

SUPPLYCHAIN

MANAGEMENT REVIEW

May/June 2024

Inside the
procurement
revolution

PAGE 16



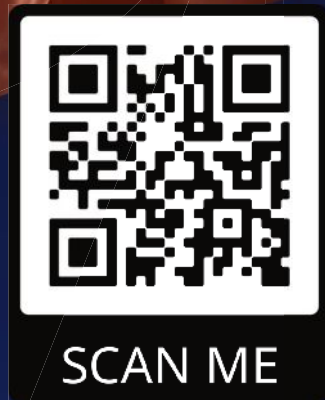
24 Supply chain harmony

32 Inflationary risk mastery

38 Energy price strategies



What Costly Risks Lurk In Your Supply Chain?





Chicago bound

Join us in October as we once again host the NextGen Supply Chain Conference.

EDITORIAL OFFICES

50 Speen St., Suite 302
Framingham, MA 01701-2000
1-508-663-1590

BRIAN STRAIGHT

Editor in Chief
bstraight@peerlessmedia.com

BOB TREBILCOCK

Editorial Advisor
btrebilcock@peerlessmedia.com

FRANK QUINN

Editorial Advisor

SARAH PETRIE

Executive Managing Editor
spetrie@peerlessmedia.com

GARY FORGER

Contributing Editor - scmr.com
gforger@peerlessmedia.com

JEFF BERMAN

Online News Editor
jberman@peerlessmedia.com

POLLY CHEVALIER

Art Director
pchevalier@peerlessmedia.com

WENDY DELCAMPO

Art Director
wdelcampo@peerlessmedia.com

KELLY JONES

Production Director
kjones@peerlessmedia.com

BRIAN CERAOLO

President and CEO
bceraolo@peerlessmedia.com
Peerless Media LLC

SUPPLYCHAIN
MANAGEMENT REVIEW



In each issue I try to leave you with some of my “limited” knowledge in this space. Or at least give you something to think about. I think it is our job at *Supply Chain Management Review* to—hopefully—leave you with at least one bit of knowledge from each article inside our issues. This time, though, I’m going to leave you with the secret to learn more than one thing: Sign up to attend the NextGen Supply Chain Conference in October.

Yes, I’m dedicating this space to self-promotion, so I hope you stay with me. To start, let’s go over a brief history of the NextGen conference. For that, I’d like to share something that Bob Trebilcock, the longtime editor of *Supply Chain Management Review*, shared with me upon his official retirement from Peerless Media at the end of March (if you are reading this, Bob, thanks and enjoy your retirement).

“[The] vision for the conference was to focus on NextGen technologies like robotics, IoT, AI and ML, and blockchain in a context that was relevant to a senior-level executive—the *SCMR* reader. As we worked it out, we wanted to present Gartner-level content by, and for, senior-level executives in a format that was more conducive to networking and sharing ... Instead of 5,000 attendees, we’d shoot for 200.”

The conference has evolved from that first foray in 2019, but its mission has remained steadfast: Provide Gartner-level content and do so in an engaging way, and in a format that is conducive to networking. After all, you can learn a lot by watching someone present on stage. You can learn a lot more by engaging with them and others from the audience throughout the entirety of the conference. Try to find the time to have an in-depth discussion of ideas with a presenter at a 5,000-person conference. You will be lucky to shake hands and say a quick hello.

There is so much more I could write about the conference, but there isn’t the space here to do so. I’d encourage you to visit our website at nextgensupplychainconference.com.

Last year, we had speakers from industry, academia, associations, and the consultancy world. The same will be true again this year.

In addition, we hand out a number of awards, including the NextGen Visionary Award, the Startup Award, the End User Awards, and the Solution Provider Awards. We are now accepting applications for our 2024 awards. You can find the registration form at nextgensupplychainconference.com/awards. I’d encourage you to apply if you have a good story to tell.

We are working hard on building an agenda that continues our mission of providing the type of content that informs, educates, and inspires. We will be releasing more information on speakers and sponsors soon. (To put on my “sales” hat for a moment, if you are interested in a company sponsorship, click the “sponsors” tab on the NextGen website for more information.)

This year’s event, which will take place Oct. 21-23, will once again be held at the Chicago Athletic Association hotel in downtown Chicago. Discounted hotel rates are available until Oct. 4. More information on the hotel, including links to secure rooms at the discounted rate, is available here: nextgensupplychainconference.com/venue.

I hope I have piqued your interest and you’ll consider joining us. If you would like to register, visit ngsc.regfox.com/nextgen-supply-chain-conference-2024. I hope to see as many of you as possible in Chicago.

Brian Straight





QUALITY CARRIERS DELIVERING QUALITY SERVICE & VALUE TO OUR CUSTOMERS

**YOUR VOTE OF CONFIDENCE INSPIRES US TO
RAISE THE BAR ON QUALITY SERVICE YEAR AFTER YEAR.**

YOU CAN TRUST US TO...

Deliver exceptional service to every customer, every day in the Mid-Atlantic, Midwest, and Northeast regions.

Prioritize reliable, on-time performance with our skilled and safety-conscious drivers.

Tailor solutions to meet your needs with our unwavering commitment to excellent customer service.

Recognize the demands of your supply chain, we emphasize visibility to effectively manage your customer's expectations.

Meticulously care for your freight, minimizing handling and damages.

REMEMBER, IF IT MATTERS TO YOU, IT MATTERS TO US.



COVERAGE AREA: ■ PITTOHIO Transportation Group ■ Seamless Coverage Across All Of North America

COMMITTED TO QUALITY SERVICE AT EVERY MILE.

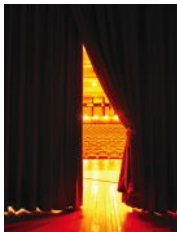


16 THE STATE OF PROCUREMENT

Procurement is transforming faster than ever. Cost, quality, and speed still matter. But now procurement managers are under pressure from one end of the supply chain to the other. As well as from within their own companies. This is going to take some work to tame.

24 BALANCED SUPPLY CHAIN MANAGEMENT: SETTING THE STAGE

Supply chains have changed, and so too has the management required to achieve balanced supply chains. This is the first in a series of articles that will address the elements needed to achieve that balance.



32 MANAGING INFLATIONARY PRICE RISKS IN SUPPLIER-BUYER CONTRACTS THROUGH INDEXING

Research emphasizes the need for innovative supply chain and financial solutions, paving the way for the integration of technology to enhance operational efficiency and economic value.



38 FIVE STRATEGIES FOR ENERGY MARKET COST AND RISK REDUCTION

Electricity and natural gas costs are major factors in the profitability of companies in all industries, but especially in key parts of the supply chain.

SPECIAL REPORTS

60
Top 50 trucking companies

68
Modex in review

COMMENTARY

4
Insights
Special planning teams for unusual times

8
Innovation Strategies
Frontiers in warehouse automation

12
Global Links
Seizing value from supply network management

52
Operations Advantage
Long-term network and capital planning is dead

56
Benchmarks
What supports accurate spend analysis?

SPOTLIGHT ON

48
Procurement best practices

TO SUBSCRIBE: Subscribe or renew online at scmr.com/subscribe. Call customer service at 847-559-7581 Fax to 847-564-9453. Email customer service at scmr@omeda.com. Mail to Peerless Media, PO Box 677, Northbrook, IL 60065-0677. Make checks payable to "Peerless Media" for all subscriptions.

LICENSING AND REUSE OF CONTENT: Contact our official content licensing agency, Wright's Media, about available usages, license fees, and award seal artwork at peerless@wrightsmedia.com. Please note that Wright's Media is the only authorized company that can provide Peerless Media brand materials.

AUTHOR'S GUIDELINES: Interested in writing an article for possible publication in Supply Chain Management Review? See our guidelines for authors on scmr.com.



PLUS subscribers: Access this issue, all archives and more at scmr.com/plus

SUPPLYCHAIN
MANAGEMENT REVIEW

Supply Chain Management Review® (ISSN 1521-9747) is published 7 times per year (Jan/Feb, Mar/Apr, May/Jun, July/Aug, Sept/Oct, Nov, Dec) by Peerless Media LLC, 50 Speen St, Ste 302, Framingham, MA 01701. Annual subscription rates: USA \$199, Canada \$199, Other International \$241. Single copies are available for \$60.00. Send all subscription inquiries to Supply Chain Management Review, PO Box 677, Northbrook, IL 60065-0677 USA. Periodicals postage paid at Framingham, MA and additional mailing offices. POSTMASTER: Send address changes to: Supply Chain Management Review, PO Box 677, Northbrook, IL 60065-0677. Reproduction of this magazine in whole or part without written permission of the publisher is prohibited. All rights reserved. ©2024 Peerless Media.

Dr. Lapide is a lecturer at the University of Massachusetts and former 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 was an industry forecaster for many years, led supply chain consulting projects for clients across a variety of industries, and has researched supply chain and forecasting software as an analyst. He is the recipient of the inaugural Lifetime Achievement in Business Forecasting & Planning Award from the IBF. He welcomes comments on his columns at Lapide@uml.edu.

Special planning teams for unusual times

Short-term supply and demand challenges should be managed by a specialized team.

By Larry Lapide

Adoption of sales and operations planning (S&OP) grew in the mid-1980s as management consulting firm Oliver Wight was advising manufacturing managers to talk to their sales organizations about future sales. This would provide important information for their medium-term planning efforts. One of my first Insights columns was titled “S&OP Psych 101” (April 2007) and dealt with the emergence of this nascent business management model and the different mindsets of its team members.

S&OP: A challenging process to sustain

Generally, the process is not complex. It involves a multi-disciplinary S&OP team routinely meeting (e.g., monthly or weekly) to develop detailed demand and supply plans, generally with a planning horizon of from 12 months to 18 months. But despite its successful adoption, it has always been hard to sustain because marketing, sales, supply chain, and finance managers don’t speak the same language. Nor do they like attending tedious, structured—and often contentious—meetings.

After the Great Recession of 2008-09 and the highly volatile customer demand that ensued, I was worried that executives would lose faith in their planning organizations and resort to making spur-of-the-moment, knee-jerk decisions during the volatility of the recession. So I wrote a column in *Supply Chain Management Review* (March 2009), titled “The S&OP rudder” to advocate not giving up on the process.

In it, I used the analogy that the S&OP process enables an important rudder

for a company's business. When a business is navigating global waters, it's the job of management to keep the ship on its chosen path, correcting for turbulent conditions that might veer it from its intended destination. Those who have seen the movie *The Perfect Storm*—which tells the story of a New England fishing vessel lost at sea in a once-in-a-lifetime storm—will recall scenes of the captain attempting to navigate the ship among gigantic waves. The last thing anyone wants is for the company ship to go down under that last big wave, just before the waters calm and the economy improves. In this regard, the S&OP team plays an important role as the navigation team that constantly updates the plan based on conditions on the sea.

My worries were unfounded, as S&OP adoption continued to grow post-recession. However, I worried again during the COVID-19 pandemic. Demand volatility had increased and had gotten uncertain enough to render historical demand useless for forecasting purposes. In addition, supplies from historically reliable suppliers became uncertain and unforecastable as well, especially when lockdowns created labor shortages.

The columns I wrote dealt with the differences between decision-making under uncertainty versus under risk. While both deal with randomness in demand, the latter can use historical data to estimate probability distributions (i.e., risk profiles) and probabilities for what might transpire. In

contrast, decision-making under uncertainty has no historical information on which to base decisions. Forecasts are rendered useless for planning. Instead, decisions have to be made using scenario-planning methodology. The pandemic might have put the S&OP process in jeopardy once again.

The Quick-Response process

In my Insights column, "Under uncertainties: Quick Response, not only S&OP" (March/April 2022), I argued that the S&OP process should not be used for planning under uncertainty. An S&OP team is largely responsible for doing tactical planning under risk. Thus, it is not trained to handle uncertainties, nor charged with doing so. The team is also not adept at dealing with significant supply-side uncertainties. I recommended that a Quick Response planning team be assembled with responsibility for operational planning during extreme uncertainties in demand and supply. I termed it Quick Response because managers must make decisions with little to no historical information to support them. Decisions made are usually practical and involve common sense. For example, during the early days of the COVID-19 pandemic, policymakers could only advise the public to stay away from each other, wear masks, wash hands and, at times, don't go to work. Later they had sufficient information to advise getting COVID-19 vaccinations as well.

A Quick Response process would be put temporarily in place whenever uncertainties arise in a portion of a demand-supply chain. An executive-led team of specialists would be assembled to do the short-term planning. It would exist until enough information and data have been assembled to return the short-term planning back to the S&OP team. In the aforementioned column, I introduced a version of Figure 1 (also shown in this column). It was titled “Hierarchical Planning Framework with Quick Response (as a short-term planning process under uncertainty to match future supply and demand).” It positioned Quick Response as a special operational planning process. The demand control or SOE (sales

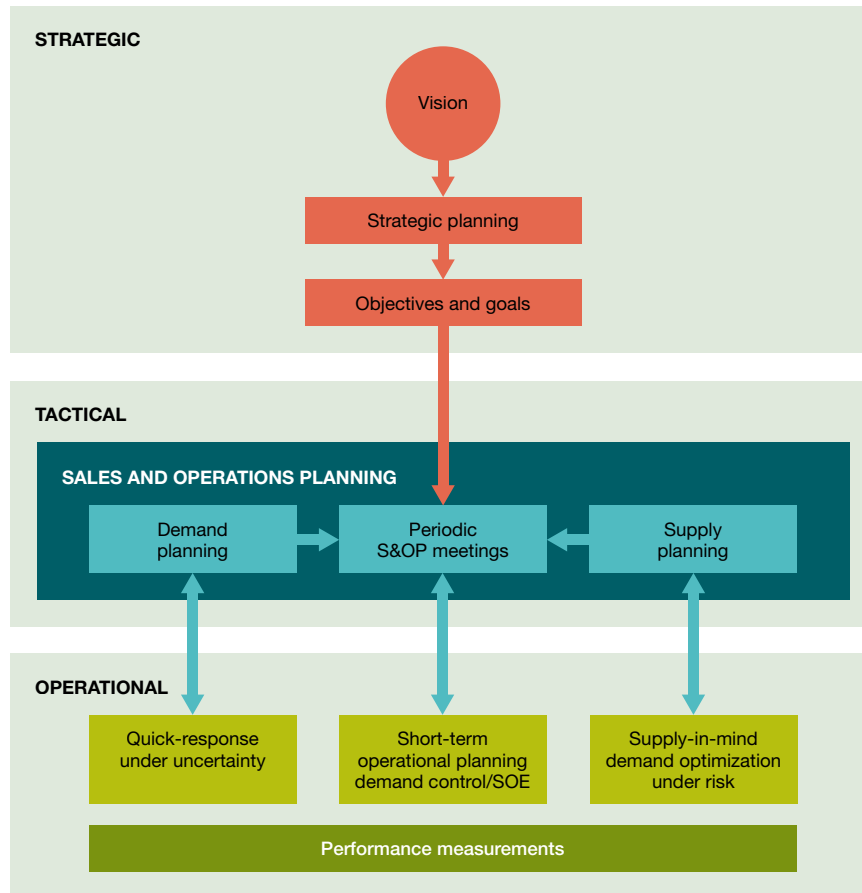
and operations execution) process was also shown in the figure.

To demonstrate how scenario planning might be used in planning decisions under uncertainty for the pandemic, I wrote an Insights column titled: “Decision making under uncertainty: A primer (May/June 2022). In it, I discussed a hypothetical \$1 billion profit-sized company, looking at three types of strategies to deploy throughout the pandemic.

A supply-in-mind demand optimization process

In my last Insights column, “Supply constraints? Demand-shaping revisited” (March/April 2024), I discussed another special team that might be required from time to time.

FIGURE 1
Hierarchy demand-supply planning framework
 Including quick-response and supply-in-mind short-term operational planning



Source: Author

It was needed during the COVID-19 pandemic to do short-term operational planning for products with supply shortages. S&OP teams are typically not experienced with supply-constrained demand matching. Rather they are comfortable matching future supply with demand forecasts, and then buffering inventory, capacity, and lead times to ensure demand is met—all according to probabilities based on historical demand.

Generally, demand shaping with supply in mind involves identifying supply issues and developing opportunities to enhance demand. By aligning supply with selling efforts. For example, it might be aimed at optimizing demand-side objectives such as revenues, operating margins, and market share. Additionally, when there is an excess of materials and components, underutilized plants, or a surplus of finished goods inventory, supply managers ought to work with sales and marketing managers to develop programs aimed at taking advantage of these excess supply opportunities. However, if there is a shortage of any type of supply, then marketing and sales ought to change their demand plans to less aggressively sell the products affected because if demand exceeds supply for these shortages, supply chain managers will have to take emergency actions to meet the excess demand, and this will be more costly and less profitable. These decisions include paying higher prices for procured materials, expediting procurement orders, adding emergency/overtime shifts at a production plant, and expediting customer shipments. This type of short-term planning process is shown in Figure 1 and labeled “supply-in-mind” demand optimization under risk.

A critical starting question for supply planners to address is: What product mix can be made from readily available finished goods and supplies on hand, on order, and procurable in the future? A variety of product mixes would be identified to help S&OP teams assess and select which is best.

Revised hierarchy demand-supply planning framework

S&OP is certainly a rudder, one critical to navigating a company sailing toward a financial destination. The team must be highly disciplined and charged with developing detailed planning numbers that drive the operations of an enterprise over a 12- to 18-month horizon. To expect it to adequately incorporate short-term uncertainties, supply shortages and surpluses, will severely hamper the job of updating plans. The S&OP process also needs to be the lynchpin process that ties strategic objectives with daily operations, as depicted in Figure 1. However, it is a tactical planning process under risk and not under uncertainty, as well as one that assumes supply is available to meet demand. The same is also true for the short-term demand control or SOE operational planning process.

Because strategic planning has a planning horizon of three years or more, forecasts are not useful. Thus, decisions are made using a scenario-planning approach. This process is already commonly viewed as a special or supplementary process. I recommend two other special planning processes be incorporated into a company’s planning hierarchy. Firstly, Quick Response to handle portions of a supply chain that are temporarily experiencing uncertainties due to turbulent economic conditions. Secondly, supply-in-mind demand optimization, when portions of a supply chain are experiencing significant shortages and surpluses.

Professional (NFL) football teams have learned that it is beneficial to have special teams on the field. According to Wikipedia: “Special teams are units that are on the field during kicking plays.” The COVID-19 pandemic highlighted the need for special short-term planning teams to supplement an S&OP team. An S&OP team is always vital to managing the rudder for navigational purposes. However, Quick Response and supply-in-mind planning specialists need to help out during uncertainties due to turbulent economies, and for short-term operational planning when extreme supply issues arise. •

Frontiers in warehouse automation

Automation is transforming the warehouse industry as companies pursue improvements in supply chain efficiency and productivity.

By Miguel Rodriguez Garcia and Erez Agmoni

Dr. Miguel Rodriguez Garcia is postdoctoral associate, Omnichannel Supply Chain Lab, MIT Center for Transportation & Logistics (MIT CTL). He can be contacted at miguelro@mit.edu. Dr. Erez Agmoni is global head of innovation, logistics and services, A.P. Moller-Maersk A/S. He can be contacted at eretz.agmoni@maersk.com.

Automating complex warehouse operations can be a formidable challenge that requires deep technical and operational expertise and an awareness of the unique problems involved.

The MIT Center for Transportation & Logistics and global logistics company Maersk organized a roundtable of industry professionals to explore the challenges of warehouse automation. This article is based on highlights from the discussions and the authors' experience and research.

Automation demands

The mix of challenges companies face when automating warehouse facilities differs with each application. However, some challenges are common to many projects. Here are some key examples.

Flexibility. The need for flexibility when evaluating new automation is increasingly important. However, different interpretations exist for flexibility. It can mean a solution's ability to adjust operations as demand and business needs fluctuate. It may also refer to a system's capacity to handle different loads, including various SKU sizes and packaging types.

Maersk has adopted a flexible approach to retrofitting its legacy warehouses. A notable example is the use of drones to improve inventory management in traditional facilities, allowing more efficient and accurate

checks. A different robot solution from warehouse automation company BionicHive is being installed in traditional racking systems to lift and transport goods across the warehouse without using additional floor space. Maersk also partnered with fulfillment specialist Fabric to install a flexible, high-density-storage micro-fulfillment center (MFC) that automates some or all of an existing warehouse's operations. This MFC can be scaled up later as demand increases.

Fulfillment speed. Fulfillment speed was another factor that roundtable participants considered critical, as e-commerce requires short lead times. Warehouses are under immense pressure to deliver orders quickly and efficiently, and automation is a pivotal tool to help expedite the order fulfillment process and enhance

customer satisfaction.

Order fulfillment automation is nothing new; what is new is the unprecedented speed at which some orders are now being picked and packed. Ocado's grid solution, for instance, is a state-of-the-art cube storage system for online grocery fulfillment that can put together an order of 50 items in just five minutes. A human worker takes more than 10 times longer to complete such a task. The solution uses thousands of robots that travel over a grid system, picking and packing grocery orders. It is being implemented by multiple grocery chains across the globe, including U.S.-based Kroger and Morrisons in the UK.

Interoperability. Effectively integrating new automation technologies into warehouse operations is a challenge faced by many companies. As a result, interoperability—the ability of automated systems to work with existing warehouse systems—is increasingly important.

However, as more companies look to tailor warehouse automation, the number of startups developing unique technologies that can solve specific challenges has grown exponentially. The designs of these various solutions are based on diverse platforms, standards, or protocols, using many interconnected elements. Consequently, warehouse systems have become more complex and prone to errors. A failure or bug in one part of the system can have a cascading effect, leading to widespread operational issues. Moreover, multiple solutions make it harder to maintain, upgrade, and adapt the integrated system over time. Companies must deal with various vendors with differing support, maintenance, and upgrade policies. Multiple automation solutions require distinct operational and maintenance skill sets, increasing the

system's complexity and requiring "layers of support" (Gooley, 2023).

To address challenges like these, companies need to find and train staff to manage a multi-solution environment, which can be both time-consuming and costly.

Spoiled for choice. In this complex environment, warehouse managers face the challenge of selecting the right automation technologies that align with their warehouse's specific requirements.

The proliferation of solutions and technology suppliers is making it harder for practitioners

to keep pace with technological developments.

Also, increasing solution diversity lengthens the time required to analyze each application. When evaluating their options, practitioners must weigh many factors, like facility layout, order profiles, demand patterns, and time to implement. Another

complication is the investments required to automate facilities. While automation usually offers long-term benefits, the initial capital expenditure (CAPEX) can be substantial. Companies that are considering automation solutions need to assess the ROI involved and the long-term cost savings that each automation initiative can provide when selecting the best solution.

Evaluating winning solutions

To meet challenges like the ones described above as the field of warehouse automation continues its rapid advance, choosing the right solutions is of crucial importance.

As a global company with numerous facilities and thousands of customers around the world, Maersk follows a structured and comprehensive

"Order fulfillment automation is nothing new; what is new is the unprecedented speed at which some orders are now being picked and packed."

approach to evaluating and implementing new warehouse technologies. This thorough, methodical approach ensures that solutions are selected and implemented strategically to deliver maximum operational efficiency and customer satisfaction. Here are the four main stages of this proven process.

o Assess the solution’s business impact. The technologies involved need to resolve a major customer pain point as well as an internal one. A “Gemba walk” follows this initial assessment to observe firsthand the issue in the warehouse that the technology could solve.

o Use Multi-Criteria Analysis (MCA) to compare potential solutions. MCA assesses the value of solving the issue with a particular solution. The primary criteria are safety, throughput improvement (mainly during peak times) and cost efficiency. Technologies that score highest on these criteria advance to the proof of concept (PoC) stage.

o Develop a PoC. This stage encompasses studying, designing, testing, and physically executing the solution. The time required can differ, ranging from a few weeks to several years, depending on whether the technology is new or already established. The process favors scenario analysis based on success probabilities rather than running simulations, which are often complex and laden with assumptions.

o Pilot the solution. Finally, having achieved a successful PoC, Maersk chooses a warehouse to carry out the pilot based on several factors. For example, the local team in the warehouse must possess the right mindset for piloting and improving the technology. Another factor is whether the facility is conducive to scaling, which allows the team to observe the solution’s full deployment and immediate results. Strong support from vendors and customers in the warehouse is vital for effective implementation and feedback.

Putting talent to work

Finally, a piece of the warehouse automation puzzle that is of supreme importance is harnessing the ideas and creativity of employees who are on the front lines of the company’s logistics and supply chain operations. Identifying and nurturing teams with the right knowledge and skills is particularly important. The Maersk Innovation Center plays a crucial role in meeting these goals.

Maersk’s partnership with MIT CTL is a significant part of the Center. This collaboration has created a tailored program for training individuals from various departments within Maersk, particularly in areas crucial to supply chain innovation. Besides classroom instruction, participants visit robotics companies and gain firsthand insights into the industry’s cutting-edge advancements. Modeled after the “Shark Tank” concept, the culmination of the program is a unique competitive event where participants present their innovative ideas to Maersk executives via a five-minute pitch. Maersk executives recognize the most promising proposals and may develop them into PoCs.

The program has trained more than 75 innovation leaders in two years. These individuals have become ambassadors of innovation within Maersk, demonstrating the company’s commitment to fostering talent and driving forward-thinking solutions in the logistics sector.

For more insights into warehouse automation, see the authors’ whitepaper, The Warehouse of the Future: Toward Highly Automated, Interconnected, Sustainable Warehouses at <https://ctl.mit.edu/pub/report/warehouse-future>. •

Reference

Toby Gooley, “How to Get Your DC Ready for Driverless Forklifts,” DC Velocity, October, 2023.



**100%
ONLINE**



**CAREER-
FOCUSED**



SMC³ LTL ONLINE EDUCATION



ENGAGING



INTERACTIVE



Expand your professional opportunities with SMC³'s convenient training to increase your knowledge.

Learn more about LTL Online Education and certification at smc3.com/onlinelearning

sales@smc3.com | 800.845.8090 | www.smc3.com

Seizing value from supply network management

Leaders must create a shared vision to achieve optimal performance, break down silos, and leverage competitive sea change and disruption opportunities in the connected market ecosystem.

By Rich Sherman and Bob Sabath

Rich Sherman is a retired guru of SCM technologies and Global Links column editor. He can be reached at rsherman@goldanddomas.com. Bob Sabath is a retired guru of SC for management consultancies. He can be reached at rsabath@sabathconsulting.com.

If hindsight is 2020, then Bob and I have 2010 vision. When we started our careers in physical distribution, technology was measured by PCRP—punched cards read per minute. Today we’re talking about the internet of things and Industry 4.0 technologies that connect everything and everyone in a global ecosystem that is brokering change in the analog physical world with the digital virtual world. Businesses grapple with complexity, rapid technological advances, and an uncertain geopolitical reality. Ecosystem supply “network” management stands at the forefront of transformation. We increasingly see “supply ‘chain network’ management” in the literature. It’s time to break the chain.

A new shared leadership vision

One of the common characteristics among market leaders is a clear and shared vision that defines the business model and structure for the operating business leaders to envision their future functional process operating models. Among the remaining companies, the most frequently cited barrier to achieving operating metrics and innovative performance is the lack of an integrated vision across functional silos for the enterprise. The supply network of the future will use artificial intelligence, virtual reality, and cognitive

digital technologies to automate process execution.

A nuanced framework (Figure 1) is needed to guide businesses through this challenging landscape, incorporating elements of visioneering, digital and robotic process automation, digital twins, ecosystem commerce platforms (cloud), composite applications, and Industry 4.0 technologies. This comprehensive, yet practical approach focuses on the inevitable transition from traditional supply chains to networked ecosystems, exploiting digital

technologies, and embracing a new era of collaborative ecosystem commerce.

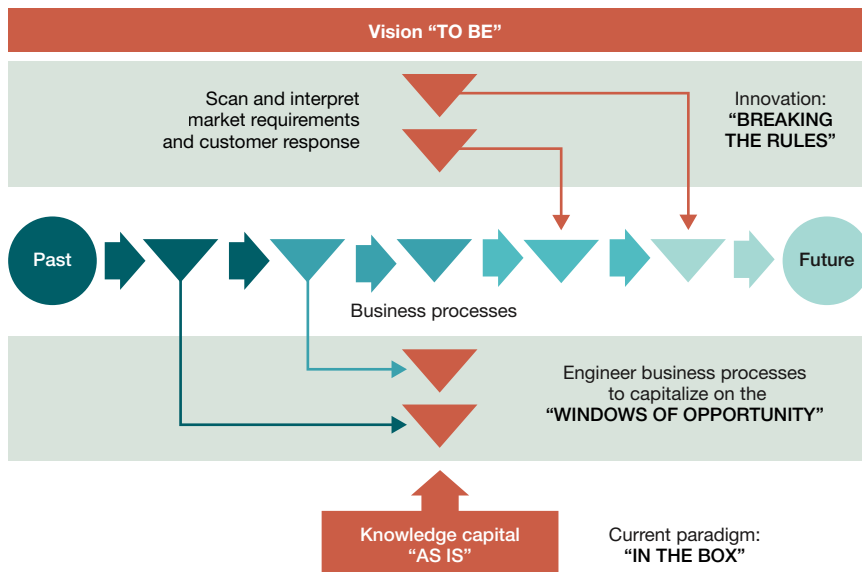
Visioneering is more than a planning tool; it's a transformative process framework that enables leaders to conceptualize the current and future states based on shared outcomes, an operating metrics hierarchy, and process definitions/maps. Future technologies and best practices as well as market scans inspire shared process metrics, collaboration, root cause analysis, and process requirements to be considered in a prioritized planned timeline moving forward. In the context of current supply chain management, it means envisioning a future state ecosystem supply network that's agile, connected, collaborative, transparent, and autonomous. This shared vision sets the stage for the transformation from "chain" to "network" management within an integrated enterprise operating within a market ecosystem—the network of networks.

From chain to network: Transforming and adapting to the future

Traditional linear supply chains are giving way to interconnected ecosystem supply networks. This shift represents a profound transformation; where siloed, sequential processes evolve into a collaborative, dynamic, responsive, resilient ecosystem increasingly goaled and operated based on simulation, analytics, and automation. Moreover, the supply networks will contend more than ever with system thinking-based decision-making that not only considers intended consequences, but must also the unintended consequences from structurally created network decision cause and effect, e.g. "The Bullwhip Effect." The transformation leverages multi-enterprise ecosystem commerce platforms, allowing real-time collaboration and enhanced efficiency from total network optimization and ecosystem-shared economic value and risk. We compete at the point of demand, not on the transportation lane.

FIGURE 1

Visioneering: Preparing and responding to change UNGROUP



Source: Sherman, Supply Chain Transformation (Wiley, 2012)

Introducing the multi-enterprise ecosystem commerce platforms

Cloud-deployed and composite application-based platform technology acts as the backbone to meet the master data harmonization and resource optimization management requirements of the modern supply network. Multi-enterprise ecosystem commerce platforms (ECP) connect all of the various ecosystem stakeholders in seamless digital environments to facilitate the adoption of ecosystem commerce. They include the following.

1. Unification of stakeholders. These platforms unite various stakeholders, including suppliers, customers, distributors, contract manufacturers, and logistics service providers. Additionally, the platform connects to the commercial support ecosystem including financial institutions, brokers/forwarders, insurance companies, government agencies/customs, regulatory bodies, industry standards organizations, legal firms, etc. It allows seamless data sharing, cross-boundary licensing, customs transaction flow, and collaboration to reduce redundancy and enhance decision-making.

2. Customization and flexibility. ECPs offer customization features and composite applications that allow businesses to tailor the platform to suit their unique needs. It creates a flexible environment where different players can co-create value.

3. Scalability and reach. With the help of these platforms, businesses can expand their reach and easily adapt/scale their operations up or down. They can tap into new markets, connect with new

partners, introduce new products, and leverage global opportunities with unprecedented resilience.

Using federated “one source of the truth” data harmonization and visibility to all ecosystem transactions and master data enables new sources of data for cognitive analytics (artificial intelligence), shared ecosystem optimization, and value creation versus individual node cost (democratization of freight movement and increased logistics network capacity utilization).

Examples include Blue Yonder’s acquisition of ONE Network Enterprises, E2Open, Oracle, SAP, Coupa, and Infor Nexus. They foster collaboration, data sharing, and real-time decision-making, epitomizing and accelerating the shift toward ecosystem commerce and democratizing commodity logistics resources for increased utilization and consolidation value.



“The future of supply network management demands a comprehensive enterprise framework that integrates various innovative practices to achieve desired results.”

Ecosystem resource planning (ERP4): The new era of resource planning

ERP4 represents an advanced stage of resource planning that integrates various elements across the ecosystem supply network. It aligns with the concept of a networked system, leveraging real-time data, composite applications, and cognitive analytics to provide visibility and analysis to optimize inventory, workforce, and supply network execution resources globally.

Enterprise resource planning (ERP) systems have long been the backbone of large organizations, providing an integrated suite of business applications that automate various organizational processes and promote data-driven decision-making. As the world becomes more digitally connected, the fourth-generation ecosystem

resource planning, commonly known as ERP4, emerged, focusing on an ecosystem and network approach.

While the ERP4 technology market remains fragmented among “best of breed” and AI startups, the necessary composite applications are beginning to be developed or aggregated by the market leaders to offer broader ecosystem commerce and ERP4 solutions. Managing a networked system requires a comprehensive understanding of its application technology and maturity levels. The path to full maturity involves integration, simulation, automation, collaboration, and innovation, empowered by digital technologies. Innovate and then automate based on a shared vision.

Industry 4.0: A holistic approach to supply network management

Industry 4.0 symbolizes the convergence of all digital technologies with traditional business practices. It represents an integrated approach, harnessing automation, intelligence, and agility to create value and resilience across all aspects of business, including supply network management. Visioneering represents the future state business model/architecture. Industry 4.0 represents the digital technology architecture for the immediate future and beyond. Industry 4.0 and digital transformation enable the creation of shared value from integration, resource utilization, cognitive analytics, and optimized resilience from implementing the base digital functional maturity level capabilities, including the following.

1. Master data management (MDM). We started our digital journey 40 years ago with a simple saying: GIGO—garbage in, garbage out. Clean, well-defined, harmonized, and managed data is critical to success; it is the lifeblood of the organization.

2. Digitization vs. digitalization. Digitization refers to converting physical information into digital media. MDM done well accelerates the journey. Digitalization

involves leveraging digital technologies to automate, redefine, or create new business processes and analytics. It is the basis of transforming an innovative vision into a practical reality.

3. Digital twins. Representing a digital replica of a physical entity (enterprise processes), digital twins enable advanced simulations and analytics. They offer real-time insights into collaborative processes, promoting innovation, agility, and responsiveness. Digital twins facilitate the adoption of advanced and cognitive analytics eventually leading to autonomy and democratization of the supply network.

Back to the future

The future of supply network management demands a comprehensive enterprise framework that integrates various innovative practices to achieve desired results. The vision must be driven by improved financial and operating performance. It requires a visionary approach that considers the transition from linear chains to dynamic networks, capitalizes on multi-enterprise ecosystem commerce platforms, and incorporates advanced Industry 4.0 digital technologies and internet of things connectivity. Visioneering is not a one-size-fits-all framework, but a facilitated outcome-driven practical roadmap tailored to individual business models and needs. Most importantly, it encourages collaboration, shared outcomes, and value creation. It's the call to action that can be shared throughout the organization as a common institutional vision and aspiration. It's an exciting journey that promises to unlock new opportunities and redefine the way we think about supply network management in a digitally connected world. Carpe Diem.

About Global Links

Global Links appears in each issue of *Supply Chain Management Review*. Richard J. Sherman, retired guru of SCM, is the Global Links column editor. If you are interested in participating in the column, he can be reached at rsherman@goldanddomas.com. •

The state of PROCUREMENT

By Gary Forger, contributing editor

Procurement is transforming faster than ever. Cost, quality, and speed still matter. But now procurement managers are under pressure from one end of the supply chain to the other. As well as from within their own companies. This is going to take some work to tame.

When it comes to the state of procurement, perhaps Alexandre Gagnon says it best. “Procurement is fundamental.” It spans everything from “day-to-day purchases to measuring sustainability to future-proofing operations for long-term growth. It’s a wide spectrum of mission-critical responsibilities, spanning all business functions.”

Gagnon, by the way, is vice president of Amazon Business Worldwide. Not a bad perch to evaluate procurement in big picture mode.

Meanwhile, your in-the-trenches mode confirms everything he says. In fact, you have been living this for some time, and probably think: “Procurement is transforming at lightning speed.”



As Amazon's 2024 State of Procurement Report puts it. That's a picture-in-picture mode if you ever saw one. And while all of this may seem a bit daunting (overwhelming on certain days?) Gagnon adds this: "Together, armed with the necessary insights and cutting-edge technologies, we can buy smarter, dream bigger, and thrive, in any economy." That's a great baseline for meeting the challenges of procurement in 2024.

Just so we're all on the same page, procurement is a big deal that gets bigger and more complex every year. You know it. Gartner identifies 29 key sourcing and procurement activities. And they fall into the following seven key management activities.

- Strategy
- Technology
- Organization
- Performance
- Spend
- Suppliers
- Risk

All of these are in play at any given moment. That means they are always part of the current state of procurement, whatever the year.

“Cost, quality, and speed
will always matter. So will
economic forces like pesky
inflation and good
old-fashioned supply
and demand.”

Cost, quality, and speed will always matter. So will economic forces like pesky inflation and good old-fashioned supply and demand. That said, three areas—the transformation process itself, technology (especially AI), and responsible purchasing including ESG and traceability—stand out in 2024. And with good reason. They are all relatively new and yet to be tamed. They are also complex and coming at

procurement professionals at an alarming speed.

Let's dig in.

Troubling transformations

Ryan Polk, senior director analyst at Gartner, calls this the great acceleration. He says we are at the intersection of accelerating change in risk management, ESG, and technology, to name three key areas.

The confluence of efficiency and complexity is the number one challenge today. That's according to Amazon's survey of more than 3,000 procurement decision-makers and executive leaders. Any objections to that insight? Probably not.

Or as Amazon says, "as responsibilities increase, procurement operations naturally grow more complex."

But it takes a Nick Vyas to balance that out.

"Despite everything going on in procurement today, it hasn't changed at its core. Procurement is still a corporate effort to find harmony between what you anticipate supply to be and what you anticipate demand to be." Vyas is associate professor of clinical data sciences and operations at USC's Marshall School of Business.

Ok, this isn't a runaway train. Unless you let it become one. But if it was only that simple. Unfortunately, there are just an increasing number of layers and even distractions that make it so difficult to find that harmony—which brings us to a bit of deconstruction.

Consider this: Amazon's survey identified top internal and external big picture challenges in procurement. Internal challenges include:

- complexity of systems/processes;
- access to a wider range of sellers and products; and
- compliance to spending policies.

External challenges include:

- rising costs of purchases;

- (tie): preparing for unexpected economic changes and corporate social responsibility (CSR) mandates; and
- working with suppliers unable to support digital procurement needs.

Sound familiar? In fact, the Amazon survey says that 95% of respondents foresee room for optimization in procurement. So, what are you going to do about it all?

A big part of the strategy of procurement leaders is to invest in analytics and insight tools, automation, and AI. That's according to 98% of the leaders Amazon engaged.

And in a country with so many other divisions, those numbers (95% and 98%) are remarkable. This is something that you and others in procurement can rally 'round.

Transforming transformations

Everything you have read so far is worthy of attention when it comes to improving the state of procurement. And most articles like this would jump now to essential topics such as ESG, AI, and more. We will get there. Just not right now.

That's because Polk, Vyas, and the respondents to the Amazon survey all have a concern for both the existing and building complexity in procurement. Just as important, they question people's abilities to accommodate the changes needed for the coming new procurement complexities.

"We need to get better at the process of change and transformation," says Polk. "We need to learn how to manage cognitive overload."

He starts with a simple line graph (see Figure 1) with change on the vertical axis and time horizontal, Polk shows that procurement's aspiration for change far exceeds procurement's reality for change.

Which, by the way, is much closer to a flat line than even the rate of change in other fields in the world. "Political, economic, social, and climatic conditions are evolving faster than procurement. That leaves the function in a reactive position and makes it harder for procurement to deliver value," says Polk.

In other words, procurement is an underachiever when it comes to change. But why?

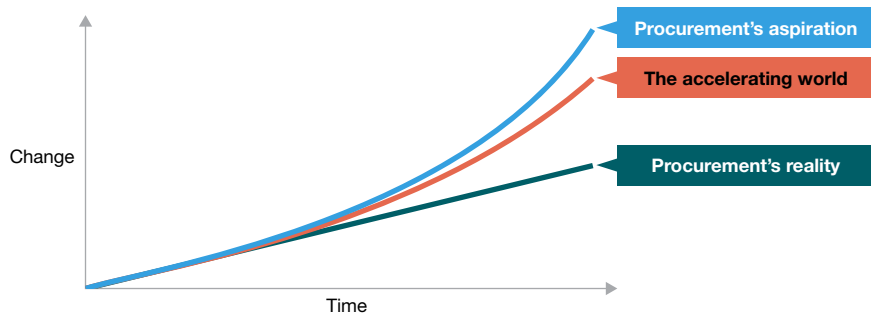
"People in procurement are being asked to do so much today that it's hard to keep pace. The number of new tasks, task workarounds, and process changes procurement staff experience is increasing at incredible speed," explains Polk.

To make matters worse, these workflow changes aren't being adequately managed. According to a Gartner study of nearly 500 finance and shared service employees, only "big change" is adequately planned for. Unfortunately, "big change"

FIGURE 1

The pace of change continues to accelerate

Pace of external trends versus procurement's aspiration



Source: Gartner Sourcing and Procurement Transformation Survey

only accounts for 4% of the change employees experience, leaving staff to navigate the other 96% of "small change" on their own. Over time, the cumulative effect of this pattern can drag employees' mental energy down to critical levels.

Gartner research also shows that “leaders must capture greater value from transformation while reducing its difficulty. These twin conditions constitute transformation success.” Just as important, procurement leaders should feel a true sense of urgency here.

Gartner says that since 2018, “the average procurement team has undergone nearly five transformations in areas such as supplier management, category management and new technologies.”

That was just the precursor to 2023. That’s when, Gartner says, the average procurement function juggled close to three active transformations simultaneously.

“Many CPOs report that achieving these transformation objectives is proving more challenging than anticipated.”

Unsurprisingly, “many CPOs report that achieving these transformation objectives is proving more challenging than anticipated,” says a Gartner report.

Another Gartner survey of nearly 300 people gauged the difficulty of achieving any procurement transformation’s full objectives. Only 8% thought it was as difficult as expected and another 22% thought it was easier. Everyone else (70%) says transformations are more difficult than expected.

Here’s an especially interesting observation from this Gartner work. Traditionally, efficiency of change has been a driving force in transformations. Unfortunately, “a focus on efficiency has almost no impact on success,” reports Gartner. Key reasons why are as follows.

- It makes implementation the goal.
- It leaves workflows incomplete.
- It is over reliant on staff experience.
- One size doesn’t fit all.

Just as bad or worse yet (depending on your preference), the efficiency-based approach

increases complexity.

So, Gartner took efficiency out of the equation in an attempt to develop a concept of design simplicity instead. Polk describes it as “a user-experience-based approach to business process management that seeks to reduce complexity by deliberately designing procedures, tools and stakeholder interactions to be easy to understand and/or execute by users.”

To break that down, here are Gartner’s drivers of design simplicity.

Workflow design

- No gaps or ambiguities in the workflow when it goes live.
- Job is easier to do with the workflow than without it.
- Workflow is easy to understand and follow.
- Workflow covers even rare scenarios.

Implementation planning

- Leaders, managers, and staff work as an integrated team.
- Leaders delegate but stay closely involved.
- Leaders take steps to minimize added difficulty.
- Learning and development are baked into actual work.
- Specific effort is made to recognize change adoption.

So, is that all worth it? Polk says Gartner’s research shows that leading organizations using designed simplicity enjoy a 42% increase in transformation success.

Not a bad start.

From where Vyas sits, the educational process leading up to the workplace, and even in it, also plays a strong role in transformational success in procurement. But let’s be upfront here. Vyas is talking the long game, not the next transformation. “The job skills needed today keep evolving and changing. It is critical to have a workforce that is able to adapt,” explains Vyas. “We need to rethink our entire educational system from the various degrees at university level to retraining

throughout a person's career," he says. Vyas is also an advocate of practical training for at least a year at the undergraduate level.

"It all comes down to lifelong learning in smaller bites and more frequently," says Vyas.

An example of such mid-career reskilling is the supply chain certificates offered by ASCM. The procurement certificate intends to "establish effective procurement policies, sourcing strategies and contract negotiation strategies that help match suppliers with an organization's needs." These self-paced programs facilitate remote learning. They also ensure the student has a secure grasp on the subject matter through an exam process.

AI: Road trip not roadmap

While most see AI as the elephant in the procurement transformation room, Vyas prefers to talk broader, about what he calls "the digital and/or technological evolution."

Digital, he explains, has already been partially integrated into both the demand and supply sides. It marks a paradigm shift in the evolution of procurement practices.

"Going digital is no longer an option; it is now essential for organizations to thrive. Digital transformation has the power to streamline processes, cut costs and boost efficiency. These tools can automate mundane tasks like data entry, contact analysis, and spend analysis, enabling procurement professionals to prioritize strategic goals."

Which is exactly what Amazon says. Just ask Doug Gray, vice president of technology for Amazon Business.

"By investing in tools that digitize, automate, and streamline core functions and processes, procurement leaders can empower

their teams to focus less on function and more on strategy," Gray says.

Amazon says there are five digital technologies currently in use for procurement. They are:

- procurement analytics or reporting tools (at 62% of survey respondents);
- automation of manual procurement processes (54%);
- digital or online invoice (51%);
- AI-driven optimization of purchasing decisions (47%); and
- voice technology (41%).

This is also where the conversation about technology inevitably narrows to AI and machine learning. That's not bad. It's just where we are in the state of procurement in mid-2024. And there are plenty of questions. More than enough, actually.

Amazon talked to the head of procurement at a multinational telecommunications company. This is

what that person said. "Which digital tools do I implement and how? They're coming very quickly—you've got everybody using automation, machine learning, and AI. Do I buy a tool now. Do I wait? Do I outsource those

services. These are all questions that are coming at the procurement department."

Indeed, they are.

"Everyone is just experimenting right now to see where they can use AI," explains Polk of Gartner. "There has just been a complete flip in client interest here from fascination to piloting and experimenting," he adds.

Polk puts the so-called watershed event in AI for procurement at January 2023. That's when AI became "imperative" to talk about because that's when ChatGPT went mainstream.

"Polk puts the so-called watershed event in AI for procurement at January 2023. That's when AI became 'imperative' to talk about because that's when ChatGPT went mainstream."

If, however, you are looking for an AI roadmap, stop. There is none at this point. Instead of AI having a roadmap, AI is in itself a road trip without a schedule or known final destination. But rest assured, this is not a time for indecision. It is, indeed, time to update the '64 Chevy.

Amazon's survey shows that the three top mid-trip destinations are:

- quicker or deeper data analysis;
- time savings; and
- different systems to connect more seamlessly.

Forty-five percent of Amazon's respondents are willing to incorporate AI into their procurement efforts immediately or within the next year. While 80% have a two-year time frame.

“Forty-five percent of Amazon's respondents are willing to incorporate AI into their procurement efforts immediately or within the next year.

It's important to note here that the survey was conducted in mid-2023. That would put us at the date of reckoning in the next year or so.

The Amazon report says, “even a year or two delay can open a window to even greater advancements in AI, meaning laggards only fall further behind competitors that more quickly adopt emerging procurement solutions.”

That said, Amazon says leading industries in adoption of AI in procurement are tech (52%), telecom (51%), and medical pharmaceuticals (49%). Healthcare services (38%) are least likely of all industries surveyed to adopt AI right now.

As you probably suspect, Gartner has developed

its own set of expectations for AI adoption.

By the year 2026:

- Virtual assistants and chatbots will be used by 20% of companies for internal and vendor interactions.
- Advanced proficiency in data and technology competencies will be as important as social and creative competencies for procurement staff.

By the year 2027:

- Forty percent of sourcing events will be executed by non-procurement staff.
- Fifty percent of companies will use AI-enabled contract risk analysis and redlining tools.

By the year 2029:

- Eighty percent of human decisions will be augmented by GenAI with humans focused on tasks requiring ingenuity, creativity, and knowledge.
- Onward and upward.

ESG and responsible purchasing

As powerful a force as technology and AI are, they are not the only ones affecting the state of procurement in 2024. ESG still has a strong influence and will for the foreseeable future.

“ESG goals have transformed into a vital KPI for organizations, surpassing their role in just mission and vision statements,” says Vyas. “A rising number of organizations are implementing eco-friendly practices and cultivating equitable supplier relationships, all while focusing on reducing carbon emissions throughout their supply chains.

“I have long advocated for the transition from a single bottom line (profit) to a triple bottom line (planet, people, and profit). It's a multi-dimensional mindset that encompasses agility, resiliency, sustainability, speed, and profitability,” adds Vyas. There are three key drivers behind this shift, says Vyas. Those are:

- 1) The debate on the reality of climate

change is almost done;

- 2) corporations are realizing that consumers are becoming increasingly conscientious about products and their ESG heritage; and
- 3) the days of government laissez faire about ESG are fading quickly.

Needless to say, net carbon emissions figure prominently here. And some are quite demanding.

“From an environmental standpoint, we are working on a 50% reduction in our net carbon emissions by 2030. So, we require all of our suppliers to sign a code of conduct. We’re doing a lot more screening of suppliers to make sure they’re behaving like they should.” That’s what a vice president of global procurement at a German tech company told Amazon in its survey.

Vyas has been on the road lately and says ESG concerns in procurement are on agendas in many countries. In the past few months, he has visited India, Vietnam, and Singapore and says business leaders in all are ESG focused.

As big as it is, ESG is not a standalone procurement concern. In fact, it belongs in a bigger procurement bucket—responsible purchasing—says Amazon’s 2024 State of Procurement report. When Amazon asked procurement professionals about top considerations for responsible purchasing, between 88% to 94% of them identified six key areas. Those are:

- the location where the products purchased originate (94%);
- the HR policies and standard of the organizations purchased from (92%);
- the type of transportation used to ship purchased products (90%);
- the ESG policies of the organizations purchased from (89%);
- the DEI policies of those organizations (89%); and
- the route and the stops that the products

purchased make on their way to their final destination (88%).

There’s also the matter of traceability, which is big enough, like ESG, to deserve some extra attention in the sphere of responsible purchasing. In fact, traceability today is probably about as developed as ESG was several years ago. Talk to Vyas and he points out that it will be 2027 before the U.S. federal government imposes 300-plus regulations that will demand product traceability. The focus here is full supply chain traceability from point of origin to final disposal. “Enhanced accountability and/or authentication will be one of the priorities across the entire supply chain,” says Vyas.

And while the general media today focuses on items such as conflict minerals, traceability requirements will include common items, not the least of which is food. This is going to take some effort and will inevitably be technology heavy. “The potential of blockchain technology to ensure secure traceability cannot be overlooked. Integrating applications and leveraging cloud-based infrastructure will enable rapid changes to be executed, managed, and monitored with great ease,” says Vyas.

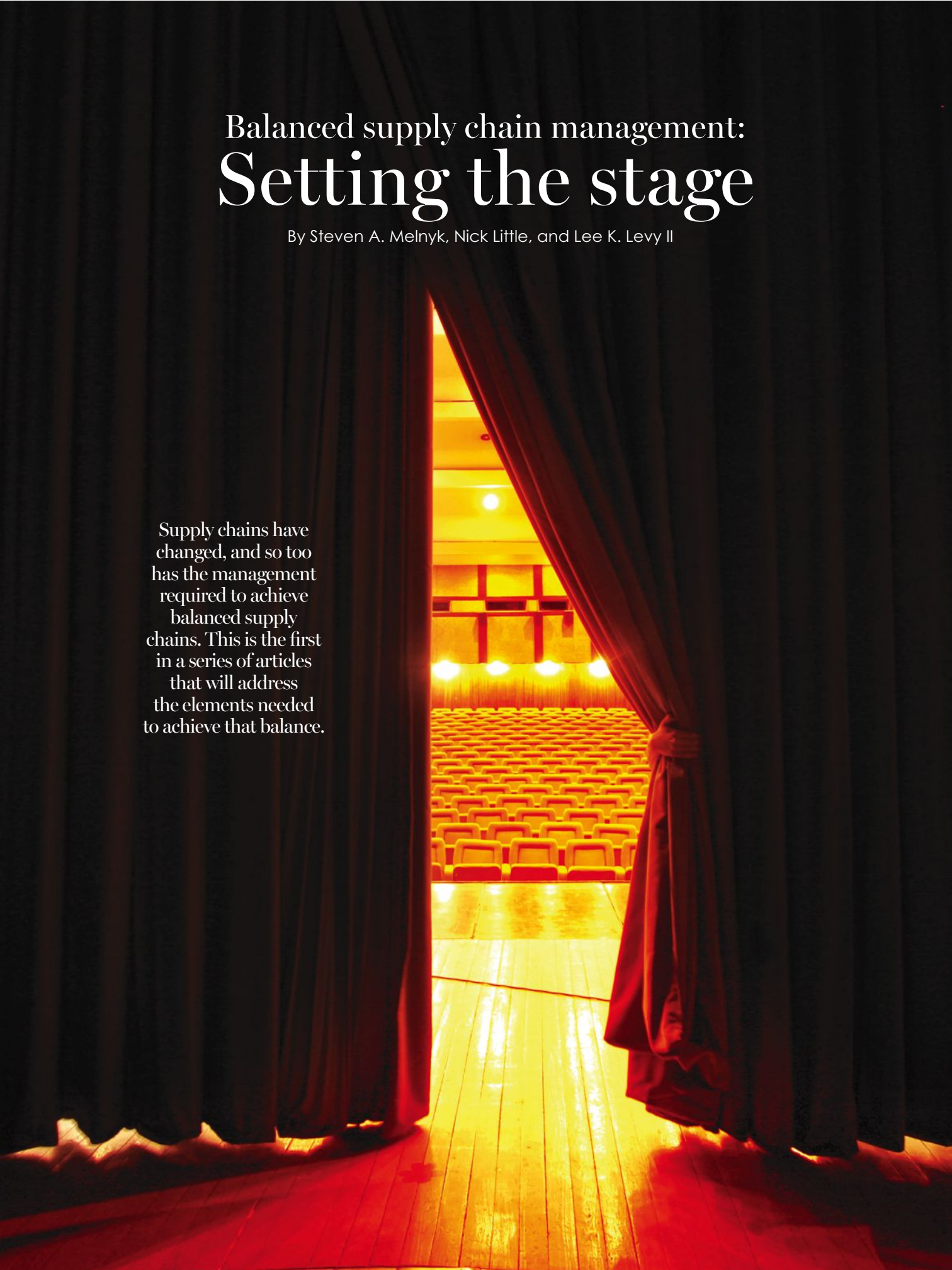
But don’t expect that establishment of traceability will be easy. It won’t be and needs some serious attention starting now.

Clearly, the state of procurement is a challenging one in 2024. But it will also only be part of an ongoing process. For the past 40 years or 50 years, says Vyas, it has been easy to focus on procurement’s effect on profit by managing cost and speed. But profit has now been joined by the effect of people and planet in what Vyas calls the new procurement triple bottom line. While procurement doesn’t have to fully embrace all three immediately, the shift is already underway. Don’t expect it to go away. •

Balanced supply chain management: Setting the stage

By Steven A. Melnyk, Nick Little, and Lee K. Levy II

Supply chains have changed, and so too has the management required to achieve balanced supply chains. This is the first in a series of articles that will address the elements needed to achieve that balance.



This is the first of four articles about balanced supply chain management, its traits, and the need for such an approach. The concept draws on the collective experiences of the three authors with supply chain management—a base of more than 120 combined years. Over this period, the authors have seen the ebb and flow of many developments—some, such as computer integrated manufacturing—were initially seen as revolutionary. However, it is our view that the reality generated by many of these developments has failed to meet the hype. These experiences have given the authors an awareness of the need for a more balanced perspective.

It is this perspective that underlies this series.

This perspective has gradually evolved over time. Its development can be better understood by reviewing the set of articles written by the authors about the theory and practice of effective

supply chain management and published in this journal—*Supply Chain Management Review*. This list is found on Page 28 of this introductory paper.

The “revolution” in supply chain management: The latest version

If you were to read the recent articles pertaining to supply chains and supply chain management, you could be forgiven for thinking that supply chains and supply chain management are about to change radically now. The reason—new tools now emerging and their potential significant positive impact on supply chains. These are tools like artificial intelligence, machine learning, big data, and analytics. These tools are more

than simply promises. There is evidence of their supply chain effectiveness. Walmart, for example, is now using AI to better negotiate costs and purchase terms with certain vendors (specifically small- to medium-sized suppliers), thus reducing both costs and negotiating time. Other areas affected by these developments include final mile delivery, demand forecasting and fleet tracking. This passion has gripped universities and business schools with an increasing emphasis on exposing students to these new developments, in some cases, we propose to the exclusion of other critical areas.

These recent developments depict a trend in

supply chain management—for the theory and practice of supply chain management to be like a pendulum, swinging back and forth in response to the latest developments or crises. In fact, we, the authors, are also partially guilty of following this trend. In 2017, one of the authors (Melnyk, S.A., and Stanton, D.J. “The

customer-centric supply chain), wrote a paper in this journal on the customer-centric supply chain.

Yet, experience and history have taught us the following.

- Not all developments are equally important. For every success story, there seem to be far more stories of failure. These failures dull the initial shine of these developments.
- The period of these developments is varied. Some like Lean have experienced a long span of impact (introduced first in 1977), while others such as computer integrated manufacturing (observed at the end of the 1980s and early 1990s) have come and gone.

“These recent developments depict a trend in supply chain management—for the theory and practice of supply chain management to be like a pendulum, swinging back and forth in response to the latest developments or crises.”

Steven A. Melnyk is a member of the department of supply chain management at the Eli Broad College of Business at Michigan State University. He can be reached at melnyk@msu.edu.

Nick Little is the director of the Railway Education Center for Railway Research & Education at the Eli Broad College of Business at Michigan State University. He can be reached at little@msu.edu.

Lee K. Levy II is a retired Major General of the USAF, and CEO of The Levy Group, LLC. He is a doctoral candidate at Vanderbilt University and holds the Directorship Certification from the National Association of Corporate Directors. Levy can be reached at lee@thelevygroup.net.

- Management practice tends to lag behind these developments. It takes time for management to learn and understand the strengths and limitations of these developments; it takes time to learn where, when, and how to use these developments. How we use these developments initially may not represent the best or ultimate usage of these developments.
- These developments do not operate in a vacuum—they are often built on or require the presence of other developments and practices. Often it is the failure of firms to recognize or provide these overlooked requirements that significantly contribute to the failure of these overlooked requirements. For example, you cannot hope to succeed with MRP with poor database accuracy and integrity.

Consequently, in reviewing these developments specifically and the theory and practice of supply chain management generally, we argue that what is needed is not a widely swinging approach to supply chain management but, rather a more measured, multi-faceted approach to our field.

The result and the focus on this series of articles is the need for a more structured, yet flexible approach to supply chain management—an approach that we refer to as *balanced supply chain management*.

Balanced supply chain management (BSCM) is an approach that recognizes that there are no magic bullets; no development is enough by itself. Furthermore, BSCM recognizes that inherent to supply chain management are numerous tensions. Success in supply chain management is finding the most appropriate point of balance when addressing these tensions. This point of balance is not necessarily in the middle or midpoint. Rather, it is at that point that makes sense and is appropriate to the supply chain, the firms, and its strategic objectives.

Some of the most common tensions that must be addressed include the following.

- Customer-centric ↔ supplier oriented.
- Investing in technology ↔ investing in culture.
- Strategic ↔ operational.
- Embracing complexity ↔ encouraging simplicity.
- Focusing primarily on cost ↔ focusing on the

other supply chain outcomes (e.g., responsiveness, sustainability, security, resilience, innovation).

- Slow thinking ↔ fast decision-making.
- Long-term thinking ↔ Near-term thinking.
- Being early ↔ appreciating the value of waiting.
- Focusing on the interfaces ↔ Focusing on only the supply chain.
- Focusing on desired outcomes ↔ emphasizing solutions.
- Delivering the right outcomes ↔ delivering just the right numbers.
- Dreaming big ↔ dreaming possible.

How the supply chain manager will address these tensions will affect not only the type of supply chain that is designed and delivered, but how the firm and its supply chain will respond to developments such as AI, big data, and machine learning. In addition, how the manager addresses these tensions will also significantly influence the success with which these various developments are implemented and used.

Before turning to an exploration of these tensions, it is important to note that the recognition of the need for a balanced approach is not unique to this article. Previously, in the areas of accounting and strategic performance measurement, Robert S. Kaplan and David P. Norton introduced the notion of the balanced scorecard in a 1992 *Harvard Business Review* article (The Balanced Scorecard—measures that drive performance, January-February, p. 71-79). The approach proposed in this paper offers a broader treatment of this notion of balance.

We will explore these tensions and their implications in this and the subsequent articles. And there is no better place to start than dealing with the first tension: customer-centric ↔ supplier oriented.

Customer-centric ↔ supplier oriented

This tension is one of the most basic and fundamental ones facing any supply chain manager. Until 2016 (with the publishing of the customer-centric supply chain article in this journal), suppliers and customers were frequently overlooked. The supply chain was focused on execution. Marketing told the supply chain what to build and it delivered. The relationship was simple. Yet, it was flawed and limited. The resulting

supply chains were often slow and reactive. They tried to implement a one-size-fits-all approach—only to find that it did not work well.

When supply chain managers became aware of the importance of customers, everything changed. Suddenly, the one-size-fits-all approach was abandoned in favor of supply chains that were built around key customers. With the recognition that not all customers were equally important and that certain customers were more important than others, supply chain managers became aware of the limitations of the traditional relationships with these customers.

As shown in Figure 1A, the traditional relationship between the key customer, marketing, and the supply chain could be described as a straight-line relationship. That is, the customer talked to marketing, who, in turn, would communicate the voice of the customer (what the customer wanted) to the supply chain manager. In theory, this should work; in practice, it was flawed. First, it was slow; it took time for the voice of the customer to work its way through marketing before the supply chain manager was aware of what was wanted (thus contributing to supply chains being perceived as slow to respond and unwilling to accommodate the needs of the customer). Second, the voice of the customer was distorted by the time it got to the supply chain manager. It was the voice of the customer, as interpreted by marketing.

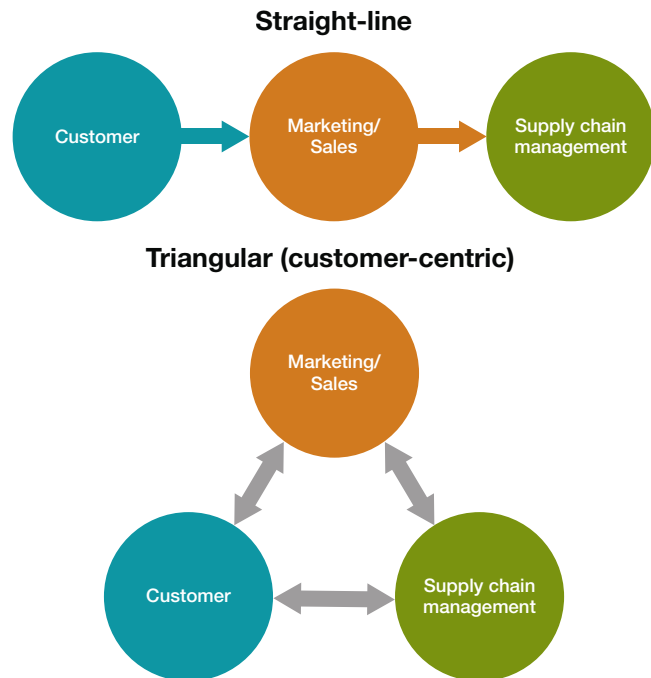
As supply chain managers became aware of the limitations of such straight-line relationships, they were quick to replace them by triangular or customer-centric relationships, as shown in Figure 1. In these relationships, the customer interacts directly with both marketing and the supply chain manager. The voice of the customer is now quickly heard, and heard straight from the customer’s mouth; it is no longer distorted. Furthermore, the effectiveness of this type of relationship has been significantly enhanced by such developments as social media (where the supply chain manager and their department can monitor how the customers, especially the key customers, are viewing their products),

and by the internet of things (where myriad sensors can be used to capture massive amounts of data about products, their performance and how customers are using them). The result has been a more customer-aware supply chain manager—a manager who recognizes that it is ultimately the customer who rewards the firm through their visits and their purchases. This approach was recognized by Sam Walton, the founder of Walmart, who noted that “The feeling our customers have when they leave our stores determines how soon they’ll be back.” This can be paraphrased as “the feeling our key customers have when they finish interacting with our supply chain will determine how soon they will be back.” Yet, this swinging of the pendulum to the customer has tended to draw attention away from the supplier base—the set of suppliers who work with our firm and who provide the goods, services, knowledge, expertise, and insights that we need to deliver better goods and services.

Several recent events have served to make the supply chain manager more aware of the important role played by the supplier. These include the

FIGURE 1

Relationships



Source: Authors

pandemic in 2020-2022. During this period, we saw a significant reduction in the supplier base as many suppliers, especially the small- to medium-sized suppliers (those with 500 or fewer employees) found themselves forced to shut down, declare bankruptcy, or undertake “silent bankruptcies” (where the suppliers simply close their doors and shut down). Assuredness of supplies, which had previously been given, was now an issue of great concern. Suddenly, the suppliers became important. As a senior supply chain executive speaking at *Supply Chain Management Review*’s and Peerless Media’s 2022 NextGen Supply Chain Management Conference in Chicago put it:

“Previously, with supplies being assured, our focus was on the customer, with the result that CRM (customer relationship management) became the critical tool. In today’s world, supplies are no longer assured. Consequently, we must focus on suppliers. SRM (supplier relationship management) has become the new critical tool.”

SRM was present before the pandemic, but it took the pandemic to make managers aware of its importance.

The importance of the supplier base has been further emphasized by the increasing presence of what can be best described as supply chain-shaping initiatives. These are initiatives, typically driven by customers and/or the government, that focus not on the transactions but rather on shaping the environment in which these transactions take place. Examples of such initiatives include those focused on cybersecurity across the supply chain, supply chain

ARTICLE FOUNDATIONS OF THIS SERIES

As promised, here are the various articles published in this journal that have shaped the development and form of balanced supply chain management.

1. Zsidisin, George A., Gary L. Ragatz, and Steven A. Melnyk, “Managing the ‘Dark Side’ of Supply Chain Management,” *Supply Chain Management Review*, March 2005.
2. Lummus, R., Melnyk, S.A., Vokurka, R.J., Burns, L., and Sandor, J. “Getting Ready for Tomorrow’s Supply Chain.” *Supply Chain Management Review*, September 2007.
3. Melnyk, S.A., Cooper, M.B., Griffis, S.E., Macdonald, J.R., and Phillips, C.L.M. 2010. “Supplier Base Management: A New Competitive Edge.” *Supply Chain Management Review*. July 2010.
4. Melnyk, S.A., Closs, D.J., Griffis, S.E., Zobel, C.W., Macdonald, J.R. 2014. “Understanding Supply Chain Resilience.” *Supply Chain Management Review*. January 2014.
5. Melnyk, S.A., and Seftel, C.M. 2016. “Myths and Truths: Myths and Misadventures in Supply Chain Management.” *Supply Chain Management Review*. January 2016.
6. Melnyk, S.A., 2016. *The Emergence of the Strategic Leader*. *Supply Chain Management Review*. November 2016.
7. Melnyk, S.A., and Stanton, D.J. 2017. “The Customer-Centric Supply Chain.” *Supply Chain Management Review*. December 2017.
8. Melnyk, S.A., Vorhees, C., and Little, N. 2018. “Serving Up An Experience.” *Supply Chain Management Review*. March 2018.
9. Melnyk, S.A., Seftel, C., Little, N. 2018. “So You want a Strategic Supply Chain?” *Supply Chain Management Review*. September 2018.
10. Melnyk, S.A., Bourne, M., Frayer, D., Rifkin, W. 2019. “Are your performance measurements destroying your supply chain?” *Supply Chain Management Review*. November 2019.
11. Melnyk, S.A., Bourne, M., Frayer, D., Rifkin, W. 2020. “Are your performance measurements destroying your supply chain? Part Two.” *Supply Chain Management Review*. January 2020.
12. Melnyk, S.A., Peters, C., Schoenherr, T., Miller, J. 2021. “Earned Preferential Treatment: The Reward for being a ‘Good’ Customer.” *Supply Chain Management Review*. March 2021.
13. Melnyk, S.A., Little, N., Levy, L. III. 2023. “Rapid Business Development: Managing like ‘Maverick’ in today’s turbulent, dynamic environment.” *Supply Chain Management Review*. July 2023.

sustainability (otherwise referred to as the circular supply chain), DEI (diversity, equity, and inclusion) within the supply chain, and social responsibility along the supply chain. For example, consider the case of the tracking of final customers' Scope 3 emissions reporting, which involves gathering, aggregating, and reporting the emissions of the focal firm, its first-tier suppliers, its second-tier suppliers, and so on.

This category of initiatives is different. For one thing, success requires the participation of the entire supplier base. It is not enough for only the first tier to participate; success requires the participation of the second, third, and fourth tiers of the supplier base. Second, for this initiative to succeed, suppliers are expected to make significant investments in systems and capabilities needed to support these initiatives. However, it is often the focal firms, not the suppliers, that are the primary beneficiaries of these investments. Finally, because the costs of the initiatives often exceed the benefits, the suppliers are now considering an option not previously considered by many supply chain managers—they are thinking about breaking the existing buyer-supplier relationship and leaving the supply chain. This new supply chain reality can be better appreciated by the following two anecdotes.

In 2007, Desso, a leading Dutch-based manufacturer of carpet tiles and sports pitches operating in more than 100 countries, began the process of transitioning its operations (including its supply chain) to a strategy of producing sustainable products (as covered by Soroosh Saghiri, Carlos Mena, and Mike Bernon in the 2015 article, "Flooring the Competition: The Desso Collection," published by Cranfield School of Management, The Pears Business Schools Partnership, pearsfoundation.org.uk). As it proceeded with this strategy, the management found out that many of its suppliers were resistant to this move. Various reasons were provided, including that not all suppliers were willing to share the exact composition of their raw materials; some did not have this information; and, for some, the costs/benefits analysis was negative. As a result of this strategic shift on the part of Desso, some suppliers ultimately decided to leave the Desso supply chain—a decision that the management at Desso was willing to

accept in pursuit of its sustainability-based strategy.

For the second example, a recent conversation with a senior executive from a Fortune 50 company revealed that the company was undertaking a program to embrace cybersecurity across the supply chain. To that end, senior management decided to support the deployment of the Cybersecurity Maturity Model Certification (CMMC) cybersecurity standard and require implementation by both the company and its suppliers. CMMC is a new program introduced and promoted by the United States Department of Defense to address

“Success requires the participation of the entire supplier base. It is not enough for only the first tier to participate; success requires the participation of the second, third, and fourth tiers of the supplier base.”

cybersecurity concerns within the supply chain. (CMMC adds a verification component to a previous regulation, DFARS 252.204-7012.) Management was concerned about the reaction of one of its critical suppliers to this requirement. This supplier was a domestic producer of high-quality, precision surgical stainless steel. As such, it provided a critical component. Finally, it was a supplier that operated in an environment where there were few domestic suppliers for this type of product. From the supplier's perspective, this Fortune 50 company was a relatively small customer. The buying organization was concerned that the supplier might respond to the CMMC implementation demand by dissolving the relationship, resulting in significant consequences—the company had conservatively estimated that it would take nearly two years to identify, qualify, and onboard an alternative supplier.

Often, when suppliers “fire” their customers, these actions occur as surprises—there is often little if any advanced warning (it's not unusual that most buyers track buyer-supplier relationships in terms of transaction-related performance: are the products on time, of adequate quality, and delivered at or below the

agreed to costs. Few buyers monitor the health of the buyer-supplier relationship). When this occurs, these suppliers take with them critical and unique capabilities and skills. Consequently, it is often difficult, time-consuming, and expensive to replace them.

As a result, the attention of many supply chain managers has been drawn to the supplier side of the supply chain. Firms are starting to recognize that in today’s environment, good suppliers are a prized asset and there is competition for them. Furthermore, there is now a new reality. In the past, good customers fired bad suppliers; in today’s world, good suppliers fire bad consumers. For many supply chain managers, one of their goals is to be seen as being a good customer. As noted by Melnyk et al in a March/April 2021 article (Earned preferential treatment: The reward for being a “good” customer) in *Supply Chain Management Review*, to be a good customer, the buying organization must master four pillars of a good relationship, as summarized in Figure 2.

It is not enough to be a good customer. The supply chain manager must recognize that suppliers can and do leave when certain conditions are present, such as the following.

- For the supplier, the costs of dealing with the

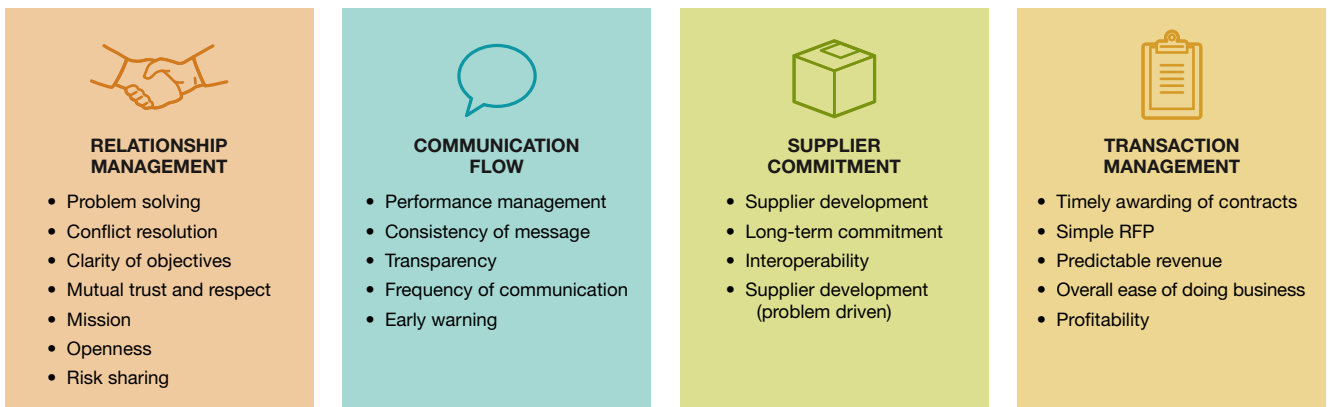
buying organization exceed the benefits.

- The suppliers feel that they are not capable of meeting certain customer demands.
- Suppliers have become burned out because of excessive demands, an endless stream of requests for actions that benefit the buyers not the suppliers, and the buyers, because of their requests and the urgency surrounding these requests, are seen as preventing the suppliers from completing those actions needed to keep their business in operation.
- External opportunities for the suppliers are far greater than internal constraints (e.g., importance of the buying firm as a percentage of sales, number of contracts and the time periods they cover, and the degree to which the equipment is specifically configured to meet the needs of that buying organization).

As a result, the effective supply chain manager must be able to balance the need to identify and satisfy the voice of the key customer(s) with the need to be a good customer to their supplier base. While their relative importance may vary over time, neither side can be ignored in the long-term without the supply chain manager, specifically, and the firm, generally, being adversely affected.

FIGURE 2

Supplier base management four pillars of success extracted factors



Source: Authors

Investing in technology ↔ investing in culture

The second tension to be discussed is that of whether to invest primarily in hard technology. At the start of this article, we were to introduce to the newest set of technological wizardry in the form of AI, machine learning, analytics, and big data. Whenever new technology is introduced, there is a tendency to greet it with some form of hyperbole. Definite examples of their success and impact can be found (as in the case of Walmart and its use of AI in generating and negotiating contracts). Yet, several cold hard facts must be recognized (many of these facts come from experiences with similar developments in the past).

First, for every success, there are many more examples of failures. Often the failures go underreported because no one wants to admit that their investments (often significant) did not produce the expected or promised results. Second, for many implementations, the results are not sustainable if the focus is limited to the technology alone. Third, managers learn about the technology over time and, when they do, sometimes, the technology is effectively dropped because it does not translate into a strategic competitive advantage. Finally, for a technology to become a strategic advantage, it must be converted from a technology into a capability.

The major source of these insights comes from the computer integrated manufacturing (CIM) revolution of the 1990s. During this period, alphabet-based technologies with abbreviations such as CAD, CAM, CAE, CAPP, CAQ, CNC, ERP, PLCs, FMS, and robots (to name a few) were introduced. The promise of CIM was simple but compelling—by introducing CIM and its integrated elements, management could improve the effectiveness and efficiency of manufacturing (higher output, more flexibility in production, reduced lead times, higher quality)

while reducing the need for resources, specifically people. This promise was captured in a poster displayed in one hardware vendor's booth at an APICS conference during this period. This poster pictured three components: a button, a man, and a dog. The dog's job was to ensure that the man did not press the button; the man's job was to feed the dog. Yet, this promise was not realized.

The reason—technology by itself, while important, was not enough. For technology to be successful, it has to be embraced by the people in the organization. It has to become a capability. That is, the investment has to be introduced in such a way as to be consistent with the organization and its past, and it has to be extended and customized so that it enables the organization to better achieve its strategic objectives in a way that is consistent with the past and that differentiates what the firm is trying to achieve from the approach found in its competitors. In other words, the hard side of hard technology has to be balanced by the soft side of culture and people. When firms fail with new technology, they often fail because they ignore the importance of people, technology, and soft skills.

Again, BSCM is needed to ensure that the appropriate relationship between these elements and the tension that they create is equalized.

Conclusion: Part one

With this first article, we have begun to lay out the elements of balanced supply chain management and the various tensions that drive the need for such an approach. We will continue this discussion and development with an article in the next issue when we continue to explore and understand the other tensions that need to be addressed and managed for the supply chain manager to better and more effectively operate and thrive in this new dynamic, turbulent, and challenging world. •

Managing inflationary price risks in supplier-buyer contracts through indexing

By Sime Curkovic, Ph.D.

Research emphasizes the need for innovative supply chain and financial solutions, paving the way for the integration of technology to enhance operational efficiency and economic value.



Ongoing inflationary pressures have led both buyers and suppliers to adopt measures for sharing price risks through mechanisms like indexing and other economic adjustments within their contracts. This approach has become increasingly common across several industries, according to our research and other recent studies (i.e., World Commerce and Contracting, *The Impact of Inflation*, 2022). However, our research, which spans companies of various sizes in diverse sectors, reveals that there is a loss of economic value during the implementation phase, placing additional strain on supply chain and finance professionals. The management of indexing and financial economic adjustments requires significant manual effort, often involving the creation and maintenance of complex and error-prone spreadsheets.

To gather a holistic view of the impact of inflationary pressures on contractual price risk-sharing mechanisms and their effects on supply chain and financial management practices, we used a combination of research tools. We completed an exhaustive review of the academic literature and industry reports. The intersection of automation, economic adjustments, and price indexing in buyer-supplier contracts is a niche but crucial area for supply chain management and procurement efficiency. Direct studies focusing on automation specifically for economic adjustments and price indexing in contracts are very rare, but some research has highlighted the importance of integrating automation for optimizing procurement processes and dealing with price uncertainties.

Further, we conducted numerous in-depth interviews with supply chain managers at various managerial levels across several industries. We also administered surveys yielding a collection of both qualitative and quantitative data. Our research illuminates the pressing need for innovative solutions in the realm of supply chain and financial management, paving the way for a future where the integration of technology not only mitigates the challenges posed by inflation and contract complexities but also enhances operational efficiency and economic value across industries. In this study, we outline these challenges and propose potential technology-based solutions.

What to do about inflation?

Inflation is becoming a permanent fixture in our economic landscape, driven by several consistent factors: ongoing supply chain disruptions dating back to the COVID pandemic, the heightened volatility in commodity and energy prices, and fundamental changes in labor markets. These inflationary challenges are set to pose significant hurdles for professionals in supply chain and finance. As we adapt to this new norm, the pressure from inflation is likely to intensify conflicts between buyers and suppliers.

However, strategic cooperation will emerge as essential for enduring supply chain resilience, emphasizing the shared management of inflationary risks between buyers and suppliers.

Acknowledging these emerging pressures, recent research highlights a tangible shift in how businesses are responding to inflationary challenges within their contractual agreements. For example, the aforementioned 2022 study by World Commerce & Contracting surveyed 443 participants from 23 industries and found that more than 70% of today's supplier contracts contain inflation-driven economic adjustment clauses, with price indexing being the most common.

The strategic value and benefits of indexing have been well documented, even before the COVID pandemic that has been a key driver to implement indexing. The 2016 Monitor Deloitte article titled *Index Based Pricing: Managing Risk and Profitability*, provides a good overview of strategic benefits and best practices. Our research shows that most of these are still relevant today, but so are many of the challenges and executional complexities mentioned, that still have not been solved by industry.

Key elements of contracts with price indexing/economic adjustments

Contracts incorporating price indexing or economic adjustments are structured to align pricing with market variations. These contracts are anchored by an agreed upon, specific, recognized, and transparent index, or several indices, ensuring that economic adjustments are based on objective and reliable data. Selecting the appropriate index that would be agreeable to buyer and supplier, and would be relevant in terms of industry, geography, and timing, is a critical task. Contracts typically include a predefined formula for an economic adjustment calculation, utilizing one or multiple indices.

Sime Curkovic, Ph.D., is a professor of operations/supply chain and Lee Honors College Faculty Fellow in Western Michigan University's Haworth College of Business, in Kalamazoo, Michigan.

The frequency of these calculations is clearly defined within the contract, normally ranging from monthly to annual intervals. Contracts may also feature more complex clauses for specific scenarios, such as trigger events, floors, ceilings, risk-sharing ratios, and conditions for price escalation or de-escalation. Common indices used in these contracts include commodity exchange market data, third-party pricing data services like S&P, Dow Jones, CRU, Argus, and a host of others, as well as government agencies such as the Bureau of Labor Statistics (BLS). These elements collectively ensure that pricing remains relevant and fair, adapting to market changes over the contract's duration.

Key benefits of price indexing and economic adjustments

Price indexing, particularly in a risk-sharing context between buyers and suppliers, brings the key benefit of enhancing financial transparency that helps to safeguard profit margins. In terms of efficiency, this approach is more straightforward and less time-consuming than traditional annual pricing reviews, as index-linked adjustments can be automated, reducing the need for extensive meetings reliant on mutual goodwill. Furthermore, price indexing offers flexibility and adaptability, allowing for swift responses to market changes, ensuring that pricing remains fair and competitive in dynamic market environments. This method streamlines the pricing process, making it more efficient and responsive to market fluctuations (both up and down).

Challenges of managing price indexing calculations

Price indexing in contracts presents several operational challenges, primarily due to the complexity of integrating multiple data sources that often have varying update schedules, use different units (such as pounds, tons, seconds, or hours), and may involve multiple currencies. Operational complexity increases with the ongoing collection of index data and other inputs required to conduct regular calculations that ensure that pricing remains current. Managing this process often involves extensive manual inputs, particularly into multiple massive spreadsheets and all their revisions. At the tail end of this process, auditing these formulas and their outcomes becomes a significant task, compounded by the potential

for errors and the need to integrate multiple formats of spreadsheets and timestamps. In addition, generating an accurate forecast of future pricing using a price indexing formula, is a separate effort and often more complex, as underlying forecast data typically updates more frequently than the frequency defined in the price indexing formula.

(Following is an example of a price indexing formula, which highlights some of its potential complexities. The formula calculates the price of manufactured steel parts, as may be defined in a contract between buyer and supplier.)

Cost calculation formula for manufactured steel parts, quarterly priced using a third party steel price index, a different third party steel scrap price index, and Bureau of Labor Statistics current employment statistics index.

$$P_n \text{ quarterly price} = W_1 A_n - W_2 C_n + t * L * D_n + E$$

The variables are as follows.

W_1 : weight of steel blank

A_n : average of three monthly steel prices published towards the middle of each month by 3rd-party data service

W_2 : weight of scrap

C_n : average of three monthly scrap steel prices published at the end of the month by another 3rd party data service

t : processing time

L : number of operators

D_n : average of three monthly salary values published after the beginning of the each month (for the previous month) in BLS CES salary indices

E : value adder

Ideally, both buyers and suppliers would perform the indexing calculation on a shared platform, but in most cases, each party will perform its own calculation. In some cases that came up in our research, only one of the parties (either buyer or supplier) performed the calculation and shared its outcomes with the other party. Additional complexities might arise from the real-world implementation of the above formula. These include:

1. An update of one or more of the indices may be delayed, or provided initially as an estimate.
2. Determining that a calculation is complete, given it has updates on all its inputs, requires a time stamp. If not implemented correctly, a

calculation may be deemed “current” despite waiting on input data.

3. Auditing the above calculation at a later date may be problematic if time stamps are not managed adequately.
4. In some cases, an adder or another parameter may be changed by buyer or supplier and agreed upon by the other party (over a phone call or email). In most cases, this would be captured as a note in a spreadsheet, but this may create confusion and errors. Creating a digital trail of such changes and their time stamps is a process that is often implemented by utilizing additional communication methods (emails, etc.), increasing the challenge of remaining compliant with agreed upon contractual terms.

Initial findings from our ongoing study

WMU’s Supply Chain Management Center has been interviewing companies from different industries to understand how they implement indexing and economic adjustments, focusing on the real-world challenges of implementing such a methodology.

During our research on how companies handle price indexing and economic adjustment calculations, several common challenges have emerged, pointing toward potential areas for improvement. One notable issue is the lack of clear organizational ownership of these processes, leading to a disjointed approach and inefficiencies. This ambiguity often results in human errors and a lack of a proper audit trail, making it difficult to track changes and correct mistakes. The processes are also predominantly manual, consuming significant time and effort due to a lack of automation. This manual nature further contributes to limited collaboration and visibility across different departments, hindering effective communication and coordination. Additionally, scalability issues arise as businesses grow, with existing processes struggling to adapt to increased demand, often requiring additional human resources due to the manual nature of the operation.

Manual and labor-intensive operations will force supply chain and/or finance professionals to perform repetitive tasks that could be automated for much greater efficiency and accuracy, allowing employees to focus on more fulfilling work, which would be seen as a major positive in today’s workforce. Instead of gathering and

populating data within spreadsheets, such professionals could be providing highly valuable insights to support decision-making on timely strategic issues.

Data security and access control also remain concerning, as sensitive pricing information must be securely managed and appropriately accessed. In addition, limited integration with other business systems exacerbates these challenges, creating silos of information and hindering the efficient flow of data. Addressing these issues could significantly streamline the administration of price indexing and economic adjustments in various industries.

Also, we observed that pricing calculated by the buyer or supplier and communicated to the other party (for example, as quotes from a supplier, or in the form of a purchase order with updated pricing from the buyer) had calculated results that have not been agreed to or validated by the other party. Validating the other party’s calculation is often burdensome as well and could benefit from automation.

Work smart and be effective. How?

Working smart and effectively can be achieved by leveraging technology to streamline business processes and automate repetitive tasks. Embrace cloud-based tools for storage, collaboration, and processing; their seamless integrations and remote access capabilities allow for maintaining work-life balance while not sacrificing productivity from any location. Start by identifying the key indices and data points your price indexing contract needs to track and then set up automated tools that will manage the process for you. The addition of AI large language models to automate the reading of proprietary internal data is also something that is being attempted.

There are various tools available that can automate the data collection, perform the calculation of these complex formulas based on their defined schedules or dependencies, enter the necessary time stamps, and disseminate the results to relevant stakeholders. This can be done down to each part number and/or assembly of parts, with available “drill down” tools to evaluate each calculation with its components and inputs. Such tools make use of data visualization, which is invaluable in simplifying the understanding and communication of complex data sets, transforming raw data into clear, actionable insights. By adopting such an automation strategy, you can enhance

FIGURE 1

Trailing quarter average of COMEX aluminum with COMEX aluminum MW U.S. transaction premium

Quarterly price, USD per lb., forecast available. Value is indexed using trailing quarter's averages of COMEX aluminum futures with COMEX aluminum MW U.S. transaction premium platts (25MT) futures contracts' closing prices.

Description: $P_n = X_n / K + Y_n$

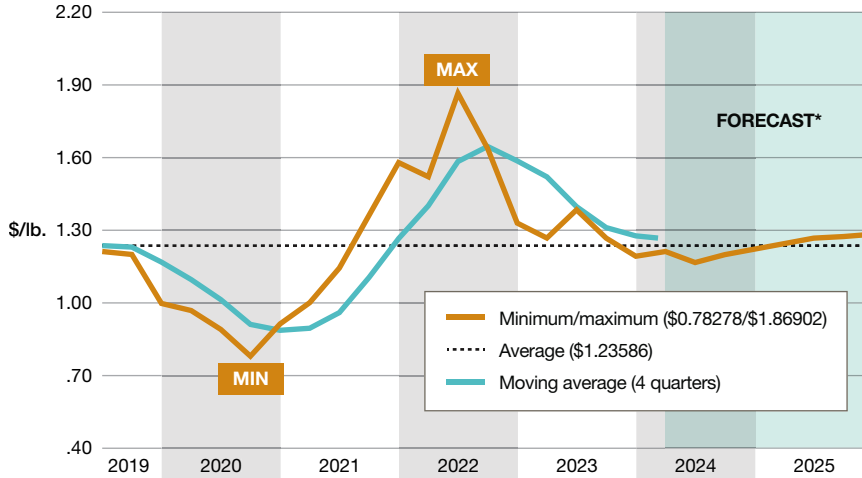
Overview: 5 years

Interval: Quarterly

Time zone: CST

The price change over the selected period of 5 years is **-0.00932 (-0.77%)** from **\$1.21766** to **\$1.20834**

The current price of **\$1.20834** is lower by **0.02752 (2.23%)** than the average price of **\$1.23586** in the last 5 years



* Forecast as of 03/08/2024 3:10 CST

Source: N-Alpha's MaterialX platform

FIGURE 2

Aluminum fender 9" x 72" x 20"

Indexed using COMEX aluminum and U.S. MW premium trailing quarter average price

Description: $P_n = 7.6^* (X_n^* (1 - 0.02) + 5.05)$

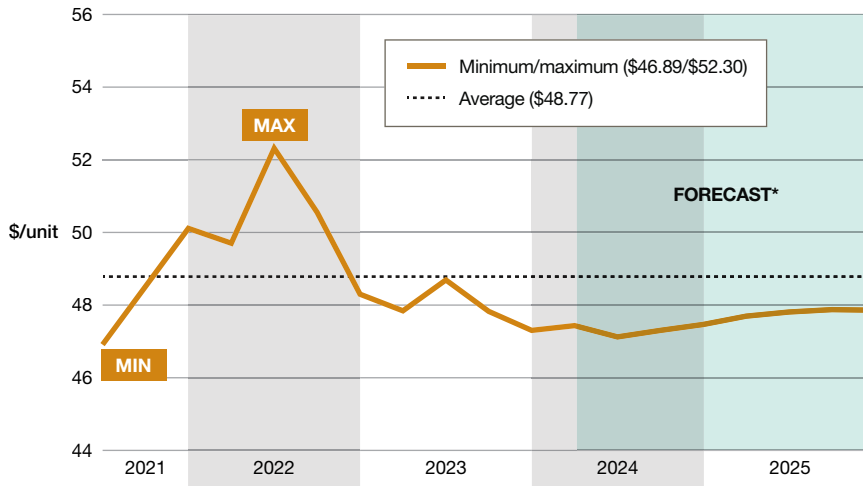
Overview: 3 years

Interval: Quarterly

Time zone: CST

The price change over the selected period of 3 years is **+0.49 (+1.05%)** from **\$46.89** to **\$47.38**

The current price of **\$47.38** is lower by **1.39 (2.86%)** than the average price of **\$48.77** in the last 3 years



* Forecast as of 03/08/2024 3:10 CST

Source: N-Alpha's MaterialX platform

efficiency and focus on more strategic tasks.

One such software tool that has been made available to our Supply Chain Management program at WMU is N-Alpha's MaterialX platform. The platform provides connectivity to multiple data sources and a "formula engine" that allows it to tie formulas to their data sources and provide the necessary time stamps and outputs on an automated basis throughout the full lifecycle of indexed supplier-buyer contracts. In essence, spreadsheets are unnecessary to obtain the calculated "quarterly price per part" or any set of parts, relying on an underlying formula infrastructure that updates automatically with the publication of pricing data. (See Figures 1 and 2.)

Forward-thinking organizations should strive toward protecting the value created by indexing by implementing automated processes and strategies that perform the basic functionality while minimizing manual effort and the potential for errors. Their ability to pinpoint erroneous calculations and their sources in a timely manner, and the ability to audit such calculations, should allow such organizations to recover error-driven costs and comply with their costing and pricing objectives.

What we teach at WMU

Our students are going into a job market that is in most cases inundated with outdated tools and processes. Manual and labor-intensive operations will force our graduates to spend hours every week doing repetitive tasks that could be automated for much greater efficiency and accuracy, allowing them to focus on more fulfilling work. Much of their time will be spent on gathering and managing data, while much less will be spent analyzing and providing insights to support strategic decision-making, which carries much more value.

Traditionally, we have worked very hard to help our students develop very sophisticated data analytics skill sets to manage very large and complicated forms of information, but there seems to be a mismatch between the potential for our students to implement their skills in the job market and the realities that they face at their workplaces. For example, employers told us they place a premium on the following data-related skill sets (of which are built into our Business Analytics minor curriculum):

1. advanced Excel (power query & pivot) & macros;
2. data visualization (Tableau, Power BI & python w/ seaborn & matplotlib);

3. data mining/RapidMiner, machine learning and data science;
4. Python and Jupyter notebook (data analytics and statistical libraries such as pandas, numpy);
5. relational data models (Excel data model); and
6. graphic and statistical libraries (Seaborn, Matplotlib, Pandas, and Plotly).

While some of these capabilities can be seen as advanced, in reality, many current processes are based on partial data, spreadsheets, and email threads. There are alternatives rooted in technology that will allow for doing things better, faster, and more cost-effectively from an operational perspective.

When we asked many former students what the most prevalent technologies they used in their supply chain and business roles, the two most common answers were Excel spreadsheets and email. In fact, with all the innovation that has been taking place in information technology, Excel spreadsheets seem to be the one tool that is used predominantly in most companies—from the largest to the smallest.

Our research shows that many hiring managers do not have a full understanding of the required skill sets associated with our graduating students, and how they may be utilized optimally to serve the organizations that they'll enter. Our business students told us many times that their hiring managers valued only their traditional Excel capabilities (i.e., lookup functions, pivot tables, etc.), as they were hired by specific skill sets. Hiring managers greatly overlook the opportunities brought by critical thinking and incorporating additional analytical solutions (which are skill sets that many of our students possess). This makes it a bit difficult to sell the analytical techniques taught in classes that go beyond our Advanced Excel and Predictive Analytics courses.

Hopefully we do a better job of training our students to promote and prove their analytics and process development skills, and managers become more open to embracing the benefits of such processes and process automation (which may require a culture change in many organizations). Embracing and trying new technologies requires leadership that is willing to try new things and commit to their implementation. Otherwise, we keep using spreadsheets and email to manage very large and complicated data sets, which often presents challenges when scaling and growing businesses. •

5 STRATEGIES FOR ENERGY MARKET COST AND RISK REDUCTION

By Bob Wooten, C.P.M., CEP;
Mark Trowbridge, CPSM, C.P.M. MCIPS; and
Claudette Calder, MBA, CPSM

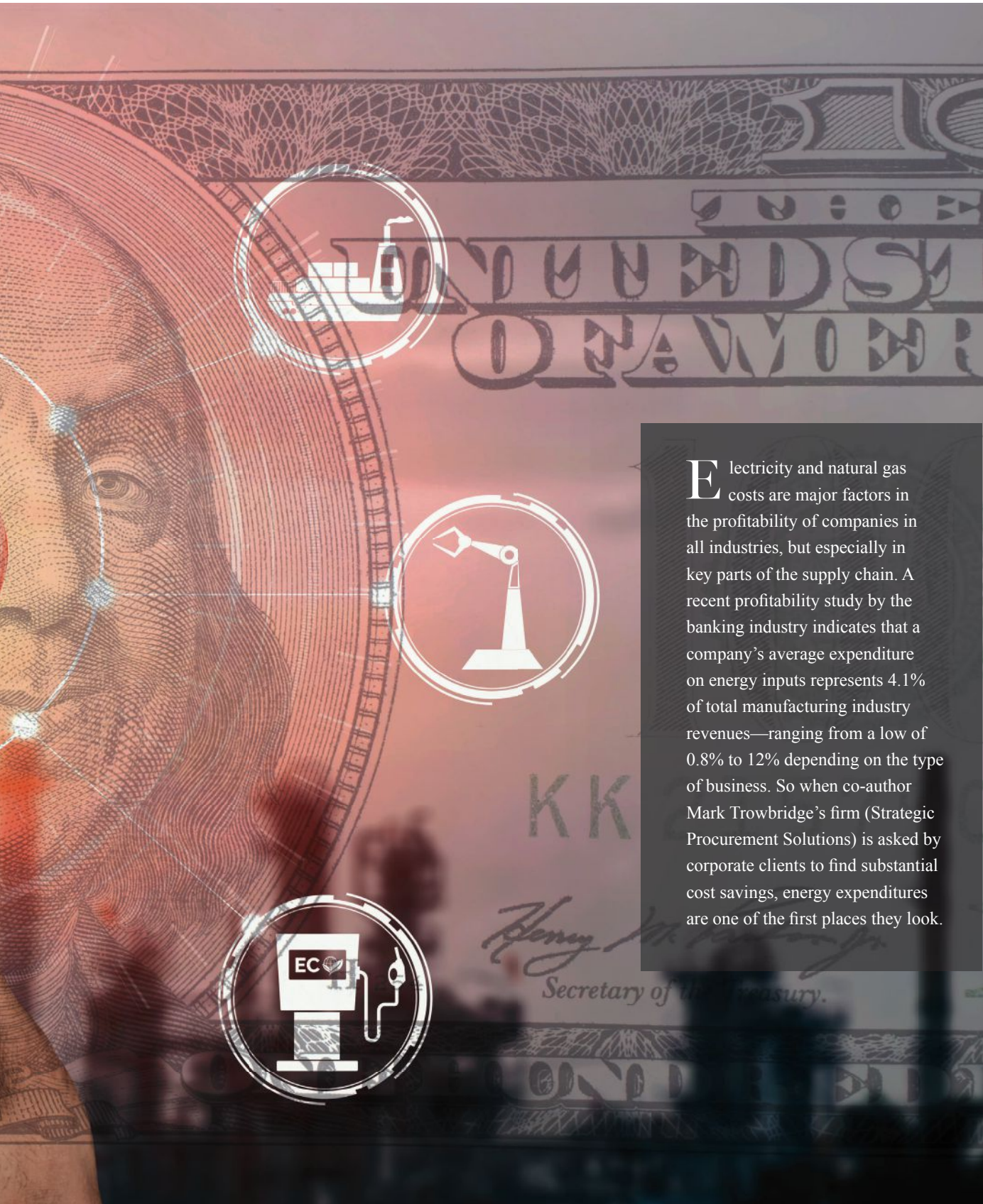
*“Ben Franklin may have discovered
electricity - but it is the man who invented
the meter who made the money.”*

- Earl Warren



Mark Trowbridge, CPSM, C.P.M., MCIPS, is president of Strategic Procurement Solutions and leading expert on negotiations. He can be reached at MTrow@bridge@StrategicProcurementSolutions.com.

Bob Wooten, C.P.M., CEP, is executive director of national accounts for Tradition Energy, an institutional broker of financial products and commodities. He can be reached at Bob.Wooten@traditionenergy.com.



Electricity and natural gas costs are major factors in the profitability of companies in all industries, but especially in key parts of the supply chain. A recent profitability study by the banking industry indicates that a company's average expenditure on energy inputs represents 4.1% of total manufacturing industry revenues—ranging from a low of 0.8% to 12% depending on the type of business. So when co-author Mark Trowbridge's firm (Strategic Procurement Solutions) is asked by corporate clients to find substantial cost savings, energy expenditures are one of the first places they look.

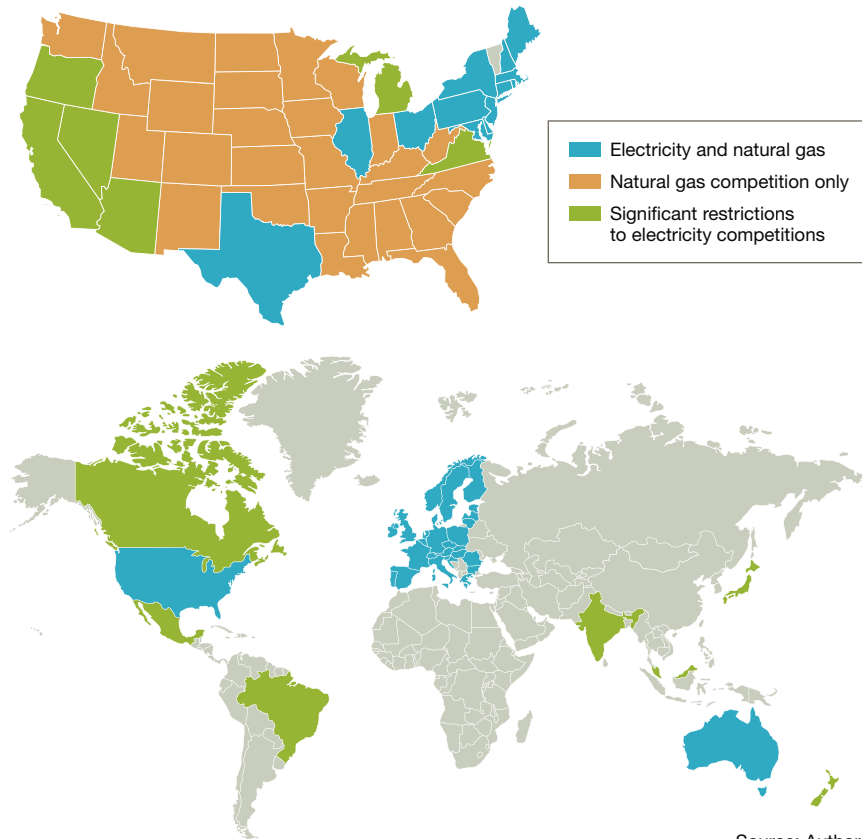
Claudette Calder, M.B.A., CPSM, is director of procurement for North America at Mitsubishi Chemical Group with expertise in global strategic sourcing and engineering. She can be reached at Claudette.Calder@mcgc.com.

The energy market is very complex. As Mark Twain once wrote: “The more you explain it, the less I understand it.” But hopefully, the techniques in this article can help your company gain a competitive advantage by reducing energy costs; whether through better procurement strategies, greater market pricing visibility, and/or demand reduction enabling less volume acquisition.

At a base level, energy procurement is complicated by the degrees of governmental regulation in each energy-buying region. In regulated markets where little to no choices exist to buy from different providers, some innovative strategies can still be deployed to control the volume, timing, and types of energy consumed. Doing this can generate measurable results—despite your company being handcuffed to a particular source of supply.

In deregulated regions, greater opportunities exist for company leaders to “compete” for electricity and natural gas. For many organizations, electricity represents a larger expenditure than natural gas. However, there can be significant spend on natural gas, especially when it is used as part of some manufacturing processes. When competition can be facilitated, co-author Bob Wooten, executive director of national accounts at Tradition Energy, relates that clients often can save between 10% and 25% of their total energy expense. In North America, a majority of the United States and significant portions of Canada are deregulated giving companies choices of multiple energy providers for electricity and/or natural gas inputs. Globally, deregulation of energy markets exists in Great Britain, across Western Europe, Australia, India, and portions of South America. (See Figure 1.)

FIGURE 1
Deregulated energy markets



Source: Authors

Energy is unlike anything else procured by most companies. Co-author Claudette Calder, who directs procurement for the Mitsubishi Chemicals Group in the Americas, has increased profit margins across the enterprise's 13 manufacturing plants on the continent by using Tradition Energy to compete its regional energy requirements. These efforts have resulted in \$10 to \$15 million in savings/avoidance for the group. Simultaneously, Calder was able to migrate a higher portion of energy purchases to renewable sources in accord with Mitsubishi Chemical Group's sustainability program goals, referred to as "KAITEKI"—the sustainable well-being of people, society, and planet Earth.

Recent changes in governmental policies concerning energy production and a push to move from fossil-fuel-generated power are further complicating procurement and utilization. Geopolitical events are affecting energy markets, whether cessation of gas pipelines, hindrance of tanker travel via the Suez and Panama canals, or realignment of Middle East alliances to name a few. Accelerated movement toward renewable energy sources and premature cessation of energy sources (like nuclear, coal, etc.) also stir the mix of challenges. All this at a time when the United States is exporting more and more of its domestically produced natural gas, in the form of liquefied natural gas (LNG), to international markets.

Can company leaders really improve profitability by reducing energy expenses? Absolutely. This article will describe five ways most businesses can reduce expenditures in today's complicated energy marketplace. They are as follows.

1. Create a formal energy procurement strategy.
2. Understand and follow the wholesale energy market(s).
3. Conduct a thorough pricing process and negotiate agreement terms.
4. Verify account enrollment and invoice accuracy.
5. Never stop monitoring markets; reporting and adjusting.

These techniques are especially meaningful to readers of *Supply Chain Management Review*

who consume energy in support of manufacturing, distribution, warehouse, and logistics activities. Even the increased recharging of electric materials handling vehicles and fleet cars/trucks requires more costly electricity.

Let's get started in exploring these five techniques.

Technique #1: Create a formal energy procurement strategy

A formal procurement strategy is an energy blueprint that addresses all locations of an organization. In areas where electricity or natural gas is deregulated, the focus is on procuring third-party supply. In regulated regions, the strategy can also address ways to minimize energy usage and ensure accounts are on the right tariff and rate class. Key factors to incorporate into your energy procurement strategy plan begin by summarizing energy exposure by facility (including all hedged and unhedged contractual positions). That's our starting point.

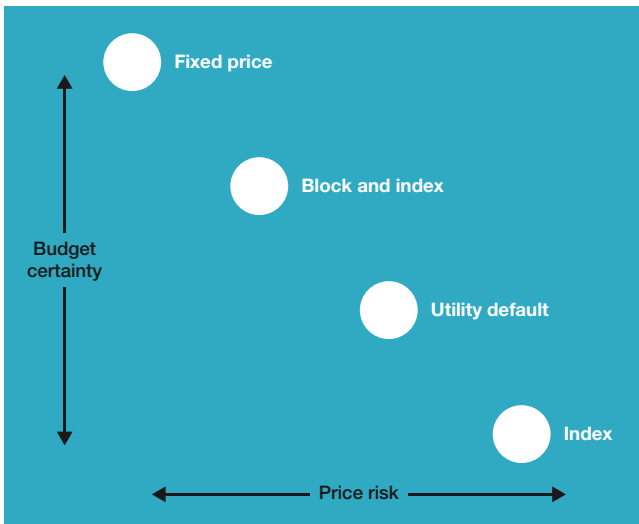
This requires some detective work. To act strategically in navigating today's market, your leadership team must understand its current situation regarding energy procurement at every company site; i.e. energy types used, provider source(s), current contractual commitments and obligations, usage volumes, usage patterns (seasonality, time of day, day of week), etc. Factors to investigate include:

- How has energy procurement been handled in the past and why?
- What is the risk appetite of the organization? Is there any flexibility?
- What are the procurement goals of the company? Budget certainty? Diversification? Lowest cost?
- Are there sustainability goals within the organization?
- What are company perspectives on hedging to mitigate exposure?
- What are the current contract expirations?

With this foundation of knowledge established, we can begin to identify preferred market pathways for bidding and contracting of energy. Four general pathways can be explored, and tailored, in approaching pricing structures for energy contracts (see Figure 2).

FIGURE 2

Pricing structures for energy contracts



Source: Authors

A fixed price contract for electricity or natural gas has a single rate to be paid by the customer for the duration of a contract. It's secure. But that rate is based on a volume commitment, and depending on how the contract is structured can expose the customer to higher rates if the usage goes over or under the contracted volume. Advantages of a fixed price contract include budget certainty and no price volatility. Attention must be paid to negotiating usage bandwidth because this could expose the customer to increased cost if they fail to achieve the committed volume (a real issue if there is a production line shutdown, labor dispute, etc.). The major disadvantage of this method is the risk that if energy prices fall, the customer may pay more for energy use than what he or she would have paid on the open market. Additionally, customers typically end up paying a premium to the supplier to hedge the supplier's market risk. Fixed price contracts are especially beneficial in increasing market conditions.

A *block & index* format contract for either type of energy offers slightly less price security but can take advantage of market decreases; whereby the buyer contracts for a portion or "block" of their energy at a fixed price. The remainder of their energy is purchased at pricing "indexed" to the market. With a block & index contract, customers often have flexibility in what percentage of their energy is purchased in blocks as well

as the duration/time of the blocks (specific options vary by market). Block & index allows the buyer the flexibility to take advantage of market dips and layer in blocks, thereby enabling a certain degree of budget predictability. It also allows customers to take advantage of demand reductions. This approach lessens the risk of price fluctuations while gaining the advantage of stability.

The *utility default* approach means that a customer doesn't contract with a third-party supplier for their energy, but rather just receives their supply from the local utility under its default tariff rate. The utility default approach is usually higher than rates available through third-party suppliers because you don't have the leverage of competition pushing down on prices. Utilities have their rates approved by the government and are established to keep

the utility whole in terms of the energy it buys and then resells to its customers. There is often price risk volatility as well; fluctuating depending upon the utility's cost to procure pass-through energy from other sources. These rates many times change monthly, meaning there is no certainty of what you will pay in the future. Although the local utility may seem like the safest option, it frequently tends to be more costly than other procurement sources for the same gas or electricity.

An *index* approach to energy pricing has rates 100% tied to pricing a particular index—thereby floating with the market. Competition of an index contract with different providers can set the starting point (and the provider's margins) competitively and drive savings in respect to the open market, but that entry point will be continually adjusted at agreed-upon times (typically monthly) according to movement in the market index to which it is tied. A fully-indexed approach is most-beneficial in a decreasing marketplace over the contract term. But it can perform worse than other formats in an escalating energy market.

Which is the best? It depends. The right energy purchasing strategy will reflect your company's goals and objectives while considering market conditions. Understanding where the market is going may

determine which contract format(s) you deploy in your energy procurement strategy. But how can we determine the future course of electricity or natural gas market movements?

Technique #2: Understand and follow the wholesale energy market(s)

This is where it gets more tricky. Because, in deregulated markets, natural gas and electricity are traded at a wholesale level; a giant step above the commercial retail market where companies contract for their supplies of energy from third-party providers. Wholesale markets don't just fluctuate every now and then—the wholesale prices of all forms of energy fluctuate many times each day based on large portions of the supply chain being contracted (bought), upstream factors like weather (a subzero cold front is sweeping across the Eastern U.S. as we're drafting this article, driving large fluctuations in both gas and electricity), geopolitical events, unplanned maintenance (remedial), or planned maintenance (preventive) which ceases production in a generation or transmission facility for a term.

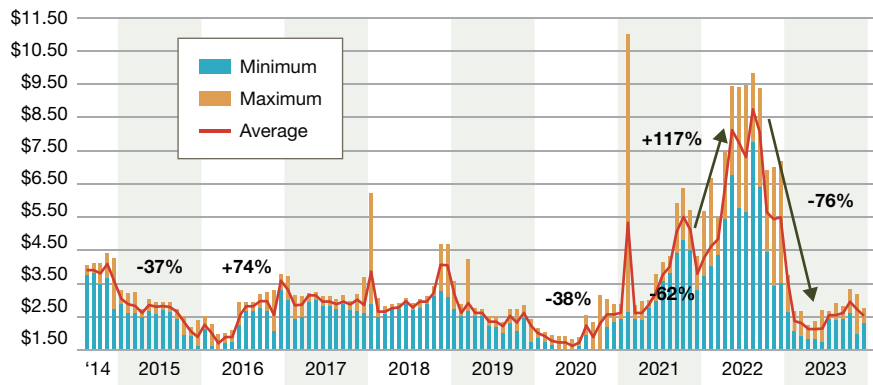
In a competitive market, the timing of a bid is just as important as choosing the best participants (energy providers) to participate in that bid. Whether a company desires a new energy contract to begin next week, next month, or two years from now, the ability to identify a low point in the wholesale market is key. Obviously, no one has a crystal ball to know exactly how a market will move, but one can utilize market intelligence to better understand not just where market prices are, but why they are moving in such a manner. With greater understanding and access to wholesale market data, you can increase the chances you secure energy contracts at

the right time in the market.

The following chart from Tradition Energy (part of the Tradition Group) illustrates the degree of market movement of a single energy element over a six-year period.

Consider the difference if your firm had bid a future 36-month fixed price contract for LNG in August 2022 compared to July 2023 when the average market price dropped by 76%? Over the six years of this energy type charted, market direction changes ranged between 37% and 117% (average delta of 72%). Even more dramatic was a three-month “peak” price near \$11/MMBTU (million British Thermal Units), more than 511% higher than the low dip just six months before. While your firm's commercial pricing agreement won't be identical to the wholesale price at the time of contract, it will vary commensurately to the wholesale market's

FIGURE 3
Energy market movement
\$/MMBtu



Source: Tradition Energy

levels. So timing is foundational to success.

Few procurement teams have resources to accurately review forecasts or to confidently predict when a particular market will dip. Too often, a company's facilities manager or energy buyer just runs a bid three to six months in advance of their current contract expiring. That's why Mitsubishi Chemical Group's category managers under Calder rely on insightful wholesale market knowledge to better time their market actions (including moving during a recent market dip to lock in

superior rates by extending an existing agreement).

Technique #3: Conduct a thorough pricing process and negotiate agreement terms

To “compete” your energy procurement needs, an understanding of the players in the market is critical. Fewer than half of corporations compete their energy needs, and relatively few do it with a high degree of sophistication using techniques like in this article. Energy is big business and there are many players representing their own interests. Billions of dollars change hands nearly every day and everyone wants a slice of the pie. Key players involved in energy contracting include:

- companies that buy and use the energy themselves;
- consultants/brokers who help companies identify and contract with energy sources;
- energy equipment (CapX) manufacturers and engineering firms who help customers contract for energy;
- energy utilities/producers who sell direct to customers and are represented by brokers;
- energy producers who sell directly in certain regions but also act as a broker representing producers/sellers in regions they don’t serve; and
- participants in energy markets who help customers evaluate all sources of supply.

The wild card in this group are the consultant/brokers. A theme which should be in every procurement leader’s toolbox is to “follow the money” (The President’s Men). To understand the energy market you must understand the money motivating behaviors.

While good energy advisors can often help a customer find better energy pricing; what is unknown to the customer is that many energy consultants/brokers are aligned with a very limited number of suppliers (sometimes just one). They are acting as a “broker” for an energy supplier and not

as an objective representative of the energy buyer. You need to ensure that all fees a broker charges are clear and transparent. Some brokers may bring a very limited number of offers to their customers because they want their connected provider to win the business.

Be careful and do your research. Broker payments influence many players in the energy market. If an advisor or CapX solution provider benefits from their customer contracting with a particular provider(s), that is usually not the best for the customer.

Additionally, an unseen rule followed by many suppliers in deregulated markets is that the first consultant/broker to contact them for a bid on behalf of a particular customer is the only channel they will then work through. If a second broker asks for a price quote, the supplier won’t give them a quote because they are now committed to providing pricing through the original channel. So that eliminates true competition from occurring at different entrance points to the market. Just as in the real estate and insurance industries, multiple brokers cannot represent the same client. When a customer tries to engage multiple brokers, it just leads to confusion and reduction of competition because an energy supplier will only work through one broker at a time. To prevent this from happening, we need to ensure that (i) we are not “bidding” energy needs to brokers (only RFP to suppliers); and (ii) if our firm is going to be represented by a consultant/broker we give the energy supplier a letter authorizing only that one representative.

So, how should energy be bid when we are certain the market is in a strategic dip? Several principles are important if you perform the pricing competition yourself.

- Most important is that your firm’s leadership must be “supplier neutral”—open and transparent to all participants.
- Confirm that all suppliers are including the same components in their pricing (for

example, a natural gas agreement may not include final pipeline delivery to a site—referred to as the “burner tip”).

- Ensure each supplier is meeting your objectives and all offers and terms are truly comparable; “apples to apples” basis.
- Identify all providers that compete in the region.

But do not allow bids from players who don’t have experience supplying energy to commercial/industrial entities like yourself. Remember that many players in a particular region selling energy are acquiring blocks of energy at different points in the wholesale market—at different cost levels. The same provider is not always the most-competitive every time. That’s why bidding to all key players at the right market timing will be key to your success in securing the best proposal.

Make sure you carefully pre-qualify all energy suppliers. There are hundreds of energy suppliers in today’s markets. With so many suppliers you must apply a rigorous vetting process, continually evaluating each firm against a defined list of criteria, including your prior experience with particular providers, their financial strength and stability, their geographic coverage, competitive prices and terms, and reasonableness of contract terms, and responsiveness of customer service. These conditions, by the way, need to continue beyond initial vetting and be hallmarks of monitoring in a subsequent contractual relationship.

Once pricing options have been identified in the format best-suited to the anticipated energy market, a prudent buyer should conduct a “what-if” sensitivity analysis to compare proposed offers to likely scenarios anticipated in your corporate three to five-year planning. This should include the effect of market

FIGURE 4
Bid summary

Supplier Fixed Price Comparison / Savings and Budget Analysis*					
Terms	12 months	24 months	36 months	48 months	60 months
Start Date	Jan-21	Jan-21	Jan-21	Jan-21	Jan-21
End Date	Jan-22	Jan-23	Jan-24	Jan-25	Jan-26
KWH Usage	9,455,713	18,911,426	28,367,139	37,822,852	47,278,585
CONSTELLATION	0.03983	0.04111	0.04036	0.04004	0.04038
Savings over CR	\$24,301	\$24,396	\$57,869	\$89,262	\$95,503
Savings %	3.8%	1.9%	3.0%	3.5%	3.0%
Est. Utility Charge	0.02500	0.02500	0.02500	0.02500	0.02500
Est. Bundled Rate	0.06483	0.06611	0.06536	0.06504	0.06538
Est. Annual Cost	\$613,014	\$1,250,234	\$1,854,076	\$2,459,998	\$3,091,073
CREDIT: Pending					
SWING %: 100%					
PAY TERM %: Net 30					
ENGIE	0.04102	0.03975	0.03681	0.03835	0.03818
Savings over CR	\$13,049	\$50,115	\$158,572	\$53,183	\$199,516
Savings %	2.0%	3.9%	8.3%	6.0%	6.3%
Est. Utility Charge	0.02500	0.02500	0.02500	0.02500	0.02500
Est. Bundled Rate	0.06602	0.06475	0.06181	0.06318	0.06318
Est. Annual Cost	\$624,266	\$1,224,515	\$1,753,373	\$2,386,078	\$2,987,060
CREDIT: Pending					
SWING %: 100%					
PAY TERM %: Net 20					
MP2	0.04180	0.03791	0.03918	0.03881	0.03879
Savings over CR	\$5,673	\$86,803	\$91,342	\$135,784	\$170,676
Savings %	0.9%	6.8%	4.8%	5.3%	5.4%
Est. Utility Charge	0.02500	0.02500	0.02500	0.02500	0.02500
Est. Bundled Rate	0.06680	0.06281	0.06418	0.06381	0.06379
Est. Annual Cost	\$631,642	\$1,187,827	\$1,820,603	\$2,413,476	\$3,015,900
CREDIT: Pending					
SWING %: 100%					
PAY TERM %: Net 25					
TXU	0.04216	0.03992	0.03858	0.03630	0.03749
Savings over CR	\$2,269	\$46,900	\$108,362	\$230,719	\$232,138
Savings %	0.4%	3.7%	5.7%	9.1%	7.3%
Est. Utility Charge	0.02500	0.02500	0.02500	0.02500	0.02500
Est. Bundled Rate	0.06716	0.06492	0.06358	0.06130	0.06249
Est. Annual Cost	\$635,046	\$1,227,730	\$1,803,583	\$2,318,541	\$2,954,438
CREDIT: Pending					
SWING %: 100%					
PAY TERM %: Net 20					

Source: Authors

movement in cases where the energy supply contract has an index or floating component to it.

Finally, with the best offer chosen and a supplier selected, the energy agreement negotiation process begins. Perform this process knowing that most providers’ agreements do not favor the customer. Remember, we are not too far removed from the days in which all energy supply was regulated, and you had to deal with standard utility monopolies. But there is often room for improvement of key terms like:

- timing and nature of payment;
- termination rights (especially important in light of force majeure events);
- overage/underage pricing;
- usage bandwidths; and
- material business or economic changes.

Most importantly, pricing efforts should seek to maintain solid relationships with a stable of pre-approved suppliers to use in future procurement actions. Tradition Energy has identified and vetted hundreds of energy providers in the firm’s history who participate in its online bidding platform. This has resulted in a large pool of producers competing for business in a truly objective environment, with more than 110 RFPs being conducted each week for customers. That knowledge and activity in the wholesale market gives the firm insights into both the wholesale markets and local commercial retail market pricing, something that has benefitted Mitsubishi Chemical Group.

“Having advanced insights about market movements and the ability to get immediate pricing quotations from all suppliers in a region within several days has facilitated impressive savings for Mitsubishi Chemical Group facilities in the Americas,” Calder says.

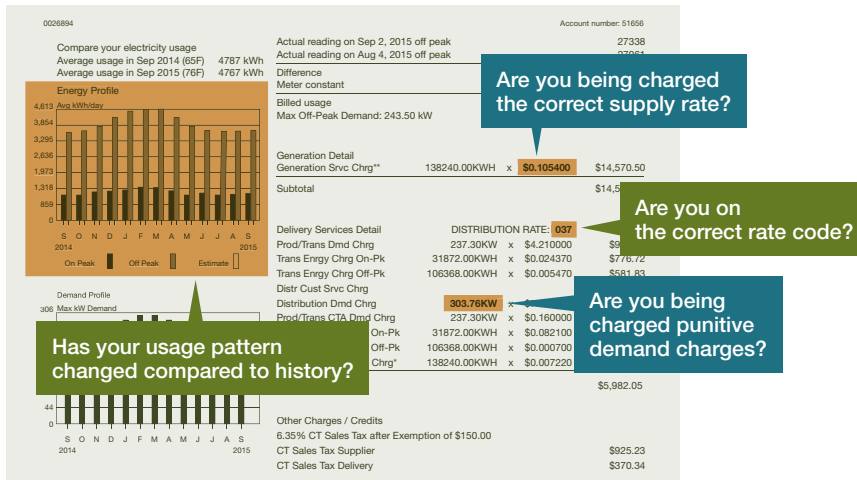
Technique #4: Verify service selection enrollment and invoice accuracy

Once the agreement is executed and confirmed by the energy provider, several steps must be taken. These are critical because often energy providers set accounts up inconsistently with the contract. This can result in incorrectly high billings that often are never caught by the customer.

A common mistake is to fail to verify that all the locational accounts are transferred properly into the new agreement. This error means that the beneficial contract rates are not experienced by all locations. If these errors are not caught immediately on the front end, they will grow into very large over-payments over several years. Other errors include:

- incorrect energy rates themselves;
- utility multiplier errors and replacement readings;
- estimated rather than actual readings;
- competitive supplier

FIGURE 5
Invoice review



Source: Authors

- benchmark misapplications;
- sales tax errors that don't properly incorporate industry exemptions for firms involved in manufacturing, healthcare, or research & development;
- incorrect energy rates due to overage/underage usage variations;
- index references and formula calculations;
- suboptimal legacy pricing rates; or
- virtual net metering credits misapplied.

Enrollment must be verified and skilled eyes should periodically review ongoing invoices from energy providers. Even billings from a default utility often contain material errors.

Technique #5: Never stop monitoring markets; reporting and adjusting

Ongoing, effective energy procurement requires frequent monitoring of energy markets, reviewing hard data about our energy utilization and costs, and adjusting our strategies to adapt to changing conditions. Obviously, anticipated changes in the cost of natural gas or electricity may offer opportunities to re-contract at preferential pricing... failure to act on market opportunities means missing potential savings.

Many other profit opportunities can also be explored through energy use reductions, self-generation and peak usage timing (demand management), which can add to these procurement benefits. For example, many energy purchase agreements contain rates which vary by time of day; penalizing the buyer for energy use during peak times (for example 4 p.m. to 9 p.m. when grid usage is highest). So, for a distribution company running a fleet with increasing numbers of electric forktrucks and even semi delivery trucks, put a timer on the recharging stations so electrical recharges don't

MANAGING YOUR ENERGY COSTS

Bob Wooten and Mark Trowbridge joined Supply Chain Management Review Editor in Chief Brian Straight on his Talking Supply Chain podcast to explain how businesses can better manage their energy costs.

Take a listen.



begin until after the peak period for instant savings.

If you need help with the five techniques in this article, it can be invaluable to use an expert advisor. But do seize the opportunity to reduce energy expenditures.

Inventor Thomas Edison famously said: “Opportunity is missed by most people because it is dressed in overalls and looks like work.” Business leaders who take time to “work” consistently through the five techniques in this article can secure substantial cost savings in their energy procurement costs—and thus increase their company’s profitability. •



PROCUREMENT BEST PRACTICES

By Brian Straight,
editor in chief, SCMR

A guide to getting started with four trends affecting procurement in 2024.

Prourement is transforming. Sustainability, cost pressures, labor challenges and artificial intelligence are creating a new procurement order. Gone are the days of blindly spending with single suppliers, replaced by a complex network of diverse global suppliers. Gone are the tried-and-true management methods, replaced by technological advancements that require additional education and upskilling the workforce. Gone are the days of procurement leaders “that just know what to do,” replaced by workers leveraging technology to fill in the gaps.







The procurement business is changing. McKinsey & Co. recently identified four megatrends in procurement that touch on some of these changes. They are as follows.

1. Multipolar world
2. Artificial intelligence/machine learning
3. Demographic shifts
4. Transition to low carbon energy

McKinsey, in its report, “A new era for procurement: Value creation across the supply chain,” noted the disruptions of the past several years and the impact they have had on procurement.

“It’s increasingly clear that the resulting shifts in how people live, work, and play are not temporary but structural, beginning a new economic era characterized by volatility, regionalized supply chains, AI dominance, and talent scarcity,” it said. “To succeed in the new environment, organizations are currently embedding agility, technology, and innovation into every aspect of their value chains ... consequently, chief procurement officers who have successfully navigated uncertainty in recent years have become indispensable partners to the executive suite.”

In this month’s Spotlight On feature, we identified four top trends in procurement (there are many others, which we have written about extensively online; you can find them here: scmr.com/topic/category/procurement) and offered a best practice recommendation for each.

Increase technology investment

Amazon Business released its 2024 State of Procurement Report last November and in it, 98% of respondents said they are planning investments in

analytics and insights tools, automation and artificial intelligence. That is not a surprise. According to research from Gartner, top-performing supply chains are investing in artificial intelligence and machine learning at twice the rate of their lower-performing peers.

Keelvar, which provides strategic sourcing solutions and software, noted that 59% of procurement and sourcing teams plan to adopt advanced technology, including artificial intelligence and automation

technology, with 42% saying those are their top tech items. “2024 will be the year when true leaders and innovators get started with AI and automation and begin to separate from the pack,” Alan Holland, founder and CEO, said. However, KPMG noted that only 29% of respondents to one of its

surveys were adopting more than 50% of the features from their cloud software-as-a-service provider.

Best practice: Dive into the AI pool and don’t be afraid to get your feet wet. If your company doesn’t have the resources to do this, there are third-party options available to help get started.

Improve spend transparency

According to Michal Cukier, a veteran procurement manager currently working for a major CPG company, “between 50% and 90% of a company’s overall expenditures” come from purchased goods and services, making “purchasing ... a key contributor to the net profit margin of the organization.” Additionally, a Globality report from 2023 noted that eight of 10 requests for proposals were still taking place via emails and spreadsheets, and that 82% of procurement leaders acknowledge their indirect spend is not well managed.

“Top-performing supply chains are investing in artificial intelligence and machine learning at twice the rate of their lower-performing peers.”

Indirect spend is estimated to equal between 20% and 40% of revenue, Globality added. The most promising opportunities are spend analytics and contract life-cycle management, the firm said. Both of these areas offer access to accurate data that can enhance the effectiveness of procurement personnel. Category management is another area for Gen AI adoption highlighted by 50% of respondents.

Best practice: Technology is providing visibility into spend management like never before, but with nearly 80% of RFPs still taking place via emails and spreadsheets, getting data clarity and visibility is difficult. Invest in digital systems, automate where possible, and analyze the resulting data to make more informed decisions.

Build resiliency

The events of the past few years have driven home the importance of supplier diversity to build supply chain resiliency. There are many ways to do this—build better supplier relationships, find and engage with new suppliers, invest in technology, and make the necessary “trade-offs.”

“The reality is that it simply won’t be feasible to make a supply chain 100% resilient, sustainable, responsive, and still cost-effective,” a Bain & Company report noted. “That said, making only incremental changes won’t be sufficient to compete. Reinventing supply chains for the new world order clearly requires making more complex trade-offs than most operations teams have ever encountered.”

Bain suggests winning the “micro-battles”—which represent the various parts of the overall problem. Assign a small group to solve those problems and then bring those actions to scale, it advised. It’s not a fool-proof method, but it does offer hope.

Best practice: Don’t be afraid to engage your supplier base in difficult discussions about their resiliency. No matter how much you might try, the risk in your supply

chain starts with your suppliers and their supply chains. Gain visibility into the entire process, and make adjustments (i.e., diversification of supplier base) as needed.

Implement benchmarking

Amid pressure to cut costs and build more resilience, benchmarking often slips by the wayside. Don’t let it. “The focus of benchmarking the procurement process is to measure its current results and see how they can be improved,” stated a LinkedIn blog post from procurement consultancy eXceeding. “By looking at the best practices, an organization can evaluate the process, procedures, and policies they have in place. Benchmarking first starts when an organization sets a baseline from its current performance, which can then be used to see how it compares to its competitors or peers.”

eXceeding suggests benchmarking cost effectiveness, staff productivity, process efficiency, cycle time, and quality. Each individual organization may also have additional aspects of the procurement process worth benchmarking, and benchmarking should also extend to suppliers.

Benchmarking helps an organization understand whether its processes and spend are in line with industry averages, and if not, why not. Adjustments, including cost control measures, can’t be effective without a benchmark to know whether they really are needed. The wrong adjustments can do more organizational harm than the savings they will generate.

Best practice: Identify, collect and analyze, implement, and evaluate. While internal benchmarking is helpful, it’s important to conduct external benchmarking to avoid bias. If you can afford it, it’s never a bad idea to get an outsider’s view, so engage with consultants who can help identify industry best practices you should be implementing. •

Long-term network and capital planning is dead

A traditional approach to network and capital planning isn't agile enough to keep pace with commercial markets where disruptions outnumber long-term norms. Successful planning for sustainable growth and profit requires new thinking and new models.

By Steve Mehlretter, Steve Cunix, and Paul Cho

Traditional long-term network and capital planning is dead. Or, more correctly, it's past time to lay the traditional approach to network planning down to the rest it so richly deserves. This doesn't mean companies shouldn't plan long-term, just that they need to do it differently.

This difference needs to start with taking a comprehensive end-to-end (E2E) look at product portfolios in conjunction with overall supply chain networks, determining what performance and capabilities are required for meeting and exceeding service, resilience, cost, sustainability, business continuity, and related objectives. Done right, this leads to making better, more informed investment decisions with respect to deploying capital on supply chain assets such as manufacturing lines, factories, and distribution capacities.

Also, as the cost of capital and asset prices has increased, having a

long-term supply chain and capital plan provides the roadmap and flexibility in prioritizing decisions as demand dynamics evolve and supply-side dynamics and shocks unfold.

Today, we seem to be seeing some stabilization of interest rates and the clearing of COVID-related backlogs. But this doesn't mean we are back to anything approaching, "business as usual." Climate-related events are having greater and more frequent impacts (e.g., slowing traffic through the Panama Canal) and proxy battles continue to pop up across the globe. Threats of future global supply chain disruptions remain a

Steve Mehlretter is a partner in the Strategic Operations practice.

He can be reached at

Steve.Mehlretter

@kearney.com.

Steve Cunix is a partner

in the Consumer and

Retail practice.

He can be reached at

Steven.Cunix

@kearney.com.

Paul Cho is a manager in

Consumer and

Retail practice. He can

be reached at Paul.Cho

@kearney.com.

question of when versus if.

If all of this isn't enough to get your attention, new and emerging equipment technologies, advanced digital solutions, and sustainability commitments constantly change the competitive landscape, especially because extended global equipment lead times remain a complication for many manufacturers/producers.

The bottom line is that companies lacking the awareness, agility, and/or motivation to recognize and embrace change and act on it—starting with rethinking both their supply chains and capital deployment strategies—will fall behind.

The voice of the Oracle

The oldest public strategy advice was carved sometime during the 5th century BCE above the entrance to the Temple of Apollo at Delphi. It read: “Know thyself.” It's still good advice, starting with your product portfolio.

Your portfolio review should include a whole series of considerations around growth, M&A activity, productivity, resilience, sustainability, the potential role of existing and emerging technologies, potential implications of near- and reshoring if appropriate, and understanding consumers in B2C companies, customers in B2B companies, and the competition.

Knowing where you're going is as important as knowing yourself

Businesses put a lot of focus on the products, customers, and markets they want to serve, but perhaps not enough emphasis on how they want to get there. Before you execute any long-term business strategy, it's critical to establish guardrails and guiding principles for how your value chain will execute your commercial vision.

Odds are, you will end up somewhere in between these three operational archetypes.

- 1. Asset Light.** Reducing Capex and outsourcing as much as possible. This requires a higher reliance on contract manufacturers and third-party logistics (3PL) providers, potentially leading to lower operational agility and higher working capital via additional days of inventory on hand (DoH).
- 2. Ruthless cost competitor.** Adopting a strategy focused on maximizing asset utilization, and minimizing total operating expense while optimizing the financial returns of fixed and working capital.
- 3. Relentless service provider.** This approach leads with service-level performance at the likely expense of higher costs, potentially underutilized assets, and likely higher inventory levels.

The guardrail you chose clearly affects the relative potential of your network and capital strategy. These operational archetypes set the guardrails around how you want to operate, which ultimately sets guardrails around how you allocate capital, set up your supply chain, and where to prioritize your capital investments.

Pushing past profitability

Profitability will always be critical in business, but moving forward focused on profit alone will not be sufficient in a commercial world where corporations are required to do much more than function as one-dimensional profit-generating engines.

New capital allocation models require weighing a series of trade-offs between growth, productivity, resilience, and areas such as sustainability where investments need to be

made now to meet commitments 10 years to 15 years out. These new metrics and demands don't just affect ESG strategies. They cut across every aspect of a business' strategic planning activity and execution schedule.

A virus causing nearly two years of supply chain turmoil is striking, but so are climate challenges affecting food, energy, shipping, and environmental refugees; trade tensions; regional conflicts; and guerrilla activities. Companies must mitigate liabilities on an ongoing basis amidst constant disruptions.

Designing for resilience uses tools such as scenario-based modeling of supply chain exposure and footprint, and the age and risk profiles of existing assets. This ensures business continuity and facilitates agility for growth within the network. One concrete example is minimizing the single-county risk challenges prevalent with modern global supply chains. Nearshoring and/or reshoring also need to be part of any supply chain scenarios that a company evaluates.

Ask yourself: When it comes to productivity—beyond just adding capacity to meet new demand—how are investments actually adding to the overall unit economics? Understanding this helps fund other current and future projects that are sometimes hard to put dollar values on, like investments in sustainability. For example, investing in vertical integration projects may not only help introduce more control and flexibility to your supply chain/value chain, but may also help internalize the frequently expensive co-manufacturing/co-packing costs.

Sustainability and environmental standards are growing and globalizing faster than ever, requiring many companies to invest in new technologies to reach sustainability

commitments and targets that are years away. More importantly, they need to not make near-term capital decisions that may effectively lock in poor environmental performance for years to come because they didn't look at those requirements now.

The view from inside the crystal ball

And then there is the consumer.

No longer the passive buyers of mass market and mass-advertised products, consumers are getting increasingly engaged with—and vocal about—the goods they buy and the companies that produce them, carefully scrutinizing ingredients, sourcing, packaging, and corporate policies.

Rather than one-dimensional, end-all-be-all commercial targets, you should create several demand scenarios based on both internal and external factors. These scenarios should be near-continuously updated as things change.

Each of these scenarios should incorporate multiple tools including consumer/customer preferences, macroeconomic conditions, the existing and potentially emerging competitive landscape, and an executable competitive positioning that will dynamically change demand.

Ultimately your supply chain network is, or at least ought to be, built to meet and enable your consumer demand in the most efficient way possible against the supply chain archetype you choose.

One is never done

Whatever your approach, it is important to not think of strategic planning as a “one-and-done” exercise, but rather as part of a continuous process that integrates into E2E planning from long-term planning (multiple years out) to sales and operations planning (quarter to year out) to sales and operational execution (immediate quarter).

Of course, you have to begin somewhere so it is critical to establish a roadmap with milestones,

metrics, and guidelines. You can't anticipate everything, but that doesn't mean that comprehensive planning isn't possible, only that you have to be agile and flexible enough to quickly respond to challenges and disruptions as they occur.

Equally critical is a deep understanding of the assumptions/projections you are making to establish this initial roadmap. As things play out in real-time, you can readily see which assumptions are changing and, because you understand how they informed your initial roadmap, you can quickly pivot with the new information. Without this deep understanding, organizations tend to restart their analysis from the beginning and frequently lose out on opportunities because they can't pivot their plan quickly enough.

Thinking and planning this way allows you to, for example, work with equipment OEMs on locking in capacity without having to finalize exact technology and/or manufacturing lines until the last possible moment. And this can't be effectively done in a vacuum. You need to encourage your supply chain partners, vendors, and anyone else engaged in helping you go to market to adopt this approach or—at the very least—communicate your long-term plan to them to facilitate joint business planning.

Why now, why not later?

At this point some readers—not sensing a “burning platform”—may argue that this is a valuable theoretical discussion for another day. We, on the other hand, smell smoke.

As we said in the beginning, four major tailwinds are fueling the case for action in developing E2E networks and capital strategy.

1. The cost of capital and asset prices has increased with higher interest rates. A

long-term capital plan provides flexibility in prioritizing capital decisions across business units and portfolios.

2. Rising tensions in global trade and regulatory dynamics lead to longer supply lead times and supply disruption risks. E2E network strategy builds globally resilient supply chains leveraging nearshoring and reshoring.
3. Developments in new equipment technology and sustainability commitments are constantly changing the competitive landscape. E2E network strategy mandates a defined pipeline to proactively build new capabilities.
4. Thanks to COVID-related backlogs, equipment lead times across global OEMs have significantly increased. An E2E network strategy and capital plan enables businesses to deal with longer turnarounds and plan in advance.

Not a conclusion, but a new beginning

Adopting a “portfolio view” of your organization isn't hard, but it does require a relentless focus on long-term objectives, prioritizing long-term goals over short-term gains, and considering the full lifecycle costs and potential future uses of your investments. It also forces the many siloed organizations and functional teams to cooperate and coordinate cross-functionally.

Again, done right, the ongoing, periodic review and maintenance of a long-term supply chain and capital plan means an organization stays in lockstep on where it is going, how it intends to achieve goals, and how it will quickly pivot as assumptions don't meet realities and the world continues to throw challenges and opportunities their way. •

What supports accurate spend analysis?

Marisa Brown is

senior principal

research lead, supply

chain management,

APQC. She can

be reached at

mbrown@apqc.org.

Improve spend analysis through better data management and automation.

By Marisa Brown, senior principal research lead, supply chain, APQC

Supply chain organizations are always looking for greater visibility into spending. Leaders are dedicating additional resources to spend management, which seeks to answer the following three questions for an organization.

1. *How much are we spending?*
2. *With which suppliers?*
3. *Are we getting what has been promised?*

Spend analysis enables procurement professionals to identify the value of spending with key suppliers. It also allows staff to consider whether the organization receives the best value for its purchases.

To conduct spend analysis, procurement staff need reliable data from sources across the enterprise. Usually, the process involves time-intensive data activities such as data cleansing. Increased automation and improved data management practices can streamline these efforts, leading to faster and more accurate spend analysis.

APQC recently used its 2024 Supply Chain Priorities and Challenges research

and data from its Open Standards Benchmarking in Procurement to identify how organizations are conducting and improving their spend analysis. The data shows many organizations are embracing the idea of automation for spend analysis tasks. However, they must ensure that they have set a firm foundation for the use of automation through standardization, governance, and data management.

Better data management is vital

Supply chain professionals recognize that data management is having (and will continue to have) a major impact on supply chains. For its annual survey on supply

chain priorities and challenges, APQC asked supply chain professionals to indicate the trends that will make the most impact on supply chain organizations over the next three years. Data management was among the top three trends identified by survey respondents.

Supply chain professionals understand the importance of reliable data for the many activities touching supply chain: from demand forecasting to spend analysis to building better supplier relationships. In a related survey result, nearly half of supply chain professionals name lack of governance and poor data management as a major obstacle to the improvement of their supply chain processes.

These results emphasize the need for formal accountability for data governance to ensure the availability and quality of supply chain data. Poor governance and data management practices can quickly lead to problems. Aside from inefficiency, inaccurate data can lead to inaccurate forecasts and can undermine any benefits offered by new procurement technology and damage efforts to build stronger supplier relationships.

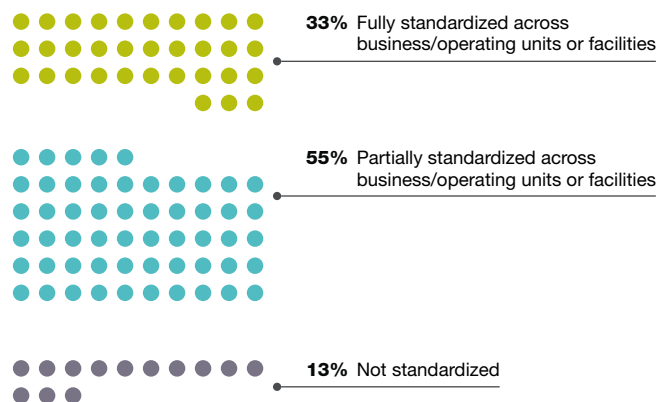
A first step: Standardize commodity coding

Standardized commodity codes can improve data governance. Although most organizations use commodity codes to some degree to help categorize purchases, only one-third of supply chain teams are using these codes to their full extent (Figure 1). Organizations must ensure they have protocols in place so that codes are used consistently across the enterprise. This ensures that procurement staff can conduct accurate spend analysis to identify spending patterns, areas for supplier consolidation, and areas for potential savings.

Organizations have the option of adopting an external, widely used commodity code system or developing one in-house. External systems require less work to adopt, and their broad use enables companies to benchmark against other organizations. On the other hand, using a system developed in-house gives the organization the ability to customize the coding taxonomy so that it aligns with the unique needs of the business.

FIGURE 1

Standardization of commodity coding system for purchase of materials



Source: APQC

Automate spend analysis and data cleansing

Process automation can help organizations optimize standardized activities and data aggregation. Many organizations have already started using robotic process automation (RPA) within procurement and are in the stages of implementing, operating, or optimizing its use. APQC considers spend analysis and data cleansing to be ideal processes for using RPA. What makes these processes good starting points is:

- » the number of rules-based transactional tasks involved,
- » the few exceptions involved,
- » the potential cost savings,
- » the frequency of occurrence, and

» the critical need for accuracy.

Specifically, organizations can automate a large proportion of the spend analysis tasks related to collecting, cleansing, and classifying procurement data. In fact, many organizations are taking advantage of the benefits resulting from automating spend analysis. As shown in Figure 2, 91% of organizations have at least some degree of automation for their spend analysis, and nearly half have automated this process entirely.

Data cleansing is part of spend analysis, and it consists of several tasks:

- » gathering and harvesting structured and unstructured data from disparate sources,
- » cleansing and pre-processing data,

“Compared to the number of organizations that have fully automated their spend analysis, slightly fewer use full automation for data cleansing.”

- » removing duplicates, and
- » converting to a uniform format to make records comparable.

All of these have the potential to be automated, with the results immediately loaded into spend profile reporting as well as other key procurement analysis, dashboards, and reporting feeds.

As shown in Figure 3, nearly all organizations have some degree of automation for data cleansing, and 47% have it fully automated. Compared to the number of organizations that have fully automated their spend analysis, slightly fewer use full automation for data cleansing. APQC strongly recommends organizations consider fully automating data cleansing tasks. Given the significant amount of procurement

data inputs, automation enables organizations to quickly collect and clean data while minimizing errors. Data Cleansing: Degree of Automation.

FIGURE 2

Spend analysis: Degree of automation

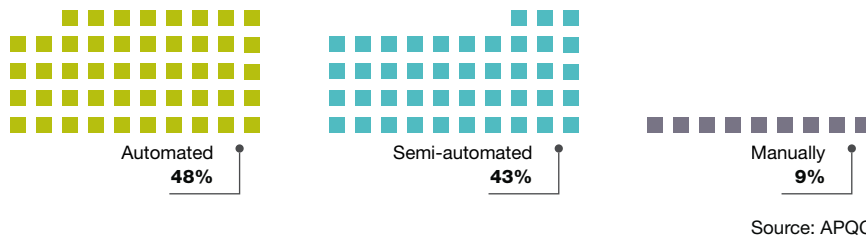
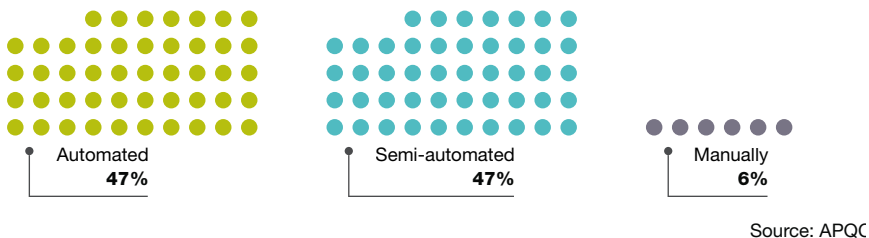


FIGURE 3

Data cleansing: Degree of automation



The impact of better data quality

Most supply chain professionals recognize the positive impact that quality data makes on spend analysis. As shown in Figure 4, over a quarter report that having access to quality data makes a very

significant impact on the speed and accuracy of spend analysis.

Interestingly, 13% of supply chain professionals believe that data quality has minimal or no impact, and 27% indicate it has only a moderate impact. When supply chain staff do not see a positive impact resulting from data quality, it calls into question their organizations' use of standardized data management and data governance practices. As noted, the use of technology is only as good as the processes that it supports. Establishing solid data management and governance is a foundational step that organizations must not overlook.


Prioritize strategy and consistency

There is more pressure than ever before to maximize the impact of procurement spend and identify areas for improved efficiency. Well-managed spend analysis offers organizations the opportunity to achieve these goals, and technology provides a way to complete many of the tasks in this process automatically. However, there are multiple levels of tasks that organizations must do effectively in order to best inform the spend analysis process.

Accurate analysis requires accurate data. At the heart of effective spend analysis are robust, strategic data governance and management guidelines that are implemented consistently. These can then inform the activities of collecting and storing procurement data from various sources across the enterprise.

Robotic process automation can reduce the amount of time spent cleaning and analyzing data for the spend analysis process. As with any technology, there is a need for human judgment in creating guidelines for the use of automation within an organization. Careful consideration

will yield accurate data while reducing the time and human effort needed for the spend analysis process.



“Accurate analysis requires accurate data. At the heart of effective spend analysis are robust, strategic data governance and management guidelines that are implemented consistently.”

Even with taking these steps, organizations must remember to conduct maintenance on their data management practices. Regular reviews of data availability, quality, and security will ensure that companies get the most benefit from their data, yielding the best analysis for making forecasts and decisions. •

About APQC

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

Top 50 Trucking: **ACCEPT THE CHALLENGE AND ADAPT**

The best fleets, buffeted by higher costs and now increasing environmental mandates, manage to stay ahead of competition through vision, strategy, and execution. But in the end, executives say it's their people who make the biggest difference.

BY **JOHN D. SCHULZ**, CONTRIBUTING EDITOR

To an outsider, the Top 50 trucking companies don't seem to change much over time. However, to those inside running the best companies in this \$900 billion industry, change is occurring at breakneck speed.

Here in the early part of 2024, the biggest change coming is the push for “decarbonization” of an industry that was built on the diesel engine invented by Germany's Rudolph Diesel in the late 1890s. But that workhorse of an engine—diesels in heavy trucks often run up to

Top 25 LTL Carriers

(Annual revenue, including fuel surcharges)

Rank	Carrier name	2022 Revenue (\$ million)	2023 Revenue (\$ million)	YoY % Change 2022-2023
1	FedEx Freight	\$10,186	\$9,106	-10.6%
2	Old Dominion Freight Line	\$6,177	\$5,805	-6.0%
3	XPO Logistics	\$4,645	\$4,671	0.6%
4	Estes Express Lines	\$4,405	\$4,218	-4.2%
5	R+L Carriers*	\$2,864	\$3,070	7.2%
6	Saia Motor Freight Line	\$2,792	\$2,881	3.2%
7	ABF Freight System	\$2,951	\$2,810	-4.8%
8	TransForce (US only)	\$2,957	\$2,375	-19.7%
9	Southeastern Freight Lines	\$1,741	\$1,685	-3.2%
10	Central Transport Int'l*	\$1,236	\$1,261	2.0%
11	Averitt Express	\$1,288	\$1,165	-9.5%
12	Dayton Freight Lines	\$1,056	\$1,035	-2.0%
13	Pitt Ohio Transportation Group	\$912	\$909	-0.3%
14	Forward Air	\$969	\$846	-12.7%
15	AAA Cooper Transportation*	\$727	\$764	5.1%
16	A. Duie Pyle	\$568	\$570	0.4%
17	Roadrunner Transportation	\$400	\$410	2.5%
18	Daylight Transport	\$389	\$374	-3.9%
19	Oak Harbor Freight Lines*	\$338	\$320	-5.3%
20	Ward Trucking Corporation	\$256	\$253	-1.2%
21	Cross Country Freight Solutions	\$187	\$207	10.6%
22	Midwest Motor Express*	\$153	\$160	4.6%
23	Magnum LTL	\$152	\$155	2.0%
24	Sutton Transport	\$112	\$123	9.8%
25	Dependable Highway Express	\$131	\$112	-14.5%
Top 25 excluding Yellow		\$47,592	\$45,285	-4.8%
<i>Yellow Corp. (closed in Aug)***</i>		<i>\$5,245</i>	<i>\$2,423</i>	<i>-53.8%</i>
TOTAL TOP 25 US LTL CARRIERS		\$52,837	\$47,708	-9.7%
ALL OTHER US LTL CARRIERS*		\$4,841	\$4,641	-4.1%
TOTAL US LTL MARKET^		\$57,678	\$52,349	-9.2%

*SJC estimates

**With lower FSC in 2023, LTL market size ex-FSC in 2023 declined by 4.5% instead of 9.2%

***While Yellow's demise in August 2023, the average daily shipments handled by other carriers thereafter are not fully reflected in their average daily shipment count

^ 2022 market size revised to exclude TFI Canada

Prepared by SJ Consulting Group, Inc.

3 million miles with regular maintenance and a rebuild or two—is facing its final end of the line.

Whether it's a fully electric, a variety of diesel run on alternative fuels, hydrogen-powered or even battery-powered, the truck of 2035 is likely to be run on a completely different power grid than today's traditional diesel fuel.

"I'm excited about the momentum and investment occurring in our industry relative to alternative fuel types," says Derek Leathers, chairman, president and CEO of Werner Enterprises, the 6th-largest truckload carrier. And that comment is typical of the thinking of today's modern trucking executives.

Today, they don't fight change; they embrace it. While there are still plenty of old-school executives in today's trucking C-suites, they're being replaced often by highly educated leaders who bring out the best in their employees.

"At its core, our industry is about people," says Kent Williams, executive vice president of sales and marketing for Averitt Express, the 12th-largest LTL carrier and a Southeast-based regional



trucking behemoth. "Averitt's real strength lies not just in our service, but in the dedicated and passionate individuals we bring onboard."

So, let's take a look at some of those people behind the 50 largest trucking companies in America—Top 25 truckload and Top 25 less-than-truckload (LTL)—that comprise our annual deep dive into

the top carriers in the nation.

Vision, strategy or execution?

Ask any of the CEOs who manage the best-run trucking fleets in America what's the most important element in their day-to-day operations and you usually get a cross-section of answers involving vision, planning, day-to-day execution, operations and people skills.

"It is all of the above," says Chuck Hammel, president of Pitt Ohio, a top-flight regional and interregional LTL carrier. "You create your strategy based on customer needs and market demands of your customer. These are constantly changing, so you need to be agile. Then you need to execute at a high level."

So, how do you do it? "The key to any successful company comes down to your selection of employees and how you nurture them," says Hammel.

Service today means much more than just picking up and delivering freight to customers on-time and claims free.

KNIGHT-SWIFT CONTINUES MARCH INTO LTL MARKET

Knight-Swift Transportation, already the largest truckload carrier in the U.S. with more than \$4.5 billion in revenue, is poised to make a huge splash in the less-than-truckload (LTL) market as well.

Knight-Swift Transportation Holdings has agreed to pay around \$2.2 million to acquire 10 Yellow Corp. terminal leases, mostly in the western U.S.—three in Idaho, two in Colorado, two in Kansas, one in Missouri, one in Nebraska, and one in Georgia.

Rival companies have spent nearly \$2 billion to acquire Yellow properties for its strategic terminal assets. Yellow sold 128 properties and 25 leases, with most of the buyers being LTL carriers.

Knight-Swift, traditionally in the truckload business, entered the LTL sector in 2021. The carrier said it plans to provide national LTL service by the end of 2025.

—John D. Schulz, contributing editor



GAIN X-RAY VISION GAIN GROUND

You weren't born with superpowers. But when you work with Penske, our ClearChain® technology suite allows us to see all of your inventory, across every distribution point, all in one place. So you gain total visibility.



Rental
Leasing
Logistics

© 2024 Penske. All Rights Reserved.

Top 25 Truckload Carriers

(Annual revenue, including fuel surcharges)

Rank	Carrier name	2023 Revenue (\$ million)	2022 Revenue (\$ million)	YoY % Change 2022-2023
1	J.B. Hunt Transport Services	\$4,332	\$4,461	-2.9%
2	Knight-Swift Transportation*	\$3,910	\$4,531	-13.7%
3	Schneider National	\$2,640	\$2,787	-5.3%
4	Prime	\$2,524	\$2,605	-3.1%
5	Landstar System	\$2,323	\$3,081	-24.6%
6	Werner Enterprises	\$2,282	\$2,402	-5.0%
7	Penske Logistics	\$2,200	\$2,300	-4.3%
8	Ryder Systems	\$1,785	\$1,786	-0.1%
9	U.S. Xpress Enterprises*	\$1,698	\$1,825	-7.0%
10	CRST International*	\$1,668	\$1,853	-10.0%
11	Crete Carrier Corp.*	\$1,342	\$1,525	-12.0%
12	Daseke*	\$1,277	\$1,398	-8.7%
13	Heartland Express	\$1,207	\$968	24.7%
14	CR England	\$1,089	\$1,209	-10.0%
15	NFI Industries	\$1,100	\$1,100	0.0%
16	Western Express*	\$1,054	\$1,138	-7.4%
17	PS Logistics*	\$1,008	\$1,104	-8.7%
18	Ruan Transportation*	\$937	\$985	-9.0%
19	Marten Transport	\$874	\$930	-6.0%
20	KLLM*	\$867	\$953	-9.0%
21	Cardinal Logistics*	\$850	\$821	3.5%
22	Hirschbach Motor Lines	\$808	\$735	9.9%
23	Stevens Transport*	\$765	\$841	-9.0%
24	Covenant Transportation Group	\$696	\$752	-7.4%
25	Anderson Trucking Service*	\$675	\$750	-10.0%
TOTAL FOR TOP 25 CARRIERS		\$35,578	\$42,810	-16.9%

* SJC estimates
Prepared by SJ Consulting Group, Inc.

SERVING SINCE 1978

Experience the Heartland difference.



901 Heartland Way
North Liberty, IA 52317
800.451.4621



153 Smith Transport Rd.
Roaring Spring, PA 16673
800.877.1173



121 Gebhardt Rd.
Black River Falls, WI 54615
715.284.4384



4701 E. 32nd Street
Joplin, MO 64804
417.623.5229



Other attributes that shippers consider when selecting a carrier are metrics such as consistent transit times, carrier trustworthiness, and ease of doing business.

Consulting firm Mastio & Co. conducts a comprehensive LTL study each year that measures carriers on 28 different service and value-related attributes. Averitt Express was ranked on top with the highest overall score this year.

“At its core, our industry is about people,” Averitt’s Williams explains. “Averitt’s real strength lies not just in our service, but in the dedicated and passionate individuals we bring onboard. We make it our mission to seek out the brightest minds, nurture their talents and create a culture where they can flourish.” Old Dominion Freight Line (ODFL) scored at the top in 25 of Mastio’s 28 individual attributes. “At a base level, it all begins with service,” says Greg Plemmons, ODFL’s chief operating officer. “You have to be committed to providing premium service. Everything else derives from that. How does that manifest itself? All our 22,000 people have to understand their role in providing that service.”

Costs relentlessly increasing

The costs of doing business as a motor carrier have never been higher. ACT Research estimates that tightening federal and state-required emissions regulations, labor costs and other factors will cause medium- and heavy-duty vehicle costs to rise by between 12% and 14%.

The industry experienced record-high costs in 2022, the last full year statistics are available. Trucking endured a whopping 21.3% increase in operational



costs over the previous year—and the expectation is that the cost to operate a truck will remain above \$2.00 per mile for the foreseeable future.

Inflation caused interest rates to rise for borrowing rates and the cost of capital. Meanwhile, pricing in all trucking sectors fell steadily last year, hampered by a poor agricultural season, generally flat housing and manufacturing and retail sales that were outpaced by inflation as retailers remained overstocked.

Total number of jobs in trucking began to fall last year for the first time since the start of the pandemic, and the number of registered carriers remained nearly flat after years of growth.

According to the American Transportation Research Institute (ATRI), concern over the state of the nation’s economy rose four spots to be the top-ranked industry issue this year. It was listed among the top 10 concerns for both trucking executives and drivers, according to ATRI.

There’s good reason for this

mounting concern. The Environmental Protection Agency’s Clean Trucks regulation goes live in 2027, unless the EPA postpones it. In the meantime, large fleets are expected to begin pre-buying their 2027-compliant engines with the 2024 model year.

According to reports, original equipment manufacturers (OEMs) have been successful in marketing the new engines, and this pre-buying should help moderate what’s expected to be runaway demand. But if economic circumstances force the OEMs to cut production this year, market analysts say that supply-chain integrity could be compromised.

To help manage costs, Werner is investing in new equipment to cycle out older trucks. A year ago, Werner had over 500 trucks that each had over 400,000 miles. However, the number of those high-mileage trucks has been reduced to 50, according to company CEO, president and chairman Derek Leathers. Werner runs nearly 8,300 trucks.

“We’re still continuing to

work more aggressively on in-house maintenance, quality of that maintenance, but also the fresher fleet gives us a pretty good head start on that,” says Leathers.

Alternative fuels

The California Air Resources Board’s (CARB) Advanced Clean Truck rule requires medium- and heavy-duty vehicle manufacturers to sell zero-emission trucks as an increasing portion of total sales within California from 2024 to 2035. Other states are sure to follow. Some trucking executives are rebelling at such mandates; however, some top fleet executives are taking the opposite approach. Werner’s Leathers, for example, says he’s “excited” about the possibilities of some of the alternative fuels.

Among the choices are renewable diesel, which is in use today and is increasing across the industry. It’s made from multiple feedstocks that can either replace diesel entirely or blended in any amount.

Another choice is renewable natural gas. It’s a biogas that comes from a variety of sources, including landfills, water purification facilities and livestock farms. The Cummins X15N natural gas engine is being used in testing phases by many of the leading trucking fleets. Hydrogen engines provide opportunities to reduce emissions. It’s expected to increase in testing among many fleets. The best fleets tend to have the youngest fleets—Werner’s trucks, for example, average close to two years old, allowing the latest technology to run over the road.

Batteries are a possibility for some fleets. For utility company trucks, for example, they’re ideal because they can



be repowered at night. However, the weight of the battery pack is prohibitively heavy for a fully loaded 80,000-pound truck to travel long distances.

The future of fuel

Ultimately, trucking executives say that there are benefits and challenges to each of these alternative technologies. But of more immediate concern is the handling of millions of loads each day when shippers expect near-flawless delivery schedules.

Some carrier executives are agnostic as to which alternative fuel eventually will win out. All they ask is that it be plentiful, reliable, cost effective, and readily adaptable—easier said than done.

“In the meantime, our customers expect us to pick up and deliver safely and on time, every time,” says Werner’s Leathers. “We will stay at the forefront of testing and investing in alternative

fuel sources, but we remain agnostic and flexible as the most viable options emerge. Either way, we’ll be ready.” “I don’t favor one fuel over the other,” says Pitt Ohio’s Hammel. “However, it needs to work in our operation and be cost effective.”

The way Hammel and others see it, the trucking industry has been decarbonizing for more than 25 years. “We’ve gone from dirty diesel engines that would get three miles per gallon to clean diesel engines that would get 7 miles per gallon to compressed natural gas (CNG) to electric and soon to be hydrogen. Each step along the way we’ve lowered our carbon output,” he said.

Pessimists see change, and complain. Optimists accept whatever challenge is next and adapt. Clearly, the best trucking companies (and executives) are in the latter category. •

Looking back at Modex

MHI's Modex 2024 saw a record-shattering number of registered manufacturing and supply chain professionals, reaching a total of 48,733. The event, held March 11 to 14 in Atlanta, saw attendees engaged with 1,200 exhibitors showcasing the latest supply chain technology and innovation across three halls and 580,000 net square feet at the Georgia World Congress Center. This was the largest Modex event to date for MHI, with 32% more registered visitors than Modex 2022. Here's a look at some of what our editors saw at the show.

FORTNA showcases OptiSweep solution

FORTNA showcased OptiSweep, robotic solution that manages small packages that have been sorted into totes and transported by a Geek+ autonomous mobile robot (AMR) to a tipping station, where the packages are tipped into a bag for transportation.

As worker availability continues to be challenging, distribution and parcel operations are searching to automate repetitive and physically draining tasks to make them more efficient, accurate and less dependent on labor.

FORTNA software coordinates with sorter logic and the automatic guided vehicle (AGV) module, eliminating the need for operators to travel between destinations. This solution gives companies the opportunity for significant savings in labor costs, allowing them to extend operations seamlessly and maintain prolonged runtime without disruptions.



FORTNA CEO Rob McKeel said the OptiSweep solution reduces labor by 60% versus a manual process for takeaway from sortation and autobagger induction.



Monty McVaugh, manager of product management; and Alex Stephens, president of warehouse automation with the OPEX Sure Sort.

OPEX launches new automated sortation and order retrieval

OPEX launched its newest automated sorting and order retrieval solutions—OPEX Sure Sort X with OPEX Xtract. OPEX Sure Sort X represents the next generation of high-speed, automated sorting. When Sure Sort X is paired with Xtract—OPEX's order retrieval system—retrieving totes and transferring their contents into shipping containers also becomes fully automated.

“OPEX remains dedicated to innovations that align with the evolving demands of the market,” said Alex Stevens, president of warehouse automation. “Our customers want one integrated solution to sort, retrieve and automatically get the product into its final container. Our new solutions automate multiple manual tasks with a simple, one-touch solution.”

Sure Sort X and Xtract join OPEX's existing warehouse automation portfolio, which includes the Sure Sort, Perfect Pick and Infinity, all of which are custom-configured for each customer and designed to completely transform supply chain infrastructure.

Yale Lift Truck Technologies debuts expanded operator assist solutions

Yale Lift Truck Technologies announced the availability of its Yale Reliant forklift operator assist solution on an additional 16 Yale models. These warehouse lift trucks expand the technology’s availability to a total of 59 models covering a wide range of applications, including retail and e-commerce fulfillment, wholesale distribution and 3PL operations.

Yale debuted stand-alone availability of its advanced dynamic stability (ADS) offering, one of the underlying technologies in the company’s Yale Reliant forklift operator assist solution.

“Forklift operator assist solutions are a step that warehouses can take today to support inexperienced operators and help reduce the risk of accidents and close calls like an operator taking a corner too fast, pulling product from high racking or tilting the mast too quickly or too far with a load in an unfavorable position,” said Joe Koch, emerging technology sales manager.



Joe Koch (in foreground) explained how Yale Reliant’s operator assist technologies leverage sensing including LiDAR and ultrawideband tagging. In some cases, the assist solutions will actively limit truck performance if an unsafe condition is detected.

KNAPP launches “Zero Touch” in North American market



Jusef Buzimkic, chief sales officer for KNAPP (holding the microphone, at right), said the company’s Zero-Touch approach and solutions span multiple KNAPP technologies.

KNAPP announced the release of its “Mission: Zero Touch” solutions to the North American market.

Zero Touch uses a variety of technologies, including KNAPP OSR Shuttles, PiE Robots, OSR Shuttle Evo Frozen and its intelligent pocket sortation, explained Jusef Buzimkic, chief sales officer. The glue for the application is a layer of software technologies, delivered by KNAPP including WMS, WCS and AI enabled technologies across the spectrum of KNAPP products.

The intent of Zero Touch, Buzimkic said, is to eliminate unnecessary touches that can be handled reliably by automation at high throughput, rather than do away with all human labor. “It’s all about adding value and eliminating unnecessary touches,” he said.

Big Joe extends opportunities with EP North America

Big Joe Forklifts showcased its innovative materials handling equipment. The company’s recent acquisition of EP North America (formerly ePicker) will allow both brands to share services across organizations, expanding support functions and improving processes for customer service, fulfillment, aftermarket, warranty, parts, marketing, operations and more.

Big Joe will continue to focus on innovative niche products and in-between-handling applications while the EP North America channel will primarily focus on “purpose-built” lithium-ion forklifts. This partnership will also provide EP North America use of the Big Joe AMR vehicles, which were demoed at the show.

Leveraging Big Joe’s legacy in the market and combining it with the added focus of EP North America’s growing dealer network, the two brands will be able to extend those benefits to its dealers as well as end-users looking for Class 1 and Class 3 warehouse equipment.



The Big Joe lineup includes autonomous units such as this one with a simple on-board flat screen to manage missions, while ePicker’s focus is on purpose-built lithium units. Pictured with the Big Joe autonomous unit is Nick Malewicki, GM of Big Joe’s autonomous division.

Dematic showcases VR experience for site simulation

Dematic featured an immersive virtual reality (VR) experience, allowing attendees to step inside realistic recreations of DCs, manufacturing centers and warehouses to view simulated operations in detail.

“The introduction of VR will provide unprecedented insights into Dematic solutions, offering an immersive experience that enhances team capabilities, enriches company partnerships and reinforces commitment to elevating Dematic’s customer experiences,” said Mike Larsson, president, Dematic and KION Group executive board member. “The integration of industry-leading software aims to redefine connectivity and deepen an understanding of customer needs.”

Attendees also could hear industry insights from Dematic executives at two educational seminars. Brett Webster, director of product management, shared his perspectives on how data, software and hardware enable the future of supply chain and warehouse operations. Eric Sharon, senior VP, legal, joined a panel with the Metro Atlanta Chamber of Commerce to discuss Dematic’s approach to cross-border growth and expansion.



Mike Larsson, Dematic's president, gave an overview of trends at a morning press conference, including how Dematic leverages its software to integrate systems and solve customer challenges.



Kardex president Mitch Hayes presented the company's newest innovation FulfillIX for Autostore.

Kardex FulfillIX for AutoStore can help businesses meet goals in under 6 months

Showing a new way to maximize automation and robotics potential, Kardex presented the latest developments in automation software.

A leading manufacturer of automated storage and retrieval systems (AS/RS), Kardex showcased Kardex FulfillIX, a warehouse execution system designed specifically for AutoStore and powered by Kardex systems. Kardex FulfillIX takes the unexpected surprises out of go-live and allows new AutoStore systems to ramp-up faster and meet or exceed business cases in as little as six months.

In addition to new developments in warehouse software, attendees experienced live demonstrations of Kardex’s Intuitive Picking Assistant that projects relevant picking information directly onto the surface of the access opening for both the Kardex Remstar Vertical Buffer Module and AutoStore ports.

“With this new intuitive picking solution, we are following the trend of intuitive and user-friendly operation with a visual picking display feature that responds to movements and guides the operator, thus enabling ergonomic, fast, error-free picking,” said Tobias Flury, head of technology, Kardex.

ORBIS showcases packaging innovations

ORBIS invited attendees to see the latest in sustainably produced packaging products and automated packaging technologies. Along with seeing ORBIS’ innovative products in person, visitors experienced products from partners like Agilox, Black-I Robotics, Combi Packaging Systems and Steel King.

“At ORBIS, we’re immensely proud of our ongoing contributions to a more efficient and sustainable supply chain,” said Lynn Hediger, VP of product management. “Our reusable totes and pallets improve the flow of product in today’s automated systems and the overall supply chain. We design products to interface seamlessly in automated systems to drive repeatable performance and system uptime.”

Attendees could also stop by the booth to see the ORBIS XpressPickup system, designed especially for buy-online/pick-up in-store applications. ORBIS also showcased the OPTEBulk sleeve-pack system for warehousing and storage, metal racks for automotive part packaging and its Bulkpak containers for part shipments.



From left: ORBIS's team of Norman Kukuk, president; Jade Abdul, Sr. brand communications; Alison Zitzke, senior product manager; and Andrea Nottesdtad, senior product manager.

“Before,
our labeling accuracy wasn’t
what we wanted. Not even close.



There was a lot of
running around,
from the pallet to the label printer, back
to the computer, then to the pallet again.



Tyler Yoos, VP/GM
McCollister's Global Services



But now our labeling
accuracy is above 99.8%.
We're blown away.

With Newcastle carts, we process shipments
and print labels right at the pallet, and out that
shipment goes, right then and there.

Problem solved.”



NEWCASTLE
SYSTEMS

SAVE STEPS.
INCREASE PRODUCTIVITY.™

CMC Packaging Automation highlights CartonWrap DUO

CMC Packaging Automation featured its recently introduced CMC CartonWrap DUO, an automated packaging solution that can produce both right-sized cartons and corrugated envelopes, on demand, in one machine footprint.

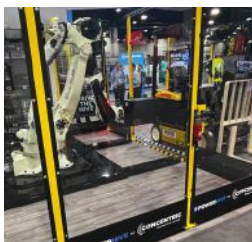
The machine automatically packages items as right-sized cartons or envelopes, using continuous roll-fed corrugated material at a speed of 900 packages per hour. The corrugated is directly fed by CMC's Wave Line, an inline cardboard coupler to produce corrugated material on demand. CMC noted its design cuts corrugated material usage by up to 50% compared to existing technology and requires up to 70% less glue.

"We are incredibly proud to introduce the CartonWrap DUO to the market," said Francesco Ponti, CEO at CMC. "This innovative solution represents a significant step forward in packaging efficiency and sustainability. By offering both box and envelope options on demand, we are empowering businesses to optimize their operations while minimizing environmental impact."

Capable of packaging diverse items like apparel, electronics, and books, this technology ensures secure delivery. Its unique feature covers a thickness range from 250 mm for right-sized cartons to an ultra-thin 1 mm for shipping envelopes.



Liza Antolick, CMC's North American business development manager, explained how the CartonWrap DUO can produce both corrugate-based bags or right-sized cartons, in one machine footprint.



The robotic industrial arm in each PowerHIVE can remove a battery core that needs charging, and replace it with a fully charged core from the PowerHIVE, in under 3 minutes.

Concentric's PowerHIVE offloads battery chores

The highlight at Concentric's booth was a working demo of its recently released PowerHIVE solution, a robotics-enabled approach to forklift battery and charging that Concentric says eliminates the need for operations with electric lift trucks to deal with battery swap processes or opportunity charging, since the PowerHIVE takes both those burdens off the table, while ensuring near full uptime.

The solution, which uses support services and robotic-enabled automation from Concentric, leverages a robotic industrial robot arm within each PowerHIVE to quickly take battery cores from trucks and place them into the PowerHIVE charging system, and then retrieves a fully charged core from the system, and places it back in the truck, all in under 3 minutes.

According to Concentric, this allows various types and makes of electric trucks to keep running productively, with no more concerns about regular swapping of lead acid batteries and also, no opportunity charging procedures for operators to learn and follow, as is typically done when using lithium and thin-plate pure lead batteries.

"For facilities with multiple shifts, PowerHIVE delivers an automated and safe forklift power experience for every forklift type," said Antonio Mendonca, Concentric's director of engineering. "The system eliminates the need to think about forklift charging or battery maintenance as operators receive a battery that's ready to go in less than 3 minutes."

Rite-Hite ONE digital platform debuts

Rite-Hite introduced the world to Rite-Hite ONE at Modex. A comprehensive digital platform, Rite-Hite ONE empowers customers to optimize facility throughput, prioritize maintenance, mitigate safety incidents, reduce trailer detention and act on meaningful data analytics from Rite-Hite's line of smart, connected equipment.

"The Rite-Hite ONE Digital platform provides smart-connected capabilities and intelligent software solutions that enhances the value of our customer's Rite-Hite equipment," said Dave Adams, president of Rite Hite Digital Solutions. "It functions as a control tower from that users can oversee and manage a connected ecosystem of materials handling operations."

The new software platform helps unify materials handling operations in warehouses, distribution centers and other industrial facilities. Along with connecting Rite-Hite's smart-enabled high-speed doors and loading dock equipment, it also collects and analyzes data from that equipment, helping facility managers and teams to see trends and make data-based decisions.



Peter Burke, director of sales and marketing, Digital Solutions, Rite-Hite, explained some of the actionable metrics in the ONE platform.

Maximize Productivity. Minimize Cost.

World-Proven Medium or Ultra High-Density Cubic Storage and Retrieval Systems + Autonomous Mobile Robotics



Medium or Ultra High-Density Cubic Storage & Retrieval Systems

Ocado Intelligent Automation is a global technology developer and operator delivering the world's most advanced fulfillment operations software, hardware and processes at scale.

OIA brings Ocado's battle-hardened, industry-leading automation solutions to applications beyond our roots in online grocery. Our over 20-year journey of innovation—informed by the experience of maximizing efficiency and minimizing costs in our own warehouses—has equipped us with the IP, technologies, competencies and confidence to transform supply chains and solve complex challenges in a wide range of industry verticals. Visit ocado-ia.com to learn more.



Autonomous Mobile Robotics



Talk To An Expert

Scan to learn more, and to book a meeting with an OIA expert.

 ocado-ia.com



BidSense®

The Premier LTL & Truckload Bid Application

SMC³'s over-the-road solution provides streamlined transportation sourcing for both truckload and LTL, delivering a competitive edge to your overall procurement process.



Automate RFPs and save valuable resource time



Evaluate carriers on more than price alone



Optimize over-the-road transportation spend



Build strategic carrier partnerships

**NOW
INCLUDES
TRUCKLOAD**

The SMC3 logo, featuring a stylized 'S' icon followed by the text 'SMC3' in a bold, sans-serif font.

sales@smc3.com | 770-486-5800 | www.smc3.com