that my own view of the future "wasn't what it used to be;" hence, the genesis of the SC2020

Project tagline.

The MIT team decided to approach the project using a Scenario Planning methodology, rather than try to do the impossible and predict the state of the world 10 to 15 years out. Our interests moved to identifying reasonable scenarios for the future, such as the worlds that supply chains might be operating in as well as the uncertainties around them. The six major factors that we feel will most affect future supply chains are: 1) the aging of developed countries; 2) oil prices; 3) a power shift toward the East; 4) trading bloc formation; 5) globalized Green Laws; and 6) pervasive technologies.

Despite the Great Recession we have experienced since the launch of this initiative, my view of the importance of these major factors has not been altered. That is because these long-term global shifts happen as a backdrop to short-term economic conditions. Indeed, the Great Recession has more than likely either delayed or accelerated their impact on future global supply chains. Their trends and implications are described on the following pages.

1. Aging of Developed Countries. Early in the MIT project, I invited Dr. Joseph F. Coughlin, who directs MIT's Age

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Lab, to discuss his research in what he terms "Disruptive Demographics." The research looks at how consumer wants and needs are changing based on the aging of populations. He showed a key chart that depicts the world's population in 1996 in contrast to what is being predicted for 2025. The chart highlighted the differences between "less developed countries" and "more developed countries" and also showed the age distributions for them. A major takeaway is that the world's population is growing larger and older. However, and more importantly, the more developed countries are getting older, while the less developed are getting younger. This trend will have significant demand-supply ramifications for future supply chains.

Relatively speaking, older people are more affluent and consume more goods, while younger people possess the physical prowess and stamina to do the work needed to create them. Thus, from a supply-demand perspective, in the future there will be significant dislocations between the consumers buying the goods and the workers needed to supply them.

From the demand side, older populations will demand a different set of goods as they age. Instead of just standalone products, they will favor total solu-

The more developed countries are getting older, while the less developed are getting younger. This trend will have significant demand-supply ramifications for future supply chains.

tions that include a host of services along with physical goods. As they age, older people will experience physical, hearing, and sight challenges. They will need goods and services to help them overcome these challenges to their quality of life. These might include, for example, in-home monitoring of their diets and health, as well as more home delivery to satisfy their in-home needs.

From the supply side, this trend also means the populations buying the largest share of goods will be located in different countries than those that can do the work necessary to create them. More developed, older consuming countries will need to solve this problem by importing more goods, increasing labor productivity, and expanding their workforce in at least two ways.

The first would be to source labor from other countries by allowing more immigration from less developed countries, while the second would be to harness the potential of workers previously considered unemployable. More automation might be needed in plants and warehouses to support workforces that are comprised of

diverse sets of immigrants, older workers, and mentally and physically handicapped workers.

2. Oil Prices. Since late 2004, oil prices have crept upward, albeit in an unsteady fashion, as prices have become more volatile in the short run. When we first noticed that this was happening to the price of oil—the critical resource needed to fuel economies and drive supply chains around the world—it was identified as one of the most important macro factors for the SC2020 project to investigate. While the price of a barrel of crude oil was well below $40 at the time, we initially postulated an oil price reaching $40. Shortly thereafter, we changed it to $200 to $400 per barrel by 2020.

We uncovered a 1980 U.S. Department of Energy chart historically depicting the real prices of oil during a period of almost 18 years that we called the Era of Cheap Oil. From around 1986 to late 2004, the real price of oil varied from about $20 to $30 per barrel. After that, the price swung wildly in the short run, while climbing to its current price hovering around $100 per barrel—three to more than five times the price during the Era of Cheap Oil—in just nine years. (The recent increase in natural gas production in the U.S. portends a long-term future with more reliance on this energy source, however, it will take decades to create the demand and supply chain needed to replace the lion's share of the dependency on oil.)

My prediction is for the climb to continue because the long-term price increases are due to rising global demand for oil from developing economies, as well as to the increased cost of extracting oil from new and more difficult places. (One could argue that the BP oil spill in the Gulf of Mexico highlighted the extra costs that will be incurred by drilling in places never drilled in before—costs relating to additional safeguards and the use of innovative drilling techniques.)

The Era of Cheap Oil also happened to coincide with a time when companies were innovating supply chains that were global, fast, responsive, and relatively inexpensive—largely driven by inexpensive oil. Now that the Era of Cheap Oil is history, these will have to be adapted to align to the more expensive oil regime. Today's networks were driven by cheap oil that rendered outsourcing, offshoring, and JIT programs cost effective. Worldwide inventories were drastically reduced through the use of faster, yet less energy efficient, transport modes that enabled goods to be cost effectively moved around the world. Companies favored the use of air rather than ocean freight, and truck and parcel rather than rail and barge, to transport goods.

The demise of cheap oil also alters the relationship between fixed and variable manufacturing costs (that are significantly dependent on oil/energy costs). Industries that routinely operate plants 24/7 may need to shut down operations occasionally to save on the higher variable costs. This wasn't on the radar screen during the Era of Cheap Oil. And, this more expensive oil could favor smaller and less fixed-cost-based manufacturing plants.

From a future supply network structure, more expensive oil will favor shorter supply lines than those that were cost justified under cheap oil. This is especially true for outbound (customer facing) supply lines that are the least energy efficient because their transport modes tend to be parcel and truck, rather than the rail and ocean often used for inbound supply. This will tend to geographically cluster source, make, and delivery functions to create global supply networks that are cost and energy efficient, rather than cost and inventory efficient.

3. Power Shift Toward the East.

While the rapid economic rise of China makes up much of today's headlines, there has been a gradual shift of economic power toward the East in general. Relatively speaking, the U.S. and Western European dominance of world trade has been shrinking over time.

Many of the world's largest companies, especially those that manufacture and market commodity goods, are now based outside the U.S. and Western Europe. In 2010, China surpassed Japan as the second largest country in terms of GDP, having already surpassed Germany in 2007 when China became the third largest. The U.S. share of GDP has been steadily declining since 2001 (according to IMF data), as has Western Europe's over a longer period of time.

An interesting book, *The Post-American World* by Fareed Zakaria, echoes the trend toward a future in which Western economies no longer rule the roost. (Indeed, some might argue that the Great Recession we recently experienced may well be the inflection point of this power shift.) As Zakaria's book starts out: "This is not a book about the decline of America, but rather about the rise of everyone else." While not necessarily bad news for the West, it does mean that there will be more competition among global companies for scare raw materials, as well as for capitalizing on revenue opportunities in the growing Eastern nations.

Implications of this change for Eastern countries include a shift from largely manufacturing based economies to more consuming oriented ones. In addition, these countries' populations will become more educated and will compete more with the West in product innovation—where the West has been dominant for a very long time.

4. Trading Bloc Formation.

The book *The World Is Flat: A Brief History of the Twenty-First Century* by Thomas L. Friedman postulates a future in which goods, information, and ideas move around freely, virtually unrestricted by country borders. I suspect most supply chain and manufacturing professionals support this view because they take pride in being able to make, move, and sell goods anywhere in the world. The Flat World is a great, altruistic world that I hope to live in during my golden years. However, I believe it is an optimistic and only a remotely possible future. Similarly, another remotely possible scenario would be an extreme backlash to globalization that results in a future that we termed the "Alien Nation" scenario in the SC2020 Project. This is a future in which there is limited cooperation and trade among nations, also cynically called "the Old Europe."

Another more likely scenario might be the formation of three to four tightly coupled trading blocs that are essentially spheres of influence around a few dominant or "magnet" countries. For example, there might be trading blocs with the majority of their economic activities and supply chains centered on the U.S., Western Europe, China, and possibly Japan. Under this scenario, the majority of international trade would take place within each bloc, with less cross-bloc trading taking place than would be expected under a Flat World scenario.

There are some trends that portend this trading bloc future. In the Western Hemisphere, there are a variety of trading partnerships in place, including NAFTA. The European Union (EU) has been formed and a common currency has been implemented. China has been developing long-term relationships with businesses in Australia, especially for the sourcing of commodity goods, and for oil in Africa and the Middle East.

Two of the factors discussed above also support trading bloc formation. As oil prices increase over time, the shortening of supply lines might drive a natural evolution to blocs, as companies geographically cluster their source, make, and deliver functions. In addition, more developed older countries might source younger labor from their less developed neighboring countries to solve their labor shortages. North America might ramp up immigration from Latin America, while Western Europe might source more labor from Africa. Japan and China might source more labor from the less developed Asian countries. (Note: China's recently reversed one child policy caused it to become one of the world's oldest countries.)

5. Globalized Green Laws. A U.S. Environmental Protection Agency report published in April 2009 stated that the first and second ranked sources of greenhouse gas emissions come from the electricity generation and transportation industries, respectively. This implies that manufacturing/supply chain activities are major sources of emissions. Global emissions will need to be reduced over time to help save the Earth, and more Green Laws will be needed over time, globally, to achieve this. Energy efficiency will become virtually synonymous with cost efficiency, so companies will have incentives to become more green as they cost effectively manage supply networks under a rising energy cost regime.

Another area of evolving and increasing global Green Laws deals with the reduction of waste materials that pollute the Earth's land and water. These laws will affect supply chains in at least three ways. The first is that more future products will be designed to be green, comprised of biodegradable and non-toxic materials.

The second is that the end-of-life disposal of products will be more regulated on a global basis. Some of this regulation is already in place in California, the EU, and in Germany, where auto makers are ultimately responsible for the environmentally safe disposal of cars. In the U.S., Dell and HP have recycling programs in that they recycle computers and extract materials from them before the computers are put into dump sites. Such recycling programs will require companies to establish better competencies in reverse logistics.

Thirdly, in the future globally branded companies will need to establish Supply Network Compliance programs. To protect the brand image of their products, companies will need to ensure that they comply with Green Laws in countries in which they do business. Moreover, they will need to ensure that their upstream suppliers comply as well on a worldwide basis.

6. Pervasive Technologies. In my view, technology is an enabler of business processes. It does not directly drive future supply chains. However, it can make innovative processes possible and speed up their evolution.

Tom Friedman's *Flat World* is one in which individuals work virtually anywhere and in any place, and also communicate freely across the Internet. While this is a common belief about the future of work, there is a caveat to this premise. Because the U.S. essentially manages the World Wide Web, the likely future scenario is one in which the Internet is fragmented and competes with other networks while at the same time being almost seamlessly interconnected with them. Thus, the future should see more worldwide trading partner electronic collaborations via the Internet and wireless remote communication devices, as well as social networks or collaborative communities such as Facebook.

These networks will be enabled by the ability of individuals to communicate and access information globally.

Meanwhile, in the future there will likely be fuller supply chain visibility of worldwide goods, assets, and inventories enabled via tracking technologies including GPS and smart tags such as RFID devices. This will allow companies to fully view and virtually manage end-to-end supply chains. Additionally, there will be a much better melding of the virtual and physical worlds, enabled by supply chain computer modeling. Managers will use computer models to plan and manage supply chains with software that closely resembles the gaming software our younger generation is playing with today. Via computer gaming, future managers will be able to plan and manage in real time by simulating and optimizing what might happen to their physical supply chains, and take immediate action to execute their plans.

Understanding Possible Futures

The above macro factors provide some insight into what might happen by 2020, but even among them there are huge uncertainties as to exactly what the future would look like. In addition, there is uncertainty as to their speed of change and implications.

Under the Scenario Planning methodology, one peeks into possible (often extreme) futures to help identify robust long-term supply strategies today. Understanding possible futures also helps drive long-term decision making, as well as identify important sensors in the ground that companies might use to monitor events that may shape where the world is heading. Previous events—such as the fall of the Iron Curtain, President Nixon opening up trade with China, and China joining the WTO—portended the massive extent of globalization we see today.

Analyzing how to successfully run supply chains when operating under various future world scenarios can help companies deploy robust strategies today that will go a long way toward achieving success in the future. ⌾⌾

This feature previously appeared in Manufacturing Executive Leadership Journal. *It is reprinted with permission.*

The following Insight columns by Lapide explore these trends in more depth:

1. "Disruptive Demographics," *Supply Chain Management Review*, September/October 2007.

2. "Beyond the Green Hype," *Supply Chain Management Review*, July/August 2008.

3. "A 'Flat' Future? Don't Bet On It," *Supply Chain Management Review*, September/October 2008.

4. "Scenario Planning for a Successful Future," *Supply Chain Management Review,* November 2008.

5. "Fracking: A Game Changer?" *Supply Chain Management Review*, January/February 2014.

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Influential Business Thinker and Co-Author of "In Search of Excellence"

Unlocking the Value of Tail Spend

How to boost benefits and efficiency through Advanced Tail Sourcing.

By Hendrik Disteldorf, Tobias Fehre, Guttorm Aase, and Mike Piccarreta

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Non-strategic tail spend presents a challenge for most procurement organizations. The term is often defined as the 80 percent of suppliers that represent just 20 percent of an organization's spend. The desire to balance resources with level of spend becomes a difficult task for conventional sourcing approaches, as complexity often outweighs expected benefits. Additionally, organizations often find themselves in single-sourced situations with little competition for materials, resulting in a steep climb up the cost curve and increased supply risk. As organizations grow and their offerings diversify, so does the challenge.

For prepared organizations, this challenge can be turned into a significant opportunity. In our experience, organizations with the right approach can achieve 10 percent to 15 percent savings across broad portfolios. By applying an advanced methodology, these companies have reached those targets while doubling the productivity of staff.

An Advanced Tail Sourcing framework helps unlock the value trapped in non-strategic tail spend by focusing on the two activities listed below.

1. Align internal capabilities, processes, and technology to manage tail spend.

2. Increase the attractiveness of the tail spend to generate market competition.

Advanced Tail Sourcing Process

A fundamental mistake made by most organizations is to manage non-strategic tail spend in the same manner as strategic category spend. Typically, companies sprinkle tail spend throughout the procurement organization, giving each sourcing manager a small portion of spend with limited alignment to their categories. This results in sourcing managers ignoring the tail and only returning to it to address supply disruptions or cash in savings after a long period of price appreciation. This is ineffective and inefficient.

Organizations successful at managing tail spend segment the tail spend away from their strategic sourcing managers and align dedicated resources with the right incentives, capabilities, and tools to attack the tail. Contrary to traditional practice, our experience shows that tail spend is best managed by dedicated, process-driven specialists with strong analytical skills rather than by market experts. Their focus is to expose spend to the market frequently and source it efficiently. Given a robust process, firms can staff teams with more junior resources while maintaining a high level of effectiveness. Processes guide the staff through sourcing events while taking advantage of their core analytic skills to draw the proper conclusions.

Enabling the effective execution of these processes are technology and tools that automate the sourcing process, including e-sourcing tools and database management tools. E-sourcing tools are essential to efficiently take spend to market and engage suppliers, while database tools provide the capability to quickly prepare RFPs for market in a repeatable way.

A leading company in the chemical industry piloted the Advanced Tail Sourcing approach by empowering a team of dedicated specialists with supporting tools. The team included a dedicated

group of analysts to take tail spend to market and a coordinator to manage the interface with the rest of the organization. These changes, along with cutting edge technology, enabled the team to double the amount of tail spend taken to market per resource, freeing up time for the rest of the organization.

Making Tail Spend Attractive to the Market

In addition to developing the appropriate internal capabilities, it is important for organizations to increase the attractiveness, awareness, and transparency of the tail spend to the market. Similar to how tail spend is viewed in many organizations, suppliers may have limited awareness of the spend or they may view it as unattractive.

Creating targeted market baskets around supplier capabilities helps improve the attractiveness of the tail spend. Successful organizations develop robust supplier databases, mapped to their tail spend, to help generate targeted market baskets. This complex but fleeting activity is best accomplished with the support of key distributors and industry experts.

Working closely with a core set of suppliers helps create awareness in the market of the tail spend. Suppliers should be selected based on how their capabilities align with the market baskets the organization has created. For direct spend, this could be key national and regional distributors in the industry. The team of tail specialists should build relationships across multiple core suppliers to help drive competition.

Finally, conducting frequent and efficient market interactions is critical to create transparency in the pricing of the tail spend. This is particularly important for tail spend that is freely negotiated or tied to spot markets, which has the potential to experience price creep over time.

A.T. Kearney recently helped clients enjoy a significant boost in market engagement employing these approaches. These clients worked closely with their core suppliers to match materials to capabilities and define attractive market baskets. They supplemented core supplier insights with market research to develop a robust supplier database for the tail. In the end, companies saw a significant increase in market participation, including identifying alternative suppliers for roughly 80 percent of their previously single-sourced spend.

Key Considerations

From A.T. Kearney's experience in implementing the Advanced Tail Sourcing framework, there are three key considerations that organizations must keep in the forefront of their planning. These considerations can prove challenging in practice but are critical to success in implementation.

- *Skills:* Identifying or developing the talent with the

desired analytical skill set.
- *Scoping:* Identifying the type of spend best suited for managing as tail spend.
- *Change management:* Garnering internal support for necessary changes and enacting changes with limited interruption.

Skills. One of the most significant considerations for implementing the Advanced Tail Sourcing methodology is skills development and talent acquisition. The skill set required for a tail sourcing specialist is very different than that required for a traditional market-oriented sourcing specialist. The specialist is a challenging role to fill internally, as this person will be more junior with less sourcing experience but will require advanced analytical skills. Organizations seeking fast implementation should consider hiring from outside.

Companies can realize benefits of 10 percent to 15 percent across a broad range of tail spend with 50 percent fewer resources when they adopt these best practices.

Scoping. The Advanced Tail Sourcing framework is designed for spend that can be frequently sourced with limited market knowledge. Spend with these qualities typically meets the following criteria: 1) Small and non-critical spend that does not present a significant supply risk to the business; 2) has more than one potential supplier in the market; 3) and does not require complex supply agreements or is managed through spot purchases. Spend that does not meet these criteria should be managed through traditional sourcing approaches.

Change Management. Organizations adopting the Advanced Tail Sourcing methodology must be prepared to proactively manage the change effort. Implementation involves transferring responsibilities and instilling new processes within the organization. Successful organizations align performance incentives with the changes being implemented and include key decision makers within the organization as part of the implementation team. By aligning incentives and garnering the support of the leaders within the organization, the approach can be adopted while avoiding potential pain points.

Regardless of the category, non-strategic tail spend is an area of large benefit potential for organizations with the expertise and techniques to source it efficiently. In our experience, companies can realize benefits of 10 percent to 15 percent across a broad range of tail spend with 50 percent fewer resources when they adopt these best practices. ∞

Show Preview:

Explore the Possibilities

Co-located with Modex 2014, Supply Chain & Transportation USA, the nation's newest transportation and logistics show, promises something for everyone working to improve their supply chain.

SPECIAL SUPPLEMENT TO:

SUPPLYCHAIN
MANAGEMENT REVIEW

BY **BRIDGET McCREA**, CONTRIBUTING EDITOR

Logistics and supply chain executives who attend Modex 2014 in March at Atlanta's Georgia World Congress Center will get a bonus this year. The materials handling centric event is co-locating with Supply Chain & Transportation USA (SCT) to create the largest international expo and conference of its kind to be held in the U.S. and South America in 2014.

Sponsored by MHI and run by Reed Exhibitions (RX), SCT is expected to attract over 100 exhibitors who will showcase their solutions on the event's 15,000-square-foot show floor. Tens of thousands of supply chain professionals from over 100 countries around the globe will attend this combined event.

According to Laurent Noel, vice president of transportation and logistics at RX, Supply Chain & Transportation USA will showcase a complete range of innovative products and services dedicated to transportation, logistics, real estate, and the future supply chain. The co-location will include approximately 230,000 square feet of exhibits as well as educational sessions.

"The decision to co-locate Modex and Supply Chain & Transportation USA was made for several reasons," says George Prest, MHI's CEO.

"Co-locating the two events will allow manufacturing and supply chain professionals unparalleled education and networking opportunities as well as exposure to the largest equipment and technology display of any show of its kind in North America. In today's world where agile and innovative supply chains are a necessity, the co-location is a win-win for participants and attendees."

Noel says that the combined event creates the first U.S. exhibition that offers a one-stop shopping experience for supply chain executives. "The event will also include free educational content designed to meet the needs of vertical industry segments," he adds, noting that MHI's move to incorporate the area "outside of the warehouse's four walls" represents the next step for Modex.

Natural Fit

Noel says that the idea of combining SCT with Modex came about when event coordinators realized that no such event existed in the U.S.

"There's no other show that provides total supply chain services and equipment in one place for the supply chain community," says Noel. "There may be a few different events covering the space, but none provide the same one-

stop-shop approach that we're giving attendees."

Atlanta was a natural selection for the show's location not only because Modex was already taking place there, says Noel, but also because the city is centrally located and representative of what's taking place in the logistics field across the country.

"When you factor in the growing rate of trade and exchange taking place between the U.S. and Europe, for example," says Noel, "Atlanta is a major hub and a great representation of the transportation activity that is going on."

Already entrenched deeply on the materials handling and equipment side of the supply chain industry, Noel adds that Modex presented a unique co-location opportunity for SCT. "Today's vice president of supply chain or logistics and transportation wants to find what he or she is looking for in one place," says Noel. "Being able to bring the transportation components to a single location with Modex—which is already bringing all of the intra-logistics together—is a perfect fit."

And because the SCT team has already successfully rolled out similar shows around the world (Paris, Brazil, and Indonesia, for example), Noel

List of Exhibitors

EXHIBITOR	BOOTH NO.
Tracking Solutions	3220
Acuitive Solutions	2313
AFS Logistics	2515
AGILE Network	2819
American Expediting Company	2113
American Society of Transportation & Logistics (ASTL)	2314
APICS	3115
APL Logistics	2316
Avery Trucking	2715
BLG Logistics Inc.	2310
Bluestar	3219
Cardinal Health Integrated Logistics Services	2116

EXHIBITOR	BOOTH NO.
ClearTrack	2919
Con-way Multimodal	2513
DART Entities	2416
Data2Logistics, LLC	3318
DB Schenker, Schenker Inc.	2213
Delta Airlines	2215
DigitalShipper Logistics Software	2820
Escro Transport Ltd.	2115
Evanhoe & Associates Inc.	3118
Exmile Industry & Construction Tyre Co., Ltd	2713
Eyefreight	2913
Freightwatch International	2719
French American Chamber of Commerce	2708

EXHIBITOR	BOOTH NO.
GEODIS Wilson	2613
German American Chamber of Commerce of the Southern US Inc.	3014
Gold Cold Chain Alliance	3114
HA Advantage	2718
Hartsfield-Jackson Atlanta International Airport	2019
HOPPECKE Batteries Inc.	2013
Insert Information Technologies GmbH	3320
Integral Strategic Solutions	2018
International Business Systems	2918
INTTRA	2816
KRC Logistics	2115

is confident that the co-located event will be well received here in the U.S.

"We know that it's a concept that works for shippers," says Noel, whose team has organized eight supply chain, transportation, and logistics events on four different continents. Each event follows a similar concept of dividing the conference up between logistics and transportation services on one side and materials handling and equipment (intra-logistics) on the other.

"In some cases we will organize both sides of the event," says Noel, "but in the U.S. we felt that Modex would be the best partner to conduct the materials handling and equipment component."

Sharing Information and Best Practices

In terms of attendance, Noel expects 25,000 participants—50 percent of whom will be manufacturers and retailers who influence transportation and logistics decisions—to be on site during for the combined event. He says that the efficiencies created by both events taking place at the same venue will help push up attendance numbers.

"Our competitors are taking a similar approach, knowing that shippers today have less time to visit events and get up close and personal with the newest products and services," says Noel.

In addition, this year's Modex/SCT event will include panel discussions, best practice sessions, case studies, and other features that encourage networking and peer-to-peer information sharing. "We're educating without competing with CSCMP, which is purely educational," says Noel. "Our event is more deeply rooted in exchanging information with peers and the sharing of best practices, information, and insights among attendees."

At the event, most of the world's top freight forwarders will be on deck, including UPS, BLG Logistics Group, Panalpina, and APL Logistics. "This is the only trade show that will feature so many leaders in the freight forwarding industry exhibiting at the same time," Noel points out. "Some will be speaking at the sessions and conferences, but most will also be exhibiting and available for discussions."

Another one of the event's notable features will be an IT-focused exhibitor area for technologies concerning the management of information flow in the supply chain, including software vendors, integrators, and manufacturers of products and services for tracking traceability or geolocation. "Most of these exhibitors will be focused on warehouse management systems and other warehousing-related products and services," says Noel, "although a portion of them will be dedicated to transportation."

Under One Roof

Noel says that the co-located event will be most applicable for logistics and supply chain professionals from the retail, distribution, and manufacturing sectors.

Retailers, for example, need to understand concepts like supply chain optimization, visibility, and agility. They also need to be able to deftly explore and move into new markets, says Noel, who feels that the show will help such attendees realize those goals in 2014. He points to the event's long list of exhibitors as proof that no attendee will walk away from the Atlanta event empty handed.

"When you look at our exhibitors, we have a long list of freight forwarders, transportation companies, and other entities that are well equipped to help manufacturers and retailers build their businesses, explore new markets, and optimize their supply chains," says Noel, adding that a lengthy lineup of educational sessions is also on tap.

In fact, the SCT event will feature 40 such sessions across a three-day period and will include a mix of panel discussions and case studies. The latter will include examples of how global organizations found new ways to track shipments and optimize their supply chains, among other examples.

"We want to cover a diverse range of topics so that there's a little bit of everything for everyone," says Noel. "We want retailers, manufacturers, and distributors alike to be able to learn something new, share with their peers, and enjoy the camaraderie and networking that this world class event provides." □

List of Exhibitors *(Continued)*

EXHIBITOR	BOOTH NO.	EXHIBITOR	BOOTH NO.	EXHIBITOR	BOOTH NO.
Lanter Distributing	2115	Panalpina Inc.	2518	ShenYang Shining Fortune Container Seal Co. Ltd	2414
Livingston International Inc.	2813	Peerless Media	3215	Site Selection Magazine	2914
LLamasoft Inc.	2916	PINC Solutions	3216	TICONTRACT Inc/ TRANSPOREON Group	2818
Manhattan Associates	2716	Port Canaveral	2415		
Metalcraft Inc.	3018	Ports of HAROPA	2318	Transwide	3116
Metro Atlanta Chamber	2019	Protrans	2720	UPS Corporate Headquarters	2118
Monode Marking Products Inc.	3020	Purolator International Inc	2015		
		Ramp Systems Inc	2920	Urban Area Bourges	2016
Next Generation Logistics Inc.	3016	Rasco Industries Inc	3319	US EPA SmartWay Transport Partnership	2315
Numerex	2614	Roush CleanTech	2615		
Old Dominion Freight Line Inc.	2516	Saddle Creek Logistics Services	2216	USSA	2507
				Worldwide Aeros	2510
ORTEC	3013	Seagull Scientific	3218	XTL Inc.	2018
Palisades Logistics	2616	SENATOR International Freight Forwarding	3015	YRC Freight	2413

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Supply Chain & Transportation USA 2014 Conference Schedule

Monday, March 17

Time	Title	Speaker	Session Type	Theater
8:30a.m.-9:45a.m.	Shipping Trends for Global Supply Chains	Edward H. Bastian, President, Delta Airlines	Keynote Presentation	B312
10:15a.m.-11:15a.m.	Found Money/ Using Modeling Technology to Find Hidden Savings in your Supply Chain	Toby Brzoznowski, Co-Founder and Executive Vice President, Llamasoft, Inc.	Presentation	B
10:30a.m.-11:30a.m.	Employee Engagement and Certification in the Supply Chain	Dominic Longo, CSCP Director, Corporate services, APICS	Presentation	A
11:30a.m.-12:30p.m.	Embracing Lean: How an asset-based truck line is using Lean principles to eliminate waste in transportation	Jeff Rivera, Vice President, National Sales, Con-way Freight; Brain McGowan, Vice President, Lean, Con-way Freight	Case Study	B
12:45p.m.-1:45p.m.	Dock Scheduling; Bringing Order to Your Logistics Universe	Elie Hiller, Director, Sales & Marketing, North America, Transwide	Case Study	B
1:00p.m.-2:00p.m.	The Benefits of Business Process Re-engineering in Supply Chain Operations	Kyle Salem, UPS	Case Study	A
2:00p.m.-3:00p.m.	Has Technology Changed The Way We Train Employees?	Elaine Puri, CTL Director of Workforce Development, American Society of Transportation and Logistics (AST&L); Wayne Kline, GLA, Program Director, Polk State Corporate College	Case Study	B
2:15p.m.-3:15p.m.	Near-shoring and the "New Normal"	Wade McDaniel, VP of Supply Chain Solutions, AVNET Velocity	Presentation	A
3:15p.m.-4:15p.m.	Urban Logistics and Supply Chain Efficiency	Chip White, Professor, Georgia Tech; Alan Erera, Professor, Georgia Tech and Tim Staroba, Freight's Eastern Area VP, Con-Way	Case Study	B
3:30p.m.-4:30p.m.	Global Manufacturing (Off-, Near-, and Re-shoring)	Larry Lonagham, Senior Executive, Logistics Unlimited	Presentation	A

Tuesday, March 18

Time	Title	Speaker	Session Type	Theater
8:30a.m.-9:45a.m.	A Conversation with Lee Scott	Lee Scott, Former CEO, Wal-Mart	Keynote Presentation	B312
10:15a.m.-11:15a.m.	Supply Chain Technology: Transportation Management Systems (TMS) Gaining Altitude in Today's Omni-Channel Landscape	Mike Mulqueen, Senior Director of Product Management, Manhattan Associates	Case Study	B
10:30a.m.-11:30a.m.	Trends in Omni-Channel Retailing	Randy Strang, UPS	Case Study	A
11:30a.m.-12:30p.m.	The Collaborative Network: Succeeding in a New Era of Supply Chain Shipment Visibility	Kristen Celecki, Product Marketing Director, Visibility Solutions, INTTRA; Mike Levans, Group Editorial Director, *Logistics Management*; and a Manufacturer (TBD) and Retailer (TBD)	Panel Discussion	B

Time	Title	Speaker	Session Type	Theater
11:45a.m.-12:45p.m.	Fueling a Competitive Edge: How Top Fleets are Succeeding with Propane Autogas	Steve Whaley, Director of Business Development, ROUSH CleanTech	Panel Discussion	A
12:45p.m.-1:45p.m.	Bar Code, RFID, RTLS and Mobile Computing Solutions Impact Operations Worldwide	AIM	Presentation	B
1:00p.m.-2:00p.m.	DB Schenker Case Study	DB Schenker	Case Study	A
2:00p.m.-3:00p.m.	North America-Europe Logistics Solutions	William Behrens, North American Representative, USA/Canada, Ports of HAROPA; Shannon Feeley, Assistant Director of Cargo Business Development, Port Canaveral	Panel Discussion	B
2:15p.m.-3:15p.m.	Need and Future of Workforce Training	BLG/Mercedes/German-American Chamber of Commerce	Panel Discussion	A
3:15p.m.-4:15p.m.	Ortec Case Study	Ortec	Case Study	B
3:30p.m.-4:30p.m.	Size Matters: How Very Large Ships, Trains, and Terminals Are Changing America's Ports	Ken Uriu, Marketing Manager, Port of Long Beach	Presentation	A
Wednesday, March 19				
Time	**Title**	**Speaker**	**Session Type**	**Theater**
8:45a.m.-9:45a.m.	Preview of MHI Industry Report	George Prest, CEO, MHI; Scott Sopher, Principal, Deloitte Consulting LLP	Keynote Presentation	B312
10:15a.m.-11:15a.m.	Strengthening Relationships in the Cold Chain—Beginning with Rail	Global Cold Chain Alliance	Panel Discussion	B
10:30a.m.-11:30a.m.	Strategies for Optimizing Data in the Global Shipping Industry	Kristen Celecki, Product Marketing Director, INTTRA; an Ocean Carrier (invited) and a Shipper (invited)	Panel Discussion	A
11:30a.m.-12:30p.m.	Global 3PL Distribution: Thinking Outside the Borders	Greg McKinley, VP of Warehousing and Logistics, Incomm	Presentation	B
11:45a.m.-12:45p.m.	Top Healthcare Strategies Revealed	Robin Hooker, UPS	Case Study	A
12:45p.m.-1:45p.m.	Omni-Channel—The future of shipping	Agile Network	Case Study	B
1:00p.m.-2:00p.m.	The SmartWay Transport Partnership—Enhancing Supply Chain Efficiency by Managing Carbon Emissions	Buddy Polovick, Team Leader, US EPA SmartWay Transport Partnership; Run Guzzi, Sr. Manager Carrier Relations, The Home Depot and Ed Connally, Manager Logistics, Admin & Compliance, Colgate Palmolive (invited)	Panel Discussion	A
2:00p.m.-3:00p.m.	Livingston International Case Study	Livingston International	Case Study	B
3:15p.m.-4:15p.m.	Is Your Supply Chain Optimized?	Rayford Collins, UPS	Case Study	B
3:30p.m.-4:30p.m.	Urban Area Bourges Case Study	"Urban Area Bourges/French American Chamber of Commerce"	Case Study	A

MARKET UPDATE: OCEAN

2014 State of Ocean Cargo:
Rate Hikes, Dead Ahead

Pent-up demand, depleted inventories, and a greater overall sense of economic security are converging in 2014. If so, ocean cargo carriers will be determined not to miss that opportunity to make rate hikes stick.

By Patrick Burnson, Executive Editor

Will this be the year ocean cargo carriers finally return to profitability? Many industry analysts think so, and logistics managers are scrambling to readjust forecasts and budgets accordingly.

Transpacific cargo demand posted steady growth coming off a healthy holiday season last year, and container lines serving the Asia-U.S. trade lane say that the gains are so far reflected in freight rates. In fact, a January 15 general rate increase (GRI) taken by member lines in the Trans-pacific Stabilization Agreement (TSA) has added an average $300 per 40-foot container (FEU) to rate levels.

Strong forward bookings proved that the increase would hold through the important Lunar New Year period, with carriers building on that momentum with another $300 per FEU increase effective March 15. Furthermore, shippers may expect yet another rate boost on May 1, separate from "adjustments" planned for 2014-2015 contracts.

"Carriers have left a lot of money on the table in this market as partially successful increases have been eroded over time," says Brian Conrad, TSA executive administrator. "There's now a growing sense that pent-up demand, depleted retail and business inventories, and a greater overall sense of economic security are converging in 2014. Lines are determined not to miss that opportunity."

At the same time, TSA also announced its 12-month revenue and cost recovery program for 2014-2015 contracts that recommends increases to

contract rates of $300 per FEU from 2013-2014 levels for U.S. West Coast cargo and $400 per FEU for all other cargo. A key consideration, obviously, is the revenue baseline set as contract negotiations move forward.

"Simply rolling over last year's contract rates—let alone reducing the rates, as some shippers have requested—is just not workable," Conrad says, reiterating that no major transpacific carrier operated profitably in the trade in 2012 or 2013. "The goal is a meaningful net increase, with full cost recovery for fuel, chassis, free time, and other costs, irrespective of supply/demand or other considerations."

Indeed, it looks like pent-up demand, depleted inventories, and a greater overall sense of economic security are converging in 2014. If so, ocean cargo carriers will be determined not to miss that opportunity.

Moment of Truth

Shippers, meanwhile, are waiting to see how the trend toward greater carrier consolidation will play out.

The TSA's "talking agreement" among 15 liners is a relatively small shift in balance compared to the recent success of The Grand Alliance, which was organized by NYK Line, Hapag-Lloyd, and Orient Overseas Container Line. Through their vessel-sharing agreement, all three operate scheduled deployments on a variety of trade lanes where each may have ownership of participating vessels in the string—giving all carriers the ability to book freight on any of the partner's ships.

"There are quite a few vessel-sharing agreements operating this way in trade lanes around the world," says Rich Roche, vice president of international transportation for the freight forwarder Mohawk Global. "Some are larger than others, and

As of 2012, the United States had not returned to 2007 peak historical total container volumes

North American container traffic growth (2007-2012)

Source: Alphaliner
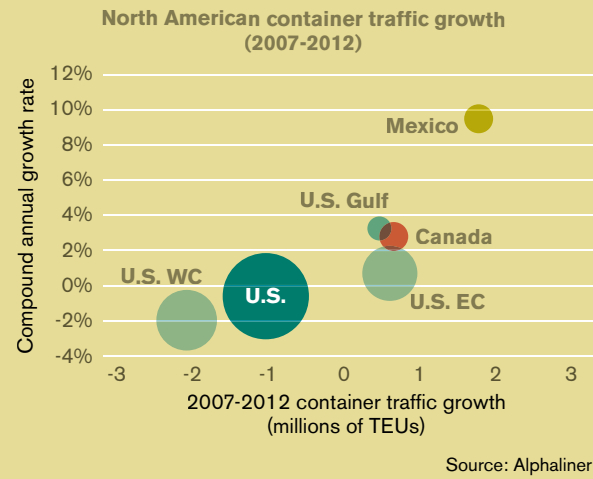
some are specific to a single trade lane while others cross multiple lanes."

Roche notes that a few carriers have opted out of vessel sharing arrangements, choosing instead to provide all the vessels on a given string, be fully responsible to fill out slots, and profit solely from their efforts. "This is not the norm on most container trades, where volume concentration is key to success," he adds.

> **"Simply rolling over** last year's contract rates—let alone reducing the rates, as some shippers have requested—is just not workable."
>
> —Brian Conrad, executive administrator, TSA

Further complicating the picture are the alliances forged by G6 and P3 carriers. Originally deployed together in the Europe-Asia trade, G6 recently expanded their service to include Transpacific and Transatlantic trade routes as well. They currently employ 240 vessels serving 66 ports in three major trade lanes.

The G6 Alliance members are: APL, Hapag-Lloyd, Hyundai Merchant Marine, Mitsui O.S.K. Lines, NYK, and Orient Overseas Container Line. Member carriers maintain that this cooperative agreement is characterized by competitive transit times, broad port coverage, and newer containerships.

"Ocean freight has been commoditized over the years," says Roche. "Drastic measures like super-consortiums are the next answer to survival for the ocean carriers we have all come to depend on."

Pending approval by the Federal Maritime Commission, the effective start date for P3 is March 24. This agreement comprises the world's largest vessel owners—Maersk, CMA-CGM, and MSC. Their plan is to operate an even larger group than G6, with 255 vessels and 28 vessel strings serving the same three trade lanes.

"Collectively, the three emerging global shipping alliances carried an estimated 70 percent of total U.S. loaded container traffic between 2005 and 2012, notes James Brennan, partner with the supply chain consultancy Norbridge, Inc. He adds that the three largest alliances account for 52 percent of the projected world fleet and 69 percent (operational and on order) of its projected capacity.

"Furthermore," says Brennan, "evolving alliance structures could provide a path to significant consolidation. This in turn, could alter global trade patterns for vessels transiting both the Panama and Suez Canals."

Economies of Scale

Bruce Carlton, president of the National Industrial Transportation League, says that shippers have voiced their concern

about having limited options, but that "free market forces" will always prevail when it comes to vessel deployments and availability.

"And hopefully these alliances will result in a lower rate level in the long term if the carriers let shippers benefit from the carriers' significant unit costs," says Carlton. "Everyone in this industry is trying to be more efficient."

But analysts at the Paris-based think tank Alphaliner say that although the P3 carriers are expected to rationalize some of their services, capacity reductions are not expected. They add that the large "newbuildings" will replace smaller ships on the east-west routes.

"P3 will probably deploy almost all of their 130 ships of above 10,000 twenty-foot equivalent units (TEUs) on Asia-Europe and the Pacific routes," notes Stephen Fletcher, Alphaliner's commercial director. "The P3 alliance will be particularly dominant on Asia-Europe trade lane, while P3 on the routes between the Far East and North America will have lesser coverage in relation to the services that the two other alliances offer.

Room For Improvement

Analysts agree that the industry's major players are continuing to adapt to a new era characterized by too much vessel capacity and cargo volumes on many trade lanes that refuse to live up to previous forecasts. Yet liner shipping may be becoming less reliable as operators ignore service standards in the rush to cut costs.

According to Drewry's newly published *Carrier Performance Insight* report, containership reliability worsened in every quarter of 2013, with the fourth-quarter decline taking the on-time average below 64 percent—the lowest

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Collectively, the three emerging global shipping alliances carried an estimated 70 percent of total U.S. loaded container traffic between 2005 and 2012

U.S. EC loaded container traffic by carrier/alliance (2005-2012)

Source: Alphaliner

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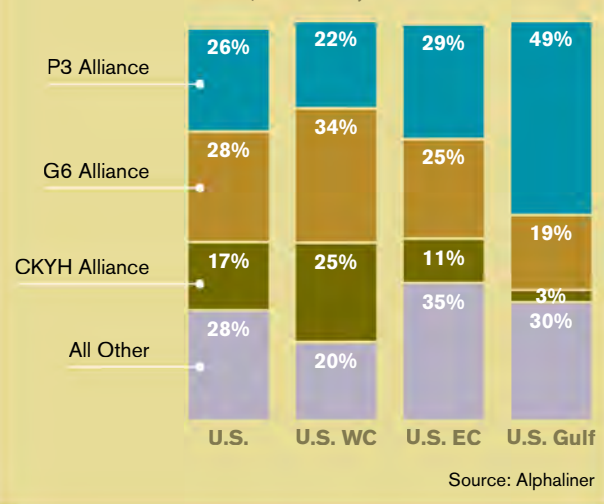
it has been for two years. Compared to the same quarter in 2012, when all trade averages reached a peak of 75.2 percent, the fourth quarter result was down by a hugely disappointing 11.4 points.

The weaker performance coincided with a raft of skipped voyages, and the short-term outlook for reliability is not great, say analysts.

"The focus on reliability seems to have been lost in the current cost-cutting environment," says Simon Heaney, senior manager of supply chain research at Drewry. "Shippers are now paying more for poorer services, but they know lines are saving money. So, they may be unwilling to accept further increases from all the carriers; in turn, this could provide an opportunity for more reliable carriers to secure better rates."

Maersk Line maintained its position as the most reliable major carrier in the industry in a generally poor fourth quarter when most of its competitors suffered a free-fall in on-time ship arrivals. Maersk achieved 80 percent on-time reliability in the fourth quarter, improv-

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ing its all-trade reliability by 0.8 points. It was one of only eight carriers to improve on its third-quarter performance.

A three-point improvement was enough to see Evergreen rise from No. 11 to No. 2 with a 74 percent on-time result. Despite a four-point decline, Yang Ming ranked third with an on-time average of 73 percent. At the wrong end of the table, the worst performing carriers were MSC (48 percent) and CSAV (51 percent).

But all this may change as a consequence of the alliances, says Alan Murphy, chief operations officer and partner at SeaIntel Maritime Analysis in Copenhagen. "As carriers continue to cooperate through alliances and agreements, they will increasingly be aboard the same vessels and will subsequently lose their ability to show differences in performance," he says.

SeaIntel predicts that carriers' reliability will remain about the same in 2014 as it's been over the past two years. However, the company advises shippers to prepare for approval of the P3 and expansion of the G6, which could cause disruptions to reliability during network restructuring.

Constant Pressure

Peter Sand, chief shipping analyst for The Baltic and International Maritime Council in Copenhagen (BIMCO), observes that the increased demand from "advanced economies" should increase the utilization of containerships.

"The US economy is the key driver for global growth in container shipping, and we see a slow but positive development there," says Sand. "On a global scale, containerized export research shows that activity improved

in May following a weak start to 2013. Since then, the pace has picked up, and November and December saw 5 percent to 7 percent growth rates from same months of last year."

In terms of fleet growth, BIMCO expects 2014 and 2015 to be similar to last year—around 6 percent. The council adds that the industry's ability to land the supply growth at a "new normal" level—one that matches demand growth better—seems strong.

In the meantime, the World Shipping Council (WSC) says that it's no secret that international liner shipping is a tough business, with shipping rates under constant pressure. "It is a bit of a paradox that, notwithstanding financial returns that are generally poor, investment continues at the rate it does," says Chris Koch, WSC president and CEO. "It's not an industry of quitters, it's an industry of fighters."

Koch adds that the strategies being used to win the fight are evolving. "Some carriers that have tried to differentiate themselves by providing higher cost and premium service have had a tough time making those higher operating costs pay off," he says. "Higher cost services struggle to attract enough cargo

Analysts agree that the industry's major players are continuing to adapt to a new era characterized by too much vessel capacity and cargo volumes on many trade lanes that refuse to live up to previous forecasts.

transportation service offerings. Because the market dynamics predominantly favor shippers, carriers have been generally unsuccessful at recovering the costs of higher "value added" services, so they are offering them less often as part of their ocean transportation offerings.

"To the extent ocean carriers provide such logistics services, they increasingly

led to a variety of ocean carrier cost saving measures, such as "slow steaming" to save fuel. They've also led to ocean carriers getting out of the practice of providing container chassis in North America. Carriers now focus on larger, more fuel-efficient ships that have lower costs per container slot—even if that means fewer service strings and challenges at port terminals that have to handle the larger cargo volumes.

"These changes are unlikely to go away," says Koch. "Carriers can't control the market, so they must focus on areas where they can hope to have some control—their core competencies."

Industry watchers say that there are plenty of reasons to doubt a reversal of fortune is in the offing. Koch sums it up this way: "Some shippers may not like slow steaming because it takes longer for their cargo to be delivered, but there are simply not enough shippers willing to pay the higher fuel costs of faster service."

> **"To the extent ocean carriers provide** such logistics services, they increasingly tend to do that through stand-alone affiliate companies that are responsible for their own profit and loss, not as an integrated service offering to give away to a customer at less than cost in the ultra-competitive liner shipping market."
>
> —*Chris Koch, president and CEO, WSC*

at rates needed to cover those higher price points. As a result, carriers have had little choice but to focus on cost-savings and increased efficiency as their strategy."

For example, fewer ocean carriers try to provide integrated or sophisticated logistics services as part of their ocean

tend to do that through stand-alone affiliate companies that are responsible for their own profit and loss, not as an integrated service offering to give away to a customer at less than cost in the ultra-competitive liner shipping market," says Koch.

The competitive market forces have

—*Patrick Burnson is Executive Editor of* Supply Chain Management Review

Perspectives From the Top

In this special "Executive Insights" section, industry leaders offer their insights and observations on market trends, emerging customer preferences, and the shape of the supply chain future.

Industrial distribution moves to the web

Q&A with Brian Littlefield, Industrial & Automotive Director, UPS

Q: The growth of e-commerce has been a long-running retail story. At UPS, are you also seeing a growth in online sales among your industrial distribution customers?

A: Business-to-business e-commerce in industrial supplies distribution is more prevalent than many would expect. In fact, UPS will soon release a study showing that nearly two-thirds of professionals involved in buying industrial supplies are making purchases online. Even more interesting is that 34 percent of those say they have bought online from a supplier with whom they had no previous relationship.

So, the dynamics are not just shifting, I would argue that they have evolved to where a certain number of distributors have figured out how to be in the right place with the right product and right terms when people are looking to buy online. Fewer customers are asking whether they should be selling online, but are more interested in how they can sell more effectively.

Q: How is the shift to online order fulfillment affecting logistics processes in the industrial distribution market?

A: Logistics can affect the quality of a customer's online shopping experience at nearly every step in the process. Is the site integrated with your inventory management system to provide real-time availability? Can buyers see shipping costs before completing the transaction? Can they take advantage of their contracted pricing or shipping costs? Those capabilities are top considerations when making a purchase from a supplier.

Our research indicates that buyers expect distributors to sell their products online, and companies are approaching UPS for support with their e-commerce logistics strategies. They know that industrial supplies buyers are basing their B2B e-commerce expectations on their personal retail experiences. That means product availability, speed, and visibility are keys to closing the

Brian Littlefield

sale. Whether B2C or B2B, online buyers will often move on to a supplier that can fill the order in the time required.

Q: Are supply chain managers in this market rethinking their approach to logistics providers in order to circumvent costs while meeting the demands of their customers?

A: UPS has been serving the world of commerce for over 100 years. The nature of business is to manage costs. But, supply chain managers know that cutting costs is rarely as simple as negotiating lower vendor services. Making meaningful cost improvements takes visibility into the entire supply chain, from inbound materials to end-user delivery.

Successful distributors understand the need to increase top line sales. They are moving to expand product offerings and meet customer demands as opposed to focusing solely on driving down costs.

In my view, supply chain managers increasingly seek logistics partners like UPS who can not only add reliable shipping and competitive rates, but also supply chain solutions that can add value to their operations.

Supply chains are evolving to meet the needs of today's enterprises

Q&A with Tom Derry, Chief Executive Officer,
Institute for Supply Management

Q: What are the most important changes you're seeing in supply chain management?

A: The concept of the supply chain is evolving. When it was first coined 30 years ago, it got people to think about the links between what had been discrete processes. But I think the term has outlived its usefulness. Leading practitioners are now thinking about supply networks and asking what does it mean to be a distributed network. That's an important change.

Q: How would you describe a supply network?

A: What we see taking place is that a company may build spare capacity in its supply network. The company is planning ahead for a disruptive event, like an earthquake, a tsunami, or a quality defect that affects production. Or it could be the result of a shift in market demand or business conditions. The best companies can leverage that capacity and shift production to a new region where it makes more sense. You may see a company shift its manufacturing from one region to another because of a swing in foreign exchange rates that has an impact on profitability. If you're manufacturing in Ukraine right now, you were probably thinking about where else you can source your product within 24 hours of the riots. And if you haven't already put a contingency plan in place, it's too late. At the highest levels, boards expect management to have a contingency plan in place to move their supply networks if required.

Q: Have supply chains become more strategic in recent years?

A: Absolutely. A phenomenon I find fascinating is that companies are now competing on the basis of their supply networks. A great example is Diageo, a producer of high end alcoholic beverages such as Johnnie Walker Scotch. Now, all Scotch whisky is produced in one place, but the biggest market is currently in China. To compete in that market, Diageo built a distribution center in Singapore where it's differentiating its product based on packaging for specific markets. One package has 80 moving parts. Diageo is able to etch the buyer's name into the bottle at the facility. These are complex processes, but they meet the expectations of an affluent consumer. They are segmenting supply chains in ways that are unprecedented.

"In the 80s, supply chain was a transactional function. Today, companies realize that value is at risk if they don't manage their supply chains appropriately."

—Tom Derry

Q: Is the role of the supply chain evolving within the enterprise?

A: Yes. Back in the 80s, supply chain was a back office transactional function. Today we have a strategic role because companies realize that value is at risk if they don't manage their supply chains appropriately. Supply chains are enabling go-to-market strategies and product innovation. People from supply chains are being tapped for top jobs. That's a seismic shift in how we are viewed within an enterprise.

Managing the cash cycle in today's supply chain

Q&A with Erik Wanberg, Managing Director, Wells Fargo Capital Finance

Q: What are some of the challenges that procurement departments and their suppliers are facing today?

A: The big change we're seeing is a requirement for improved financial performance from supply chain processes. Not that long ago, supply chain management focused on the physical flow of goods. Today, there's a focus on how the cash cycle matches the physical flow. Large manufacturers and retailers that once paid their suppliers in 30 to 60 days are pushing out their payment terms to 90 or 180 days so that their cash cycle matches their manufacturing, inventory, and sales cycle. The companies that do this well compared to their peers have been rewarded by Wall Street, especially in markets where their top line sales growth is static.

Q: That has an impact on suppliers as well, doesn't it?

A: It does. Suppliers need to collect on their invoices as quickly as possible because they have the same issues on their cash cycle. By agreeing to long term payments, which is a requirement if you're going to sell to a number of large buyers, the supplier is essentially the bank for its customer. The issue for middle market suppliers is that they are often bad banks. Smaller companies may have a high cost of capital or a limited line of credit, so it's expensive for them to extend those terms. That's where a supplier finance program can play an important role. The financial institution managing the program is going to have a lower cost of capital than the supplier. That allows it to pay the supplier on more favorable terms in return for a low discount while assuming the risk that the customer will pay the invoice within the extended payment terms. Buyers and suppliers can both meet their cash cycle needs.

Erik Wanberg

Q: What are the hurdles to implementing a supplier finance program?

A: The biggest hurdle is training procurement people. They are used to negotiating for the lowest cost for a product or service, even if that means paying in 10 or 30 days. Because most companies don't have supplier finance programs, procurement people usually are incentivized to get the lowest cost. However, those quick payments have an impact on the company's balance sheet. It may even be better to pay more for 60 to 90 day terms than a lower cost for the fastest payment. The challenge is getting procurement people to consider payment and financing terms rather than just cost. The best companies we see have targets and incentives for their procurement people to get what we call higher "days payable outstanding," or DPO. They also track outcomes. If no one is looking at whether procurement is paying in 10 days, then no one cares.

Q: What are the benefits to buyers and suppliers?

A: Just as manufacturing, logistics, and warehousing has been outsourced from company enterprises, there is a need for financing those processes. The main benefit to the supplier is that it lowers their cost of carrying an invoice and frees up its lines of credit for more productive and rewarding purposes. Buyers can improve how much capital they deploy in their supply chains and obtain those longer payment terms that match their sales and inventory cycles. Buyers and sellers both benefit from improved processes and the transparency that comes from a third party managing the reconciliation process.

Technology and safety are driving transportation and logistics

Q&A with Sally Buchholz, Vice President, Marketing and Customer Service, Saia

Q. How is technology driving customer expectations in the transportation industry?

A: In today's Just-in-Time world, customers expect up-to-the-second information regarding their shipments. These expectations are driving technological innovation with regard to customer service and, our number one goal: Safety.

For example, we are using GPS in our tractors to provide ongoing estimated time of arrivals to our customers. The system allows us to constantly re-optimize our routes to make sure we are able to meet our customers' pickup and delivery times while leaving the smallest carbon footprint possible.

Technology is also driving our comprehensive culture of safety. Companies that institute proactive safety strategies enjoy more sustainable results than those that are reactive. To that end, technology in our tractors provides drivers with lane departure warnings, adaptive cruise control, space cushion monitoring, and collision mitigation. The technology is so advanced that when an incident occurs, video of the event is automatically sent to headquarters for review.

Q: Has Compliance, Safety, Accountability (CSA) changed the transportation industry and are customers paying attention?

A: CSA has elevated driver standards through its comprehensive scorecards. This will be positive for the industry over time. We have used it to further reinforce safe driving behavior and to screen carriers that we use for purchased transportation.

As shippers become more knowledgeable, they're paying attention to the scores. While there is still a pretty wide divergence in how they're using the data, I believe as time passes they will look more to CSA for companies that are transporting freight responsibly and safely.

Q: How is the supply chain changing?

A: The supply chain is becoming more sophisticated each year because of customer expectations. The

Sally Buchholz

customer expects to remain in the loop on every shipment, which means the supply chain itself is more transparent than ever. Visibility into a particular carrier's system is detailed and, in many cases, it is real-time information.

As younger individuals enter the industry, the use of mobile apps and websites, texting, e-mail, and proactive automatic notifications are becoming the norm. Thanks to new means of communication, today's supply chain is just as much a figurative as a literal one of highways.

Q: Last year, we asked: "What are users looking for most in providers of logistics and supply chain services?" If we asked you the question again this year, has your answer changed?

A: The answer hasn't changed. Customers continue to seek out carriers that offer consistent, reliable service. Many shippers look for a partner carrier that provides transparency in their data, evolution in their service and products, and the latest technology with regard to customer service and safety. Even small to mid-size shippers are becoming increasingly more sophisticated when it comes to making decisions on which carriers to use. They tend to look at a carrier's value proposition more and more.

Managing the reverse supply chain

Q&A with Tom Burton, President and Executive Vice President, Liquidity Services' Capital Assets Group

Q: Historically how have organizations approached their reverse supply chain and how does that differ from what is going on today?

A: Some residual product has always come back through the reverse supply chain. What is different now is how a business deals with those assets. What has changed is that our customers and communities want us to be responsible citizens when we dispose of assets. We can't just put them in a landfill or sell them to any willing buyer. There is a lot more complexity to the process. There are filters, restrictions, and requirements that limit who you can sell to, where the buyers can be located, and how they're going to repurpose the asset. Because of Sarbanes Oxley you need to be aware of shareholder value, which means you can't just sell it to your cousin or neighbor.

Q: What are some of the drivers of the reverse supply chain?

A: Residual assets come back for a variety of reason. One is obsolescence. A good example would be lab and test equipment in the biotech and pharmaceutical industries that becomes outdated. Another is mergers and acquisitions: Companies may downsize and sell off assets because they now have three of something and only need two.

Q: What are some steps an organization can take to maximize recovery for surplus assets while minimizing risk?

A: The first step is to recognize that there is an issue and that there are efficient and effective ways to handle this problem. Using an asset-management software tool can provide you visibility of the surplus inventory and equipment across the network. You may find that there are surplus assets in New England that could fill a need at another site in Arizona. If that's the case, you can do a transfer within your organization rather than purchasing the asset new. If you can't redeploy those assets within your network, you want to look at how you can dispose of them; working with a trusted partner to manage the disposition and marketing of surplus equipment is advisable.

Q: What are the benefits of working with a partner to manage surplus assets?

> "Our customers and communities want us to be responsible citizens when we dispose of assets. We can't just put them in a landfill or sell them to any willing buyer."
>
> —Tom Burton

A: That's a great question. If this isn't your business, the most important benefit is that a professional partner can help you maximize the sale of your assets transparently and efficiently. An organization like ours has more than two million buyers and a global reach. That means a number of people will be bidding on your assets. More importantly, we can give guidance to areas that are sensitive in nature. We're going to make sure that assets are removed compliantly, that the buyers have been vetted, and we're going to document every step along the way.

Looking Beyond Centralized and Decentralized Procurement

To achieve superior procurement performance, more emphasis should be placed on effective processes than on procurement structure.

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

Many organizations have adopted a centralized structure for their procurement functions in an effort to streamline purchasing efforts and take advantage of bulk pricing. This organizational strategy also has the appeal of reducing the number of employees needed for purchasing because relevant staff are consolidated into one group that services the entire enterprise. It is a strategy that a number of organizations have adopted. As illustrated by data from APQC's Open Standards Benchmarking in procurement, a majority of the organizations participating (68 percent) use a centralized structure for their procurement organizations.
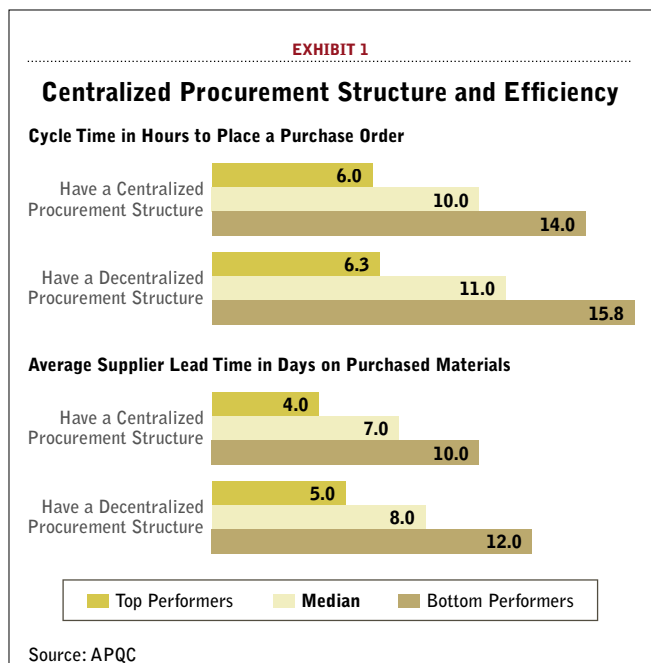
In an effort to determine whether organizations with centralized procurement structures are at an advantage over organizations with decentralized procurement functions, APQC compared the procurement performance of these two groups.

The results of APQC's analysis indicate that, overall, organizations with centralized procurement functions have only a slight advantage over organizations with decentralized procurement. This finding points to the importance of processes in achieving efficiency and lower costs rather than structure.

Purchase Order Cycle Time and Supplier Lead Time

According to APQC's data, organizations with a centralized procurement structure perform only slightly better than those with decentralized functions with regard to efficiency measures such as cycle time and supplier lead time. As Exhibit 1 illustrates, there is little difference between the two groups in the number of hours needed to place a purchase order. At the median, centralized procurement organizations need only one hour less to place a purchase order than decentralized organizations.

It is worth noting that both centralized and decentralized organizations, at the median, take the equivalent of more than one business day

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EXHIBIT 1

Centralized Procurement Structure and Efficiency

Cycle Time in Hours to Place a Purchase Order

Have a Centralized Procurement Structure
- 6.0
- 10.0
- 14.0

Have a Decentralized Procurement Structure
- 6.3
- 11.0
- 15.8

Average Supplier Lead Time in Days on Purchased Materials

Have a Centralized Procurement Structure
- 4.0
- 7.0
- 10.0

Have a Decentralized Procurement Structure
- 5.0
- 8.0
- 12.0

Legend: Top Performers | **Median** | Bottom Performers
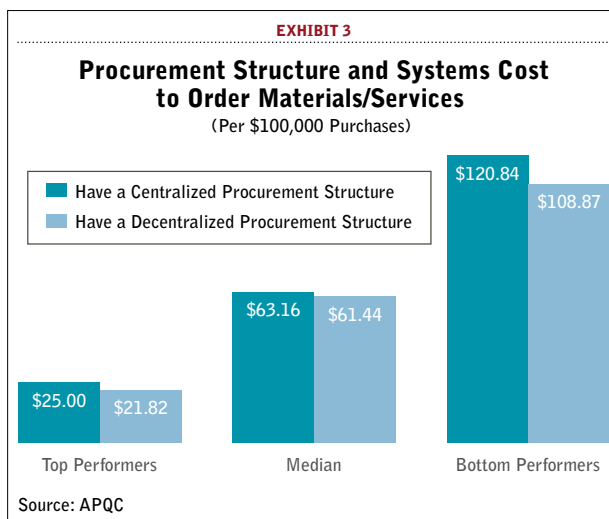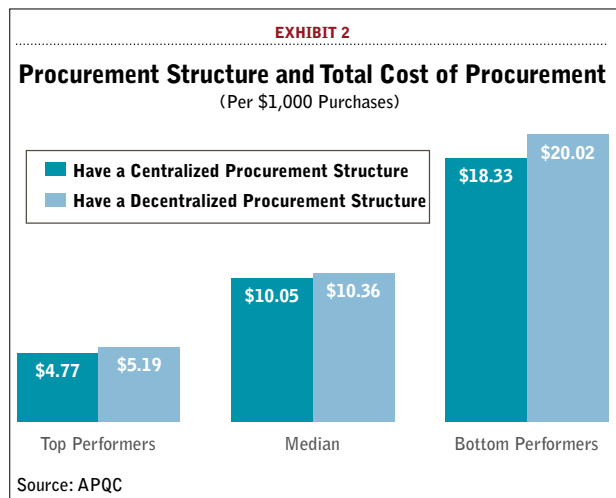
Source: APQC

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to place a purchase order. The time needed to complete this activity is even longer among bottom performers, with centralized organizations needing 14 hours to conduct this activity and decentralized organizations needing the equivalent of nearly two business days to place a purchase order. These results indicate that both groups of organizations have room for improvement with regard to the cycle time to place a purchase order.

The performance of both groups of organizations is also similar when it comes to the average supplier lead time in days for purchased materials. At the median, centralized procurement organizations need one calendar week in supplier lead time while decentralized organizations need eight days. The difference holds among top performing organizations in these groups and increases by only one day among bottom performing organizations. These results indicate that centralized procurement organizations may be able to track supplier performance more effectively, which can lead them to conduct business with suppliers that can provide slightly shorter lead times.

Procurement Costs

The two groups also perform similarly with regard to the total cost of procurement. For this cost, APQC includes all personnel, systems, outsourcing, overhead, and other expenses associated with the procurement function. As shown in Exhibit 2, at the median, organizations with a centralized procurement structure spend $10.05 on procurement per $1,000 in purchases, whereas organizations with a decentralized structure spend $10.36 per $1,000 in purchases on their procurement activities.

The nearly identical spending on procurement for the two groups is interesting given that APQC also found that organizations with centralized procurement functions have slightly higher procurement systems costs. As Exhibit 3
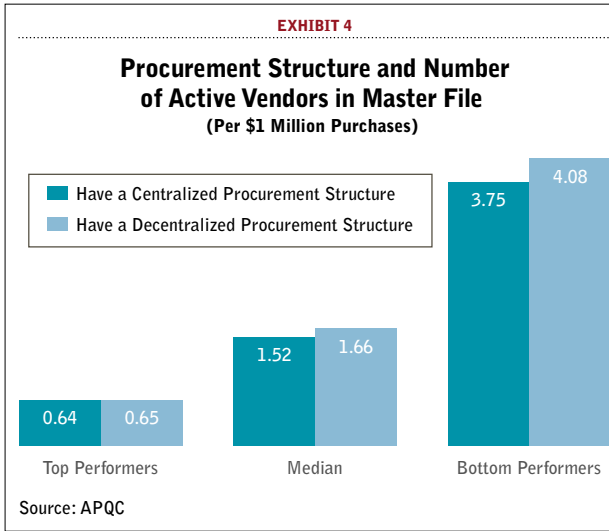

EXHIBIT 3

Procurement Structure and Systems Cost to Order Materials/Services
(Per $100,000 Purchases)

- ■ Have a Centralized Procurement Structure
- ■ Have a Decentralized Procurement Structure

Top Performers: $25.00 / $21.82
Median: $63.16 / $61.44
Bottom Performers: $120.84 / $108.87

Source: APQC

shows, at the median, organizations with centralized procurement functions spend $1.72 more per $100,000 in purchases on systems associated with ordering materials and services.

One factor that may influence systems costs is that these organizations approve more purchase orders electronically than organizations with a decentralized procurement function. At the median, they approve 4 percent more purchase orders electronically than their decentralized counterparts. With centralized procurement groups handling purchasing for all areas of the enterprise, it may be necessary for them to implement electronic purchase order approval to ensure that this activity is done in a timely manner. The time saved through automating this activity may allow the staff at these organizations to spend their time on developing supplier relationships and other value-added activities.

Active Vendors and Maverick Purchasing

Given that organizations often adopt centralized procurement functions to streamline purchasing through the consolidation of suppliers and purchases, APQC anticipated its data to show significantly lower numbers of active vendors used by organizations with these procurement structures as well as significantly lower amounts of maverick purchasing—off-contract purchases that don't take advantage of negotiated terms. However, this was not the case. APQC's data reveals that organizations with centralized and decentralized procurement functions have similar numbers of active vendors in their master files. At the median, centralized procurement organizations have only 0.14 fewer vendors in their master files per $1 million in purchases than decentralized procurement organizations (see Exhibit 4).

EXHIBIT 2

Procurement Structure and Total Cost of Procurement
(Per $1,000 Purchases)

- ■ Have a Centralized Procurement Structure
- ■ Have a Decentralized Procurement Structure

Top Performers: $4.77 / $5.19
Median: $10.05 / $10.36
Bottom Performers: $18.33 / $20.02

Source: APQC

EXHIBIT 4

**Procurement Structure and Number
of Active Vendors in Master File**
(Per $1 Million Purchases)

■ Have a Centralized Procurement Structure
■ Have a Decentralized Procurement Structure

	Top Performers	Median	Bottom Performers
Centralized	0.64	1.52	3.75
Decentralized	0.65	1.66	4.08

Source: APQC

These results reveal that organizations that have adopted procurement centralization have trimmed their supplier lists nearly the same amount as organizations with decentralized procurement functions. This could be because organizations in the centralized group have not taken any additional steps to consolidate suppliers other than centralizing their purchasing efforts. Although having a central group responsible for purchasing can lead to a decrease in the number of suppliers an organization uses, additional efforts are necessary to ensure that the supplier list includes vendors that have been thoroughly vetted and can provide the best value.

It may also be that the organizations in the decentralized group have taken additional steps to eliminate unnecessary or under performing suppliers from their lists. For these organizations, it may make more sense to have a decentralized procurement structure. Yet they may have adopted additional initiatives, such as the use of spend analysis, to ensure that the procurement function is as efficient and provides the most value to the enterprise as possible.

APQC's research also indicates that centralized procurement organizations have only slightly lower amounts of maverick purchasing than their decentralized counterparts. At the median, centralized organizations have only 0.6 percent of their total purchases made via maverick purchasing, whereas decentralized organizations have 0.8 percent of their total purchases made this way. Among bottom performing organizations there is no difference between the two groups: both have 0.3 percent of their total purchases made via maverick buying.

These results are surprising given that some organizations may have adopted centralized procurement structures as a means of combating maverick buying. It may be that, regardless of procurement function structure, organizations must make a concerted effort to ensure that employees follow established processes. This could be done through a variety of methods, such as making employees more aware of procurement processes and adopting systems that make it impossible for staff to bypass purchasing approvals.

Focus on Processes

APQC's data indicates that organizations with a centralized procurement structure perform only slightly better on procurement performance measures than organizations that have adopted a decentralized structure. Although centralized organizations have higher systems costs associated with ordering materials and services, they have slightly lower costs associated with the procurement function overall. These results indicate that organizational structure is not necessarily the primary factor in obtaining superior procurement performance. Depending on the organization's industry and physical

> **By gaining efficiency in routine tasks and further reducing maverick buying, procurement staff can have more time to focus on strategic activities such as developing supplier relationships and evaluating supplier performance.**

distribution, it may make more sense to centralize procurement or to allocate procurement activities to groups in different business units or geographic locations.

Organizations looking to improve the efficiency of their procurement efforts and ensure that they contract with high quality suppliers should look at processes and initiatives that specifically address these issues. Organizations can customize these processes based on their size, their unique challenges, and whether they have a centralized or decentralized structure. By gaining efficiency in routine tasks and further reducing maverick buying, procurement staff can have more time to focus on strategic activities such as developing supplier relationships and evaluating supplier performance.

About APQC: A member-based nonprofit founded in 1977, APQC is the leading resource for performance analytics, best practices, process improvement, and knowledge management. For more information, visit www.apqc.org or call 713-681-4020.
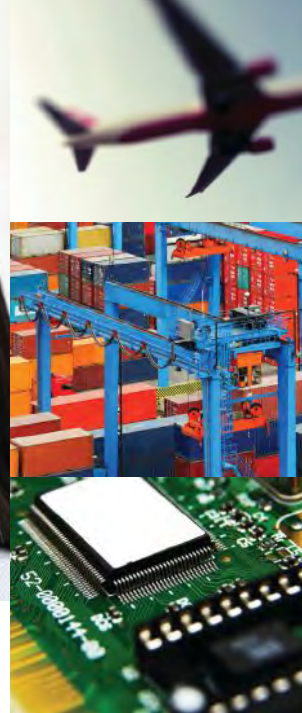
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