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SUPPLYCHAIN MANAGEMENT REVIEW

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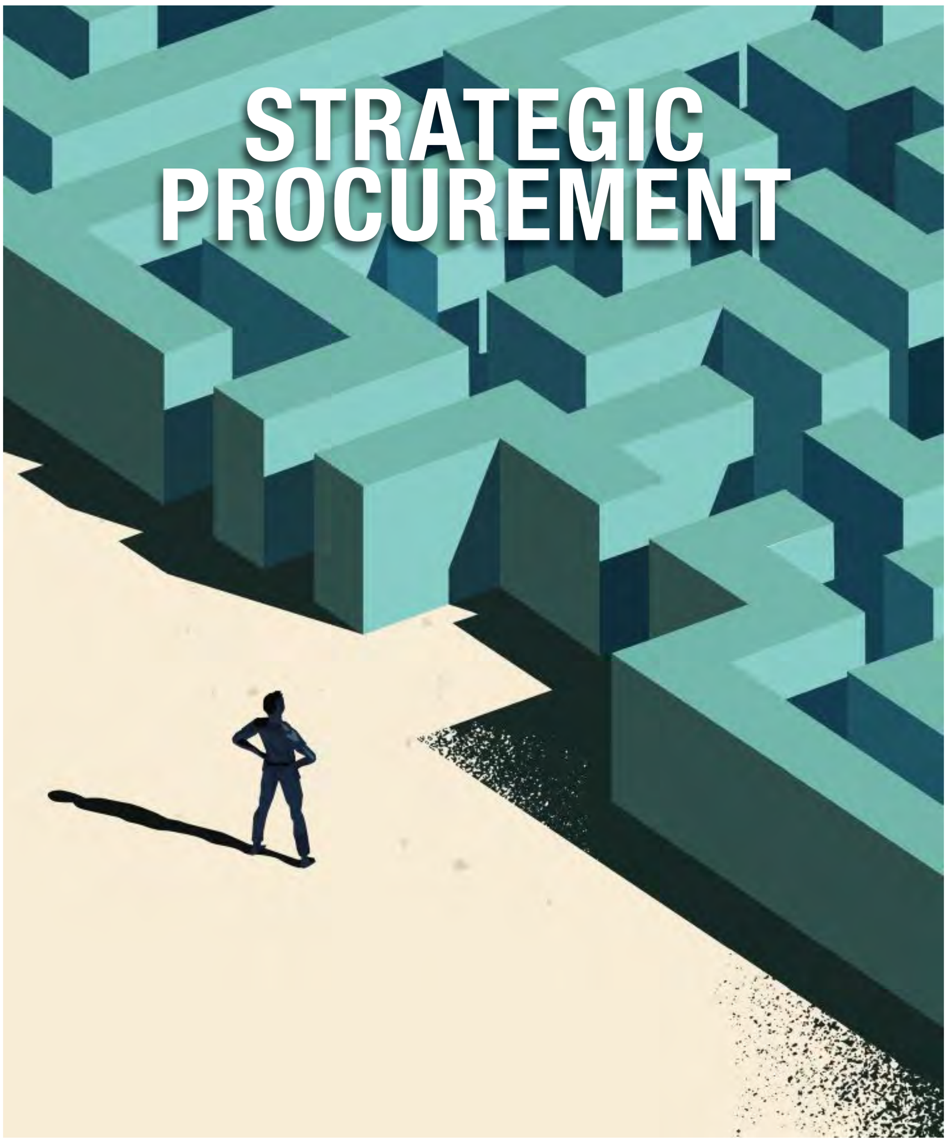

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Supply chain still in the spotlight

Indulge me for a minute, while I lead a cheer for our profession.

I wrote my column for the January 2021 issue of *SCMR* one Sunday morning after watching the first trucks full of vaccine roll out of a Pfizer plant in Michigan, headed for a UPS sortation depot. I felt an incredible sense of optimism for the country, and pride in the role that we, as supply chain managers, were going to play to combat a pandemic. Supply chain was in the spotlight, and on that morning, it was for all the right reasons.

Fast forward to late April 2021. Sure, there have been some supply chain-related hiccups in the vaccine rollout. There were planning and forecasting snafus in January. Recently, there was an ingredient mix-up that resulted in the loss of millions of doses of the J&J vaccine—where's an MES when you need one? Let's not dwell on the negative, but accentuate the positive: Think of how many doses have been manufactured, delivered and injected in just four months as of this writing.
It's a remarkable supply chain achievement.

And yet, some aspects of supply chain management continue to struggle. The shutdown of the Suez Canal is the most obvious, but there are others. Last week, I went to a national sporting goods chain to buy some summer weight running gear only to learn that spring inventory has been back ordered for six weeks. Like the fight against the pandemic, supply chains are getting there, but not there yet. Still, I contend it's supply chain's time to shine.

Bob Trebilcock, Editorial Director
btrebilcock@peerlessmedia.com

This issue of *SCMR* focuses on the evolving role of procurement in today's supply chains—after all, if supply chain is in the spotlight, then so too is procurement. We present a variety of articles geared to help procurement professionals navigate the future of the profession, starting with "It's a great time to be in procurement," an excerpt from an excellent new book by Kearney's Elouise Epstein.

It's followed by articles from Mark Trowbridge on new payment methods that save you money while paying your vendors on time, or early; the power of incomplete contracts, co-authored by frequent contributor Tom Choi; and strategies for tracking conflict minerals in your supply chain.

Remember: We're in the spotlight, and it's our time to shine.

One final note: This year's NextGen Supply Chain conference will be a virtual event taking place November 2 – 4, 2021. Like last year, we'll focus on important emerging technologies like AI, robotics and digital transformations that are shaping the supply chain processes of tomorrow. You can learn more about the conference at nextgensupplychainconference.com.

Bob Trebilcock

SUPPLYCHAIN MANAGEMENT REVIEW

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We all want to conserve working capital by extending payments. But here are five ways procurement can save money while paying suppliers.

22 How to navigate inefficiency and incomplete contracts
In uncertain times, incomplete contracts help companies gain flexibility, agility and resilience. They're made for times like these.

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How your procurement team perceives your suppliers—and their capabilities—can have a profound impact on the performance of your supply chain. Those can be managed.

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SC2020 Project Update: Uncertainties

Dr. Lapide is a lecturer at the University of Massachusetts and an MIT Research Affiliate. He has extensive experience in industry, consulting, business research, and academia as well as a broad range of forecasting, planning, and supply chain experiences. He 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 llapide@mit.edu.

In 2004, I managed the launch of MIT's Supply Chain 2020 (SC2020) Project. The major research question addressed was: What will excellent supply chains look like in 10 years to 15 years? A significant number of my Insights columns and articles in *SCMR* have since addressed various aspects of the project's findings.

Now that 2020 is no longer, it's time to revisit five of the six macro factors we identified as the most impactful toward shaping future global supply chains. One reason is to learn from what we got right or wrong in our thinking at the time. Another reason stems from my last column, "Decision-making under uncertainty,"* which discussed the difference between decision-making and planning under risk versus under uncertainty. The former is done using statistical and other analytics because probabilities of future events, as well as their quantitative impacts, might be estimable. The SC2020 Project addressed strategic planning under uncertainty.

Forecasting into the long-range future (10 years and more) rarely yields meaningful results. Rather than forecasting, it's more useful in strategic planning to identify possible scenarios of future states of the world and events. Namely, the major uncertainties, often devoid of any estimates of their probabilities of occurrence or timing. The strategic planning approach we developed during the project focused early on the uncertainties in the macro factors. In my next Insights column, I will discuss the scenario planning approach we developed to help companies align their future supply chains to possible future states of the world.

SC2020 Project background

The SC2020 Project had three major phases that addressed the following questions.

1) What is an excellent supply chain?
2) What are the major factors that will shape future excellent supply chains?
3) How can supply chain managers strategically plan for the long-term futures that might occur?

Regarding the first phase, the strategic alignment planning methodology for supply chain excellence we developed appeared to be well received—especially in the United States. I initially wrote an article in *SCMR* on excellence,** then a variety of Insights columns.

However, I saw the most global interest from a discussion of the major factors we identified that would shape future supply chains. I wrote an *SCMR* article, titled "Global supply chains: When uncertainty is a certain factor."*** The six major factors that we felt would most affect future supply chains were:

1) the aging of developed countries;
2) oil prices;
3) the power shift toward the East;
4) trading bloc formation;
5) globalized green laws; and
6) pervasive technologies.

A post-2020 update on the first five factors follows. Because I believe that technology primarily enables rather than shapes future global supply chains, I will not provide an update, other than to state the obvious—that these decision-supporting enablers are rapidly evolving.

The aging of developed countries

At the start of the SC2020 Project, I met with Dr. Joseph F. Coughlin from MIT's Age Lab to discuss his research into "disruptive demographics." He provided an insightful chart that depicted the world's population in 1996 in contrast to what was being projected for 2025. The chart highlighted the differences (by age) among "developing" and "developed" countries.

The major takeaway from Coughlin's chart was that the world's population was growing larger and older. However, and importantly, the developed countries were getting older, while the developing ones were getting younger. We postulated that the trend would have significant demand-supply ramifications.

Older, affluent populations consume more goods and services, younger people possess the physical prowess and stamina to do the manual work needed to create them. Thus, in the future, there will be geographical dislocations among consumers purchasing products and laborers needed to supply them. Having older, healthier and more affluent consumers, developed countries will have a substantial portion of their economies generated by non-working elderly. These richer "longevity economies" will demand a myriad of innovative new products specifically for the elderly.

From a supply perspective, labor to produce these products will need to be outsourced to developing countries and/or will involve significant immigration from the developing into the developed countries.

Indeed, these past two decades have seen substantial outsourcing and immigration. A swatch of the outsourcing has been to Asian-based developed countries. Concurrently, we've seen large migrations into the European Union (EU)/UK from the Middle East and Northern Africa; into the United States from the southern border and into developed Asian countries as well. While demographic impacts are glacial in nature, various wars, droughts and climate change have exacerbated these trends.

Oil prices

When we began the SC2020 Project, oil prices were starting to rise from a period of time we termed the "era of cheap oil." We postulated that oil pricing might shoot up by 2020—based on the fact that oil extraction costs and demand from developing economies were rising. The catchphrase was that supply chains needed to slow down by making them cost and energy efficient rather than cost and asset efficient.

Oil prices did rise. Then, a variety of supply demand factors drove them down, while causing more volatility. The Great Recession initially affected demand. Following that, fracking techniques became more economical, and oil got a dirty name once Co2 emissions were believed to be responsible for existential climate changes.

My recent update on oil concluded that we are almost back to cheap oil, as the oil market moved toward a market free from politics as a significant driver. However, oil prices will always rise up and down, especially with the move to electric vehicles and away from carbon-based fuels.

Power shifts toward the East

There has been a gradual shift of economic power toward the East in general. Relatively speaking, the United States and EU/UK dominance of world trade has been shrinking over time. Their shares of world GDP have been steadily declining for quite some time. "The Post-American World," a book by Fareed Zakaria, echoes the trend toward a future in which Western economies no longer rule the roost.

Current events have signaled that China is planning to surpass the United States in GDP in the foreseeable future. The Asian leader feels confident that it is harkening back to the glory days of the Ming Dynasty, when it was a major global powerhouse. However, there are a few uncertainty wild cards in China's future. It's prior one-child policy has resulted in it getting older faster than many countries; and older yields a less productive society. As this happens, GDP growth will become harder to achieve.

Japan got rich after World War II, and since the 1980s has gotten poorer because of a shrinking and aging population, the result of lower birth rates and smaller family sizes, coupled with no immigration. However, while birth rates and family sizes are also shrinking for the United States and the EU/UK, they rely on significant immigration to stay younger. While currently rich, they will get less rich from the demographic shift. On the other hand, China may have run out of time to get rich first; before it starts to get poorer from the demographics.

A second, emerging uncertainty wild card is whether the Communist Party will "over-regulate" its free markets. It has already begun by putting dampers on Alibaba's growth plans and Hong Kong's free-market economic system. The ruling party is also eyeing "powerhouse" Taiwan, which it believes to be part of its nation.

Trading bloc formation

In "The World is Flat: A Brief History of the Twenty-First Century," Thomas L. Friedman postulates a future in which goods, information and ideas move freely, virtually unrestricted by country borders. However, I believe it is overly optimistic and only remotely possible.

A more likely scenario might be the formation of three to four tightly-coupled trading blocs or spheres of influence around dominant countries. For example, there might be four trading blocs with the majority of their economic activities centered around the United States, EU/UK, China and Japan (with India and Australia). Under this scenario, the majority of international trade would take place within blocs with some cross-bloc trading taking place as well.

Two of the factors discussed above support trading bloc formation. As energy-efficiency drives shorter supply lines, companies might geographically cluster their source, make and deliver functions to serve regions. In addition, more developed "older" countries might source "younger" labor from their developing neighbors to solve their labor shortages. North America might ramp up immigration from Latin America, while the EU/UK might source more labor from Africa and the Middle East. Japan and China might source more labor from developing Asian countries. Interestingly, we might see more north-south supply chain flows than today's prevalent east-west flows.

Globalized green laws

Global emissions will need to be reduced over time because of climate change, and corresponding "green laws" will be needed. However, another area of evolving green laws deals with the reduction of waste materials that pollute the Earth's land and water. These laws will affect supply chains in at least three ways. The first is that more future products will be designed to be green, comprised of biodegradable and non-toxic materials.

The second is that the end-of-life disposal of products will be more regulated on a global basis. Some of this regulation is already in place in California, the EU and in Germany, where automakers are ultimately responsible for the environmentally safe disposal of cars. In the United States, Dell and HP have recycling programs in which they recycle computers and extract materials from them before the computers are put into dumpsites. Such recycling programs will require companies to establish better competencies in reverse logistics, an area they don't put much focus on now because it has minimal and sometimes negative revenue implications.

Thirdly, future globally branded companies will need to establish supply network compliance programs. To protect the brand image of their products, companies will need to ensure that they comply with green laws in countries in which they do business. Moreover, they will need to ensure that their global upstream suppliers comply with them, too.

In summary, much of what we hypothesized regarding macro factors during the SC2020 Project has played out in some regard. Some more so, and some less so. The only major surprise appears to be that the price of oil did not rise much from the era of cheap oil nearly 15 years ago. Pricing did get more volatile. However, the uncertainties we identified of what might happen over the next 10 years to 15 years remain uncertain. Companies will need to do their strategic planning with an eye towards uncertainty, as well as risk. Stay tuned for the next column about scenario planning for long-term planning under uncertainty.

****

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**L. Lapide, "Decision-making under uncertainty,"* Supply Chain Management Review, *Mar/Apr 2021.*

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Can consumers commit to sustainable products?

By Yinjin Lee

Existing academic and industry research, which is largely based on survey findings, suggests that a sizable group of consumers want to support social justice and environmental conservation through their shopping decisions. But to what extent does this support translate into sales of sustainable products? The MIT Center for Transportation & Logistics carried out research in one particular market—coffee—to find out.

According to our study of coffee purchases, it seems that consumers are not strongly committed to Fair Trade or organic labels given the current offerings at grocery stores. We found that the price premium—the typical reason that consumers don't buy sustainable products—is not the sole reason consumers turn away from this type of purchase.

However, the news is not all bad for purveyors of sustainable coffee products. Our findings also suggest that certified sustainable coffee can be more competitive if consumers have a wider variety of certified coffees to choose from than what is currently available. In other words, companies need to be more innovative in the way they sell sustainable alternatives to traditional coffee varieties.

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Reality gaps

In an effort to attract elusive socially- and environmentally-conscious buyers, some companies have invested in ways to improve and communicate their supply chain sustainability practices. A common approach is to use third-party certification labels to differentiate a company's products.

Fair Trade and/or Organic (FTO) labels are often used to highlight a product's credentials as a sustainable buy. Fair Trade programs promote economic, social and environmental goals, and the number of certified products in mainstream markets has nearly doubled in 2015 to reach 35,000. Organic label programs support sustainable farming and conservation, and are available in more than 75% of all product categories in U.S. supermarkets.

However, FTO products command only a relatively small share of the U.S. coffee market. In 2016, only 5% of coffee beans sold by volume were labelled as Fair Trade, and a mere 5.5% of the coffee beans sold by dollar sales were organic.

This small market share does not reflect the more optimistic picture painted by consumer research. This is a well-known phenomenon called the intention-action, where individuals indicate their support for sustainable brands when answering survey questions, but their responses do not translate into actual purchases.

The intention of our research is to understand if offering FTO products at prices with and without a premium have attracted consumers to commit to certified offerings.

Let sales tell the story

Our study's overall goal was to analyze whether premium and regular FTO products are competitive against conventional products in CPG markets. The study is based on observations of Keurig K-cup coffee purchases in 2016 by a U.S. consumer panel. This dataset includes information on the prices and the products purchased. We used the retailer scanner and product websites to obtain information of what other products were available at the stores when the consumer visited and the labels that the products carry. The consumer purchase data and the retailer scanner data are provided by NielsonIQ.†

Although consumers' motivations for buying Fair Trade and/or Organic certified products can differ, products in these categories were analyzed together because most K-cup coffees carry both certification labels. The coffee products were categorized into four groups: premium conventional, regular conventional, premium FTO and regular FTO.

We used price sensitivity and substitution behaviors to measure competitiveness. This analysis was carried out for the market as a whole as well as in market segments of consumers who spent more on FTO than on conventional coffees.

Limited appeal of FTO

We found that in general, most consumers were more sensitive to premium and regular FTO prices than to the prices of conventional coffees. This difference implies that most consumers were not markedly attracted or loyal to FTO products. Moreover, while buyers who spent more on premium FTO coffee were less sensitive to price and relatively loyal to these products, when they chose not to purchase premium FTO coffee they were more likely to switch to conventional alternatives than to regularly-priced FTO varieties.

This latter finding could not be explained by price disparities. Even though lower-priced FTO regular brands were available, the premium buyers still favored conventional coffees when they decided against buying the premium FTO product. This behavior suggests that premium FTO coffee buyers could forgo the sustainability standards supported by FTO programs in favor of other qualities offered by the conventional products.

A key conclusion from these results is that FTO certifications do not adequately differentiate coffee products or provide the competitiveness that companies expect. There are several possible reasons for this shortfall listed as follows.

- There were fewer assortments of FTO coffees than conventional equivalents in stores. Using certification labels did not appear to counteract this disadvantage.
- There is limited awareness, trust and understanding of certification programs among the consumers.
- Other factors that consumers consider, such as brand familiarity and taste, may detract from the competitiveness of FTO products.

Managerial insights

Manufacturers of FTO coffee products need to take note of these influences and the substitution behavior of consumers, and do more than compete on price. Following are some possible alternative strategies.

- Increase assortment sizes of FTO products in stores.
- Provide consumers engaging information about certification programs' impact on sustainability and related concerns.
- Improve product and service strategies to offer consumers more compelling direct benefits such as product status and quality.
- Adopt other approaches to sustainability that supplement labeling such as recyclable packaging.

While some of these strategies are out of the control of supply chain managers, others, such as an increase in assortment sizes, and hence SKUs, sustainable packaging and new service strategies will require supply chain involvement if adopted.

There are important lessons for makers of conventional coffee products, too. We found that regular and premium conventional coffees offer stiffer competition to each other than from FTO products. Given the current market condition, there is little compelling reason for companies offering conventional coffee to add FTO labels to their existing products.

Certified products have to match in quality, too

Our analysis has some limitations. Like other econometric models, our study did not isolate specific brand and product attributes such as consumers' familiarity with certain brands. Firms' marketing and inventory decisions such as shelf placement of FTO and conventional products were not observed. We took these factors into account in the way we interpreted the results.

Our research suggests that given the current K-cup offerings, consumers generally lack commitment to FTO coffee despite regularly-priced offerings. The findings imply that the lower-than-expected sales performance of sustainable products is not only because of their price premiums, but is also related to other product attributes associated with the FTO products. Certified products must match up to the non-certified product offerings in functional aspects and quality, including taste.

In addition to more innovative competitive strategies such as the ones mentioned above, market research is needed to identify the most effective ways to influence consumer buying decisions for sustainable coffee products. Future research could explore the relative attractiveness of Fair Trade versus organic offerings. Also, more information is needed on the influence of the shopping environment—independent grocers versus e-commerce channels, for instance—on the competitiveness of sustainable coffee products.

As more and more innovative sustainable product offerings become available in the market, companies possess large datasets that capture consumer behaviors. Applying analytic tools to real-world datasets, in addition to other types of information such as consumer interviews and experiments, can help us explore consumers' intention-action gap and develop creative selling strategies to better serve consumer preferences.

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† Researcher(s) own analyses calculated (or derived) based in part on data from The Nielsen Company (U.S.), LLC and marketing databases provided through the NielsenDatasets at the Kilts Center for Marketing Data Center at The University of Chicago Booth School of Business.

The conclusions drawn from the Nielsen data are those of the researcher(s) and do not reflect the views of Nielsen. Nielsen is not responsible for, had no role in and was not involved in analyzing and preparing the results reported herein.

Reimagining the procurement operating model for tomorrow

Adopting new procurement strategies and embracing new vendor relationships.

By Sandeep Shah and Chand K (CK) Raina

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All organizations, irrespective of the nature of their business, are dependent on external vendors for most of the materials and components comprising their products and services. External vendors play so much a part of the current operating model that organizations cannot be sustained without their support. We are emerging from the unprecedented challenges thrown at us by the COVID-19 pandemic. It has significantly changed the basic ways in which operations are planned and executed, necessitating procurement leaders to transform their operating model to align with a revised organizational business operating model.

Procurement leaders and strategists will be challenged to reimagine the entire procurement model and vendor relationships and lifecycle management. It is going to be a journey with a consistent focus on redefinitions and continual efforts to enhance efficiency and optimize costs while considering new requirements for resilience, sustainability and purpose.

What have we learned?

While more long-term issues will emerge, let's consider some of the near-term issues that have surfaced already during the pandemic to challenge CPOs.

1. COVID-19 led the world into complete uncertainty, chaotic phases and surges of rapid infection. The resulting forced lockdowns required people to quarantine themselves, disrupted operations and created business loss that led to significant job losses.
2. In the absence of revenues, the global network of Tier 2 and Tier 3 companies that support Tier 1 suppliers and OEMs have struggled to sustain themselves. The dependence on such vendors can disrupt the supply of products and services, stalling the total operations of the organization.
3. The availability of raw material to produce products, especially imports, will generate the highest disruptive impact due to uncertainty in the availability of people, transportation and increased import/export restrictions.
4. Social distancing is changing people's mobility as well as workstation configurations on shop floors and in offices. Organizations must redesign the most optimal layout and material movement processes to operate the business, run the operations with right mix of resources at work locations and work from home from a longer-term perspective.

5. In the current scenario, most companies are trying to leverage digitalization; however, only a small percentage of organizations are truly digital at this stage. At the small- to medium-business level, digital transformation is financially challenging and at the large to global levels, transformation is not only financially challenging, it challenges the ability to scale and deploy operationally.

Aligning procurement and business operating models

Organizations are experiencing new and expanded dependency on their partner ecosystems; current procurement organizations will need to adapt and align with new business operating models.

Procurement professionals must revisit all of the functional requirements and gauge the impact of COVID-19 across the end-to-end value stream from analytics, sourcing, contract management, procurement, logistics, planning and forecasting to consumption.

Based on our experience, we have identified a high-level quick impact analysis on these functional areas; however, this may change from organization to organization and from industry vertical to industry vertical. Key considerations in doing this analysis are the people dependency, proximity, potential digitalization, outsourcing possibility, time sensitivity, process stability, special skills, and regulatory needs.

TABLE 1

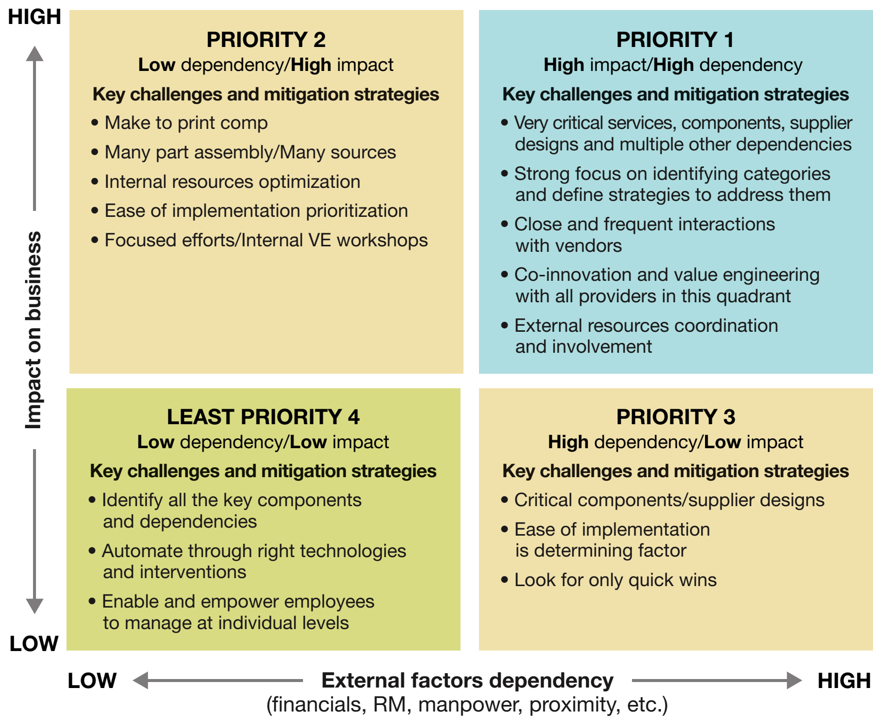
Impact analysis

SCM FUNCTIONS	SCM SUB FUNCTIONS	PANDEMIC IMPACT		
		HIGH	MEDIUM	LOW
SOURCE TO CONTRACT	Supply market analysis			■
	Strategy development			■
	Source and negotiate	■		
	Contract management		■	
	Monitor and manage			■
PROCURE TO PAY	Requisition management			■
	Approval routing			■
	Purchase order management		■	
	Receipt and invoice	■		
	Supplier performance	■		
SALES ORDER MANAGEMENT AND OTHER SUPPORT	Master data management			■
	Sales order management		■	
	Warehouse management	■		
	Logistics channel/Fleet management	■		
	Warranty management	■		
OTHER SUPPLY CHAIN OPERATIONS	Forecasting			■
	Planning			■
	Replenishment	■		

Source: Authors

FIGURE 1

Category matrix



Source: Authors

Transforming from the current normal to the future not so normal

The procurement team must document the current state impacts, priorities and requirements for each function and innovate new requirements, mitigation strategies and priorities for each function needed for the future state. Once completed, we can identify obstacles to transformation and reclassify them into different categories aligned with new future state sourcing strategies.

Based on the new classification, the categories can be plotted on a 2x2 matrix as highlighted in Figure 1, including corresponding mitigation strategies. The horizontal axis highlights the "factors of external dependency" such as financials, raw materials and capacity availability, manpower dependency, proximity and few others based on the nature of your business. The vertical axis highlights the "impact on the business," which could include both financial and non-financial dependencies, such as earnings, efficiency, productivity and technology.

Based on the matrix, the following are the key interventions that the procurement organization will have to embrace.

• ***Operating model*** elements need redefinition and reprioritization. The processes will change. The organization managing the operations must consider both outsourcing and remote work elements in a different environment. The technology components and data security will change; and, finally, the KPIs will need to be evaluated and modified to align to the new process and organizational models.

• ***Digitalization*** opportunities must be explored across the process areas to ensure that the new procurement operating model becomes resilient, sustainable and purpose-driven.

— Procurement 4.0 models involving platform solutions, Artificial Intelligence, Robotic Process Automation (RPA), blockchain and various other solutions should be adopted and implemented with much more relevance. Such technological interventions are inevitable and accepting that reality, the leaders are adopting early.

— Digitization (electronic data and connectivity) and digitalization (process automation) are going to ensure that resources operate from any location (work or home). There will be more dependency on employees from an accountability and authenticity point of view. Organizations must adapt to ecosystem commerce and platforms to integrate with all customers, partners and even competitors in the new environment.

— Data security and overall data management will be a challenge; but enterprises will have to implement various security applications and governance to ensure that data security and IP protection are a highest-level priority.

• ***End customer and ecosystem alignment*** with the procurement operating model will be the new mantra in post-COVID-19 eras. Procurement will have to enable vendor contracts to ensure that delivery, delivery expectations (in shape and form), delivery location and other key strategies and opportunities are considered and implemented.

The path forward

While the new normal has brought innumerable challenges, we are observing an equal number of opportunities for growth and market leadership. It's increasingly important that C-level leadership learns from how it responded to disruptions, both what went right and what went wrong. Procurement leadership must accelerate ecosystem adoption of Business 4.0 technologies to attain resilient, sustainable and purpose-driven maturity.

Multiple factors will eventually have more impact on the future state than in the past and current states. Factors such as, for example, parts availability impacting manufacturing capacity, labor shortages and safety, finance restructuring, pricing policies, global information/IP security and, above all, the geopolitical environment and government regulatory compliance.

Procurement leaders need to, very carefully, reflect upon the changes, and adapt their organization, strategies and business models to adopt change, respond to challenges and emerge as winners.

Strategies to build a resilient supply chain and how to manage the people to keep it operational

With COVID-19 impacting supply chains around the world, companies are turning to their transportation and logistics providers to help them create more resiliency, agility, and continuous improvement in their supply chain networks.

F If there's one thing all companies take away from the COVID-19 pandemic, it's that the world's supply chains are tightly intertwined and interdependent, and they only run smoothly when all links in the chain are operating at their best. In order to respond quickly and efficiently to customer expectations, organizations need resilient, flexible and reliable supply chain providers that can help them turn strategies on a dime, mitigate risk, and maintain profitability.

The labor shortage, which was in force pre-COVID and exacerbated when the pandemic emerged, is a particularly sore spot for many shippers right now. With truck drivers in short supply and commercial driver schools producing fewer graduates, for example, the logistics and cost of getting goods shipped from point A to point B have become enormous headaches for companies of all sizes.

Using a holistic approach that encompasses all aspects of the logistics process, Ryder serves as a trusted transportation and supply chain solutions partner for organizations across all industries. Through its real-time solutions, the company is solving immediate challenges while also helping organizations avoid future disruptions.

OPERATING IN A "NEW NORMAL" ENVIRONMENT

Entering 2020, few could have predicted the impact a global pandemic would have on the world's transportation markets. One year later, ocean containers were hard to come by, ships were stacked up outside of U.S. ports, the truck driver shortage was hitting a new high-water mark, and freight rates were rising as much as 20% (year over year) across most modes.

"It's definitely a carrier's market," says Dave Belter, Vice President & General Manager, Global Transportation Management, for Ryder, "with both contract and spot rates at historically high levels." The high number of unseated tractors (i.e., trucks without qualified drivers to operate them) and limited throughput from commercial driver schools aren't helping the situation.

Concurrently, strong consumer spending and a booming e-commerce focused market were pushing both shippers and carriers to their limits. Goods that used to flow from warehouses to brick-and-mortar stores are now being delivered directly to consumers using small order sizes. Forced to adjust to this shift, the carrier networks wound up "a bit out of balance," says Belter, as they moved quickly to accommodate the new volume of consumer orders, add new lanes, and make up for the deficit in the industrial side (which receded during the early stages of the pandemic).

SOLVING REAL-WORLD PROBLEMS

Belter advises all shippers to conduct cross-functional risk assessments and to adopt a cadenced, disciplined rhythm of supply chain assessments. These reviews should be performed on a quarterly basis, and with a particular emphasis on freight volume forecasting. Include internal, functional subject matter experts (SMEs) and outside trading partners in these conversations, he adds, and focus on the potential constraints or failure points within your product and material flows.

"These collaborations should be a strong component of your supply chain," says Belter, "and they should impact how you're working with your partners, both at a tactical and a strategic level." Using RyderShare™, a collaborative logistics platform, for example, companies have tactical visibility of their products and materials flowing through the supply chain. RyderShare™ gives shippers the ability collaborate with trading partners, identify problems, and solve issues quickly.

"RyderShare™ also includes strong exception management logic," Belter explains, "which means all trading partners can focus on solving problems versus looking for problems." This, in turn, helps companies address immediate end-to-end supply chain challenges while also ensuring they are ready to take on future risk as it emerges. As a result, RyderShare™, eliminated costly delays, improves analytics, and improves operational productivity.

FILLING THE LABOR GAP

With traditional labor sources depleted, companies are turning to their transportation management partners for help. Patrick Pendergast, Ryder's Vice President, Talent Acquisition and Dedicated Operations, says the company has been called upon to help even out the "peaks and valleys" of the current shipping environment on both the transportation and labor side of the equation.

"We're able to flex labor in and out, so companies aren't necessarily carrying the overhead of more labor than they need," says Pendergast. "That's just one of the values that Ryder brings to the relationship."

By offering performance bonuses, safety bonuses, and other incentives, the logistics provider helps reduce employee turnover and improve worker satisfaction. "One of our strong suits is being able to recruit talent where our customers need it most," Pendergast says, "and then be able to flex extra capacity in as those shippers require it."

IT'S IN RYDER'S DNA

Ryder's internal risk assessment and management plans extend right out to its customer network, which benefits directly from the transportation management provider's own efforts in these areas. "It's in our DNA, so everything we do for ourselves naturally extends to our customers' businesses," says Belter. "Our professional logisticians work side-by-side with customers—to the point where you can't discern who works for whom, since we're all supporting the customer's supply chain."

This cohesiveness is invaluable not only during extreme events like global pandemics, but also on an everyday basis as companies strive to create more resilient, agile global supply chains. "At Ryder, we're focused on continuous improvement and risk mitigation as standard operating practices," Belter concludes. "We bring professional talent that not only manages supply chains, but also ensures that transportation and supply chain logistics networks remain resilient in tough times."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SAVE MONEY WHILE SPENDING MORE

We all want to conserve working capital by extending payments. But here are five ways procurement can save money while paying suppliers.

BY MARK TROWBRIDGE

Many working in procurement view their role as saving money, either through negotiating for ever lower prices or by negotiating ever more favorable—and extended—payment terms. It's no surprise then that one of the hottest business topics today is cash management.

This is not new. Some 20 years ago, when I led all of Bank of America's contracting management and much of its sourcing procurement operations, we called it "float management;" a term that referred to the enterprise-wide strategic management of cashflow in, cashflow out and overall financial benefits. My team's projects on timing of payments out to suppliers increased annual financial benefits by significant seven-figure amounts—benefits that accrued year after year. What's not to like?

Since then, my consulting colleagues and I have advised many major companies and governmental agencies on how they too can use various payment methods and timing to increase corporate liquidity, reduce costs and receive impressive rebates. These benefits are in addition to cost savings that can be achieved through negotiation and traditional sourcing methods.

Yes, processes like strategic sourcing can initially reduce the costs of products and services bought by a company. But just re-bidding a spend segment the second or third time is not going to yield dramatically different results. After all, suppliers can only go so low and remain solvent.

Or, as Albert Einstein once said: "The definition of insanity is doing the same thing over and over again and expecting different results."

Years ago, Strategic Procurement Solutions' co-founder and I were invited to confer with the then-CPO of one of the largest global energy companies. I remember writing down the executive's challenge at the time: "We have sourced everything you can possibly source, and sourcing again is not going to get us significant savings. We need to look outside of our traditional spending to find dramatic savings." What followed was an innovative discussion of out-of-the-box ideas that leaders could deploy. Cashflow optimization was a key part of that discussion.

Today's procurement methodology of category management is a major improvement over traditional sourcing because it looks more deeply at all cost elements in the total cost of ownership (TCO) model. In the training workshops that my firm conducts for procurement teams, the proper understanding of all elements of the following TCO model is one of the biggest takeaways for participants.

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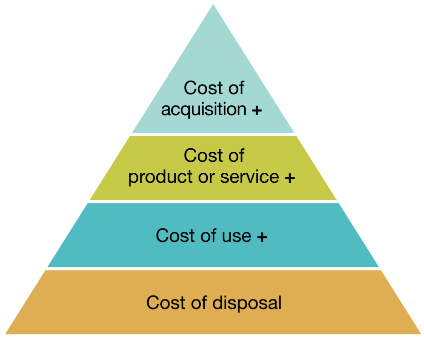
FIGURE 1
The total cost of ownership (TCO) model



Source: Author

TCO over the lifetime of a procured product or service can be calculated using a four-pronged formula:

1. cost of acquisition; plus
2. cost of product or services (delivered, installed and made operative); plus
3. cost of use; plus
4. cost of disposal.

In a typical sourcing methodology, a procurement team may realize savings in establishing strong contracts and issuing purchase orders. But too often they then hand the supplier payment process over to the finance department and accounts payable to complete the procure-to-payment (P2P) cycle.

Unfortunately, too many accounting groups think that their job is to delay supplier payments as long as possible within or beyond terms before processing invoices in the easiest manner possible. But, with a cash management strategy in place, procurement and finance can partner to deliver impressive benefits.

This article will outline five innovative methods to capture cash management advantages that enhance company liquidity and reduce overall costs.

First methodology: Do detective work. In order to strategically leverage our payment timing and processes, we first need to do investigative work. Several important areas of investigation are as follows.

1. Payment terms. Getting visibility into spending with each supplier may be easy if you've implemented a spend analytics technology. If so, pull data on annual spend with every supplier that also shows the payment terms established in your procurement/payables system. You'll need to matrix the terms into several separate data elements (supplier name, supplier number, total 12-month spend, discount percentage, discount number of days and net days). But without spend analysis technology, you may need to work with information technology to extract information into good old Excel to be able to conduct your own analysis.

You will be surprised to find how many suppliers have been set up over the years with terms like upon receipt, net zero and others. As a general rule, no supplier should be paid faster than 30 days without providing a discount.

In a recent review my firm performed for a company in the agricultural sector, we found that nearly a quarter of suppliers had been set up with payment terms under 15 days. Just by moving those suppliers out to their CFO's preferred 45-day terms, the company could free up $18 million in average monthly liquidity. (Note: Readers with a good understanding of accounting may observe that this action also moved non-accrued OPEX portions of that $18 million in payments back by 30 or more days into the next fiscal accounting period).

2. Cost of money. The next thing you need to discover is the interest rate that finance uses in its business modeling. Two alternatives here are as follows.

Cost of funds: This is typically the annual interest rate that the firm has to pay on a line of credit for funds. *Opportunity cost:* This is the annual profit margin management expects from a single dollar invested into company operations.

Understanding senior leadership's approach to cost of money is essential for us to understand the perceived value of payment timing. That's because the interest rates from these two approaches are dramatically different for the same business entity.

3. Liquidity. The final piece of information we must understand is the company's liquidity. This will again come from the finance organization as a summary of the firm's cash flow position. The is important because the leveraging of payment flow must be harmonized with fund availability.

I recently spoke with a CFO who mentioned that three times in the last year she had drawn upon the company's line of credit to finance cash shortfalls. This is an example of a liquidity cost.

4. Current payment flow. For each supplier identified in step 1, you also need to find out how payments to that firm are currently made. The most common method used today is automated clearing house (ACH), which is a direct transfer into the supplier's bank account. Your firm's treasury bank probably charges between $0.25 and $0.50 to process each ACH direct deposit to a supplier (e-mail notification included). Buried in the monthly banking statement, you probably pay an additional batch payment charge of between $12.00 and $15.00 for each payment batch processed.

Another common method used in cross-border international transactions is payment through wire transfer. There is usually a much higher bank fee for this service of between $15.00 and $18.00, but this may be invisible to you because it's deducted from the supplier payment. If you have smart suppliers though, they will insist the payment fee be added to their payment amount so they receive the correct net amount in their account.

Though not as frequent today, some companies still mail hardcopy checks for supplier payments. Typically performed by the accounts payable staff, this requires secure check stock paper printed on a secure printer, usually with two accounts payable staff members witnessing. Once printed, the check must be inserted into an addressed envelope and mailed with a first-class stamp.

A final form for supplier payment is the new methodology of virtual card payments, or vCards. vCard payments cost nothing to process and result in significant rebates. More will be discussed about this revolutionary payment method later in this article.

Now that our detective work is complete, we're ready for the next step.

Second methodology: Earn rebates on "retail-like" B2B transactions. Let's face it, the creation of a purchase order and processing an invoice makes little sense for expenditures like employee travel, fleet car fuel purchases, Internet downloads, supply purchases at stores like Home Depot or Lowes, telecommunication and utility bill payments, subscriptions, facility lease payments and a number of other expenses. The 2015 Center for Advanced Procurement Strategy (CAPS Research) Cross-Industry Benchmark Report identified the average company's purchase order transaction processing cost to be $429. So why incur $429 to process a non-essential purchase transaction?

That same CAPS report showed that the average company spends 1.4% through corporate cards and procurement cards, or pCards. Thus, a company with $1.0 billion in total (direct and indirect) spend should be pushing at least $14.0 million through pCards. Where is your pCard program on this scale?

Having helped many companies and governmental agencies set up pCard programs, I can attest that many corporate credit card programs share some interesting "smoke and mirror" elements.

1. *Cardholder incentives*. Some card issuers pay no rebate to your company but offer incentives to the cardholder. These incentives make it more challenging to pry the card out of an executive's hands. Interestingly, the full value of the incentives is almost never acted upon by the cardholder, and thus costs the issuer very little.

2. *Rebate timing*. Most pCard programs pay rebates annually in arrears (not monthly). That means you need to deduct half your annual cost of funds rate from the rebate to offset them holding your money until the end of the year. The math calculation here is net present value, or NPV, on the future payment stream.

3. *Minimum spend requirement*. Many providers pay no rebate unless "at least" $1.0 million in card spend goes through them annually, and because they pay rebates at the end of the anniversary period, you can push a year's worth of spending through their card program before learning that you missed the minimum level and did not receive any refund.

4. *Impossible rebate tiers*. If a large bank does offer pCard rebates, they are often tiered at impossibly-high spend levels that the customer organization may never reach. I recently reviewed the tier levels of one retail client's pCard provider and found that the client would have to push $1 billion in spending through pCards in order to reach the bank's top 1.95% tier for rebates. The rebate the company was actually receiving on its $9 million annual spend was 0.75%, far below where it could have been.

5. *High average transaction size*. Another trick used by some bank programs is to alter the rebate percentages based on the average transaction size. This is often hidden in the fine print footnote of the program's terms. The tiers presented in the initial proposal are for a large transaction size—often >$500 in a card-in-hand program. But the customer may not realize until a year after program implementation that the received rebates are not at the level that they originally thought they would receive. For example, an average $175/transaction size is typical for card charges of a traveling cardholder or fleet vehicle driver. And it is very difficult (if not impossible) to increase your cardholders' average transaction size.

The good news is that best-in-class procurement card programs are now available through non-bank sources that offer dramatically better terms. For example, I recently helped a group of chemical industry companies establish a pCard program with a non-bank provider in this vertical that gave rebates starting at 1.4% at "dollar one" up to nearly 2% for high volumes of spend. The program pays rebates monthly, not yearly. That particular card issuer offered dramatically-better value to its clients than the other card programs we evaluated.

Third methodology: Utilize virtual card payments (vCard). The world of supplier payments has expanded during the last decade to include what I think is a revolutionary new secure form of payment via credit card facilities. A virtual card, or vCard, is a secure single-use payment made from a corporation's checking account to a supplier's credit card merchant account. The notification includes the initial card digits while the supplier/merchant has the remaining digits to process the transaction. You can pay traditional suppliers via vCard payments, just like you would with ACH, wire transfers or paper checks, pushing an AP batch payment file out to the card program provider.

vCard payments provide rebate revenue similar to a pCard transaction. But unlike traditional pCards or ghost cards, vCard payments can replace costly check, ACH or wire transfers out of accounts payable on purchase order and non-purchase order transactions. This allows inventory purchases, capital project payments, technology licensing and services and other traditional expense purchases to be settled via vCard payment.

vCard payments are a major trend today. Companies are moving away from banks for digital payment to suppliers. The "2017 Purchasing Card Benchmark Survey" results from RPMG Research Corporation One estimated that "as much as 15% of banks' global payments revenue, or $280 billion, is likely to be displaced by the growth of digital payments and competition from non-banks, as payments become more instant, invisible and free."

The opportunity is significant. However, it must be analyzed and implemented carefully due to games often played by traditional card issuers, including the "smoke and mirrors" tricks mentioned for pCards in the second methodology section, plus another shell game trick.

Large ticket interchange exclusions. Big card issuers often strictly impose large transaction "interchange" limitations on the rebates they pay. They sometimes do this even though the card program collected a full interchange merchant fee. These are program definitions where typical rebates are not paid because a transaction is above a certain value under the card program rules. This is frequently those above $7,500. This is the ultimate shell game trick because by moving the transaction into a large ticket interchange bracket, an issuer might exclude more than 20% of a corporate customer's typical accounts payable payments from a full rebate.

A recent analysis my firm performed for a mid-sized client company in the manufacturing space identified between $1.7 and $2.8 million in potential vCard rebates, over-and-above supplier payment term discounts they had taken decades to establish in their $600 million annual supplier expenditures. Our review took just three weeks to conduct. Let's face it: It's not often that procurement can pull several million dollars in savings out of thin air in this short of a time.

A strategy in establishing a vCard program is to first choose the right card program with the right provider. Major financial firms such as American Express and Discover primarily work directly with customers, while banks or other issuers usually structure programs through Visa and MasterCard. Different levels of merchant fees charged by the program should be researched by a procurement team, as well as the level of merchant acceptance in countries where your suppliers are located because acceptance has major differences between the programs mentioned in this paragraph.

The next piece in a vCard strategy is to compare programs from different providers. This should be done by persons who truly understand the complex card space. A proper vCard analysis must ask each potential partner to match your supplier portfolio expenditures against their existing vCard payment acceptors. They can provide estimated rebate levels using your actual expenditures with companies that also accept their vCard payments. But, be very careful before solely allowing finance to ask its favorite treasury bank to estimate rebates through their pCard and vCard "programs. Get some competition involved and solicit a review from a non-bank.

A trick some legacy banks play is to match your supplier spend to a high-match list. These are lists of card-accepting merchants with accounts that are paid via credit cards or virtual cards. The problem? The supplier/merchant may never have accepted vCard payments from this issuer, instead their high-match lists tend to be comprised of merchants that merely possess an active card merchant account for receiving retail payments from their customers. This greatly overstates the real match you are likely to experience.

In reviewing card programs, you cannot merely compare rebate tier percentages, as other factors in this article make a huge difference in rebate revenues that would actually result from each provider. This truth is missed by many finance leaders when selecting a card provider. Note that the following rebate formula has two important elements: Card program spend x rebate % = rebate amount. A high rebate percentage times a low spend volume equals a low rebate amount. You get no rebate on money that didn't go through the program.

Interestingly, the highest-volume vCard payment processer is not a bank. Nor does it issue consumer credit cards, but only corporate commercial cards. In addition to being the largest U.S. commercial MasterCard issuer, according to Accenture's "2019 Banking Pulse Survey: Two Ways to Win," this firm is one of the seven largest corporate card issuers. The issuer processed more vCard payments in 2019 for its customers than the four largest vCard volume U.S. banks combined.

That company converts its customers' check suppliers to vCard payments between 26% (average implementation) and 49% (best practice implementation) of the time, compared with 17% for an average bank vCard program, according to Nilson Report, Tearsheet Research. Its success builds upon already having the largest number of vCard acceptors in the industry at nearly one million suppliers/merchants, which can largely be transformed into vCard acceptor for new customers. *

Fourth methodology: Evaluate which payment term discounts are actually being captured and take steps necessary to ensure capture. If a supplier is set up with 1% 15–Net 45 Day terms and ACH payment—that's great. But, that also requires accounts payable to actually pay each invoice within 15 days to take the discount.

There are two problems here. The first problem is that many payables departments are instructed by their controller to extend the payment and not take the discounts procurement negotiated. Procurement often doesn't know this. The second is that many organizations don't process invoices fast enough to take the discounts.

This is a complicated problem to diagnose. Typically, most companies can only identify which discounts are actually being taken with a spend analysis technology solution. Otherwise, special reports need to be created to identify missed discounts. This is complicated by some companies' accounting procedures that place captured discounts into a separate general ledger account than the actual expenditure.

Compounding this is a misconception that is held by some CFOs or controllers about payment term discounts. I can't tell you how many of them have said something like: "A 2% discount doesn't offset our cost of funds." That sounds logical until I point out that a 2% 10–Net 30 discount gives them a 2% return for speeding a payment up by only 20 days. In comparison, their cost of funds percentage is an annual number. I illustrate this by telling the CFO: "If I could tell you the name of a stock guaranteed to increase 2% in value every 20 days would you buy it?"

Fifth methodology: Strategically leverage supplier payment timing to hold cash the optimal time, move suppliers toward rebate-generating vCard settlement processes, and/or move non-participating suppliers toward discounted payment terms, such as 2% 10–Net 30. This overlays the other methodologies we've already discussed.

In synergy with a card provider communication campaign, which should include e-mail, letters and call center phone calls (at the provider's cost), a company can offer its suppliers several options for payment, in descending order of preference. For suppliers currently set up with lengthy payment terms, offer them shorter payment timing in exchange for accepting a rebate-producing vCard payment. For suppliers currently set up with abnormally short payment timing, such as Net 15 days, let them know that timing will no longer be honored and give them a choice of longer terms or a vCard payment. That will nudge them toward your vCard program.

Cost savings can be calculated based on the cost of money percent multiplied by the average extension in payment timing, the vCard rebates identified, and new payment discounts negotiated.

To capture new payment term discounts, many company leaders don't know that they must be entered into the ERP system vendor master record for the supplier and that a change order must be created for every one of the supplier's existing purchase orders. Merely updating the vendor record will not insert the new terms into any previously-existing purchase orders, including blanket purchase orders.

Achieving value

In procurement, we all want to generate savings through lower costs. However, great value can be achieved when procurement groups look beyond upstream cost savings through strategic sourcing and category management; by augmenting that with additional benefits from optimizing their payments to suppliers.

Innovative card program providers in this space are doing to payment processing what has happened to bookstores and taxi services in years past.

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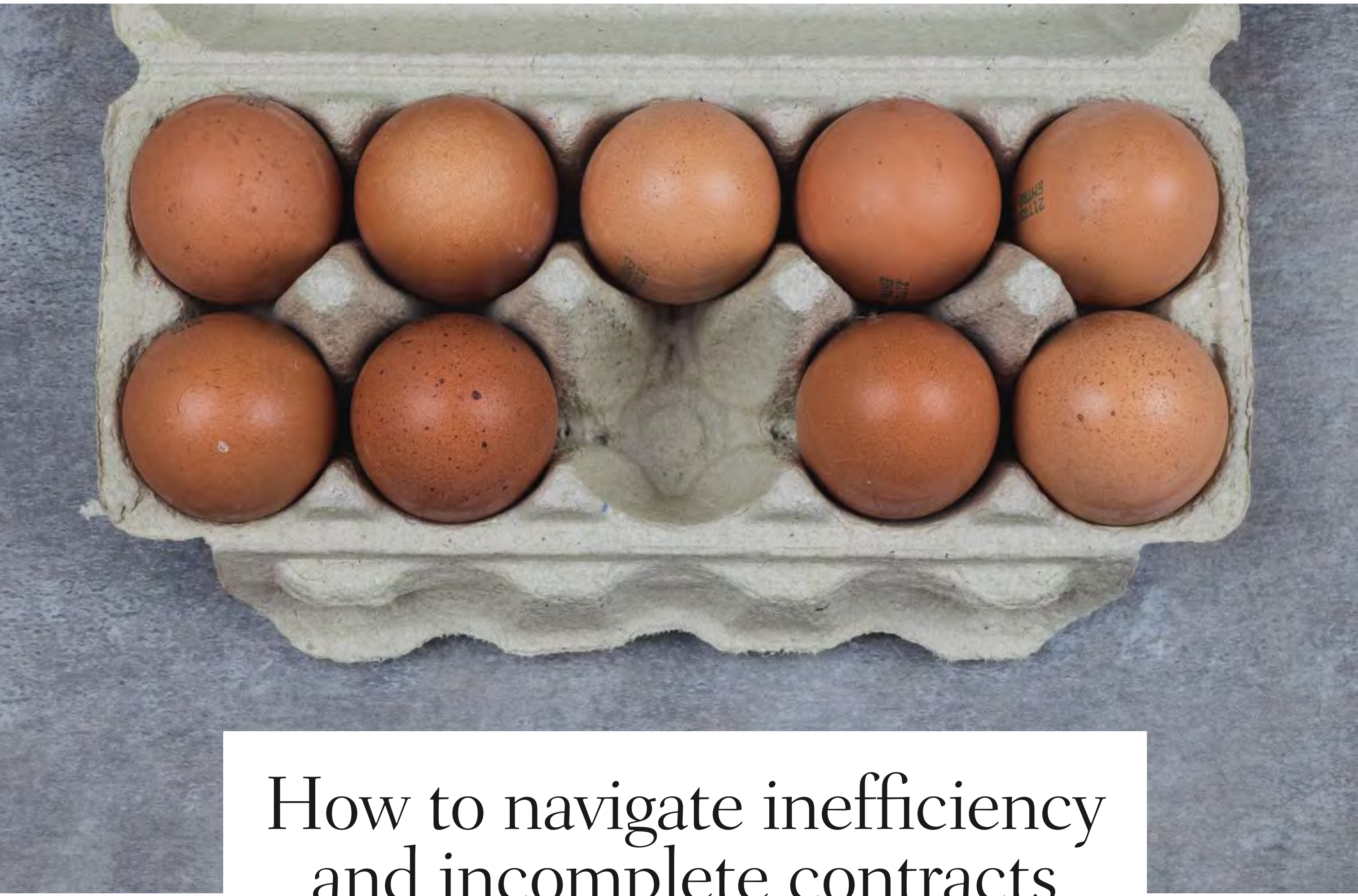
Readers with questions or who are interested in the name of the vCard issuer are welcome to contact the author via the e-mail address provided in the bio.



How to navigate inefficiency and incomplete contracts

In uncertain times, incomplete contracts help companies gain flexibility, agility and resilience. They're made for times like these.

BY TIM CUMMINS, STUART KAUFFMAN AND THOMAS Y. CHOI

A fundamental theory underlying the concept of supply chain resilience is that the most efficient supply chains are also the most fragile. Of course, when the global economy is humming, as it was for the past 10 years, and supply chain disruptions are region-specific and isolated, as was also the case for the past 10 years, that theory seems, well, theoretical. It was something for academics to discuss while supply chain managers designed supply chains that took advantage of the labor arbitrage, minimized the amount of inventory on hand, operated near capacity and relied on logistics networks for just-in-time delivery over long distances.

Then along came COVID-19. Suddenly, theory became practice and global supply chains came to a screeching halt. Companies operating just-in-time networks with minimal on-hand inventory proved to be the most fragile—shutting down first. Others that were already operating at near full capacity, such as the toilet paper industry, could not increase production to meet demand. Efficiency became a vulnerability rather than an asset.

In addition to supply problems, many of these companies grappled with rigidly worded contracts, with limited options. They were either required to take delivery of supply they didn't want or couldn't get supply they desperately needed. The contracts were incomplete. In this paper, we'll demonstrate that when used in the right context, the adoption of incomplete contracts can actually help companies gain more flexibility and resilience.

What are incomplete contracts?

The term "incomplete contracts" was first used in 1986 in the Nobel Prize winning work by Sanford J. Grossman and Oliver D. Hart.* They noted that in practice, contracts cannot specify all possible eventualities—some may even be unknown at the time of the contract—and no one can commit themselves to never engaging in mutually beneficial renegotiation later on in their relationship. There are two important points of departure when considering incomplete contracts: The first is that all contracts are incomplete by nature and the second is that such incompleteness needs to be embraced rather than avoided.

If, as we suggest, firms can successfully implement incomplete contracts, they might be able to operate with more flexibility and prevent local failures, thus making the entire supply network more secure. Lawyers generally work hard to avoid incompleteness in contracts, but we propose otherwise. We accept incompleteness and try to use it to our advantage.

Here are two examples of how incomplete contracts have worked. An article co-written by one of the authors described how Japanese automobile manufacturers use incomplete contracts. With its strategic suppliers, Honda uses a one-paragraph contract that basically says: "We will work together." That offers Honda and its suppliers more flexibility in their working relationship.

Similarly, Toyota utilizes incomplete contracts. After a fire at a plant operated by Aisin Seiki, other Toyota suppliers rallied together to ensure the continuity of supply and that Toyota could continue to operate. They did so without contractual language spelling out compensations for their efforts; rather, these suppliers recognized that by simply working together, success would generate mutual benefit for everyone.

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A consumer example that readers may be familiar with occurs when we sign a community supported agriculture (CSA) agreement. In this instance, farmers and consumers agree to share the risk in farming without specifying exactly what kind of vegetables will be delivered on a regular basis. The farmers get paid early in the season and learn about their customers' preferences, while customers are assured of getting farm fresh vegetables while developing a relationship with the participating farmers. Together, they are supporting local agriculture. Flexibility is a critical component of a CSA agreement because consumers are making a trade-off between the variety found in the produce department of a large supermarket for freshness and the support of the local community. Here, incomplete contracts work because the supplier (local farmers) and customers (consumers) share a common value system.

Existing practice

As supply chain professionals, we have sought efficiency in supply chains. We have implemented just-in-time (JIT) and reduced inventories. We have downsized the supply base to the point that dual sourcing and single sourcing are commonplace procurement strategies.

They work well when supply chains are working. However, the current global semiconductor chip shortage illustrates the fragility of these strategies in the face of a disruption. Automakers like Volkswagen and General Motors receive their chips from just one or two suppliers such as Taiwan Semiconductor Manufacturing Corp (TSMC) or GlobalFoundries. If these suppliers run out of capacity, and chips are in short supply as they are now, supply chains break down, assembly plants stop producing and dealer inventory lots stand empty. What's more, the present shutdowns and inventory shortages are occurring at a time when demand for new vehicles is strong. The most immediate solution, although not always easy to accomplish, is to increase inventory, moving from JIT to just-in-case. As such, companies in general have learned to expand inventories. In the United States, after the introduction of lean practices, the ratio of inventory to sales decreased from about 1.5 in the 1990s to 1.2 in the 2000s. It has since increased back up to 1.4.

Companies are also trying to build up redundancy in their supply chains, as the automakers will undoubtedly do following the resolution of the semiconductor shortage. For instance, the Japanese government recently recommended that its manufacturing companies engage in a "China plus one" policy to account for the uncertainty coming from their Chinese suppliers. The Japanese government is also in talks with TSMC to build a semiconductor factory in Japan. These moves are designed to increase supply chain redundancy. However, where and how much are difficult questions that all companies—and governments—are still trying to answer.

Even if they find answers to those questions, external conditions change and inventory models have to be run again. Regardless of the outcome of those models, firms may not be able to implement changes quickly. You can't simply build a new semi-conductor factory overnight, and when it comes to other materials, current contracts may not allow companies the flexibility they need. They are bound by what we call "complete contracts." Motivating values in complete contracts are specificity, efficiency and certainty—driven by an overall desire to cut input costs.

Lessons from COVID-19

Companies need to work together to combat the common foe—the coronavirus and its impact. Yet, there is friction between buyers and suppliers when one party (most frequently the buyer) imposes unilateral change in contractual terms to grapple with a dilemma, such as the one caused by the pandemic.

This is largely because the existing contracts have been built on the complete contract paradigm and have ignored or been unaware of incompleteness and consideration of the "residual rights" described by Grossman and Hart that address what should happen when unforeseen events like a global pandemic occur.

We need to consider the risks this missing link creates—acceptance of incompleteness and the establishment of a framework to handle unanticipated situations. For instance, a July 2020 survey by The International Association for Contract & Commercial Management, now known as World Commerce & Contracting, of the most negotiated terms found that 49% of organizations report an increase in the frequency of disputes and disagreements as a result of COVID-19. In another recent survey by the organization, 92% of respondents said they believe there is a need to develop contracts that support increased collaboration in trading relationships.

We are discovering the usefulness of incomplete contracts. There is a fundamental difference between the immediate purchase of 50 laptops and a three-year agreement for laptop supply or availability. The former offers and requires little flexibility, so if a crisis like COVID-19 happens, whoever has leverage will likely dictate new terms (i.e. a complete contract). The latter forces the two parties to engage in a dialogue and look for creative solutions (i.e. an incomplete contract).

The realities of market conditions mean that aiming for precision and trying to deny incompleteness makes no sense—as COVID-19 has shown, businesses must work around the contract when it offers no help. If we instead adopt codes or working practices that fill the gaps, we can reduce the need for such precision and also speed interactions at every phase of the relationship.

Next steps

There are several steps that supply managers and their suppliers can take to address the issues we've highlighted. They are as follows.

Acknowledge that incompleteness exists. Incomplete contracts intentionally build in legal indeterminacy to incorporate greater flexibility in the parties' ability to fulfill the contract. Flexibility and adaptiveness, based on shared interests, become more important motivating values.

Shift away from risk transfer to risk management. We need to rethink the traditional approach to negotiation and contracting, which typically seeks to transfer risk from one party (usually the buyer) to another (usually the supplier). The shift occurs from allocating the consequence of things going wrong to establishing terms and principles for how unanticipated events will be managed. Think of how Toyota's suppliers came to the aid of another supplier—in other words, managed the risk—for the mutual benefit of the network.

Structure agreements to manage incompleteness. By using intentionally indeterminate, open-ended language in contracts, parties may be able to come to agreements that allow for more flexibility to fulfill the terms of the contract while also adapting to ongoing supply limitations. And by specifying the values of the parties in the contract itself, rather than focusing on the specific transactions at issue, parties can keep their contractual relationships more indeterminate, open-ended, and flexible.

For the common cause and common good, the parties to a contract can negotiate after the fact, such as an episodic recurrence of coronavirus, what a fair trade would be, given the innovative, jury-rigged solution and its value to the contracting parties. For instance, when we were all suffering through toilet paper shortages, we were focused on finding toilet paper that fit our perception of what a roll of toilet paper should look like in terms of its feel and size. What we did not know was that industrial toilet paper was in abundant supply at the time. With a bit of change in perception, we could have easily solved the problem.

We believe there are practical solutions to these problems, and that options are either available or starting to emerge following the scale of disruption created by the pandemic. Following are three examples.

- ***The development of relational codes or charters across a supply network.*** The Australian Department of Defense has been a leader in the development of *relational charters* spanning the amalgam of organizations required to deliver an outcome as part of a long-term program. This new thinking was based on the concept that an enterprise is a joint project or undertaking such that the parties to it should be bound by common rules and principles, jointly developed and adopted. None of these approaches has been formalized in a contract. They simply overlay the body of formal agreements with a set of working practices and behavioral norms.
- ***Adoption of relational practices across a supply ecosystem.*** A supply ecosystem consists of a group of companies that acknowledge their co-dependent relationships in terms of delivering products or services. Within industries such as oil and gas or construction, where there are major benefits to be gained from collaboration, there are instances of *relational codes* being established across a group of companies. An example is the UK North Sea oilfields, where demanding geographic conditions combined with price volatility combine to drive a need for more dynamic approaches to contract and performance management.
- ***Establishing industry models or standards.*** Private law is well understood as a branch of law that is distinct from public law. Yet within the concept of private law, there are extensive variations in terms of rights and enforcement. While private laws are formally defined, at one end of the scale, adoption and adherence are essentially voluntary. *Industry codes of practice* are an example of this and are designed to reduce disagreements and disputes and to reduce or eliminate the cost and time associated with resolution. Certain retail sectors operate with such codes and they are now of growing interest to a wider scale of business. For example, the insurance and aerospace sectors are exploring the development of voluntary codes that would establish principles of governance to improve supply chain resilience, to increase

efficiency and, potentially, to streamline issue resolution (for example, through expert panels).

Trading relationships are changing and they are affected by increasingly challenging geopolitical and economic conditions, with fast-changing regulation and social values. Contracts in their traditional form do not offer the agility and adaptability needed to allow smooth and efficient adjustment.

Indeed, one of the biggest complaints about contracts is their length, obscurity and innate complexity. Hence, it is unrealistic to suggest that the solution to a need for increased speed and efficiency is to make contracts themselves even more complicated. That is why the solution to "incompleteness" is taking a variety of forms and may even result in fundamental changes to the process and practices of contracts themselves.

Ultimately, all contracts are incomplete. Yet, contracts in a traditional sense create a relatively rigid framework that defines areas where there is certainty, but ignore, prevent or sometimes even deny the management of areas of uncertainty. The question is how best to fill that gap.

According to "A new approach to contracts: How to build better long-term strategic partnerships," a 2019 article in the *Harvard Business Review*, the gap should be filled by expanding the contract itself and formalizing the management of incompleteness through legally enforceable contract terms. We suggest that while this may occasionally be the answer, to date those efforts have not worked well. Moreover, there are many barriers to adoption. Therefore, we need to recognize and promote the practical options for how we deal with continuous changes brought on by a crisis such as a global pandemic or other major disruptions. Each of the three alternatives we identify introduces a degree of formality that is embedded in process and practice, not simply written into a contract.

Embrace incompleteness

We submit that contracts are inevitably incomplete because they cannot anticipate every eventuality, as shown by COVID-19. However, in our efforts to avoid the uncertainties of this incompleteness, we create rigidities in contracts that mean they cannot easily be adapted in changing circumstances, nor can they be adapted often. Because of the way we seek to allocate risk and push for lowest cost, our counter-party has no real incentive to collaborate.

If in fact we want to achieve greater flexibility and cooperation, we should acknowledge and embrace incompleteness, and develop norms or standards of behavior and practice to handle its consequences. We can do that through the sort of codes illustrated by the three examples above. Essentially, we propose making incompleteness something that is a positive aspect of our supply relationships, rather than the problem it is viewed as today.

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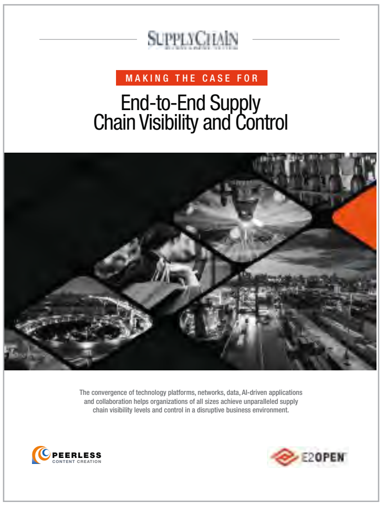
To learn more, readers may be interested in the new book: "Contracting in the New Economy: Using Relational Contracts to Boost Trust and Collaboration in Strategic Business Relationships," published by Palgrave.



MAKING THE CASE FOR

End-to-End Supply Chain Visibility and Control

The convergence of technology platforms, networks, data, AI-driven applications and collaboration helps organizations of all sizes achieve unparalleled supply chain visibility levels and control in a disruptive business environment.

END-TO-END SUPPLY CHAIN VISIBILITY, or the use of real-time data to make decisions based on a complete picture of the holistic supply chain, became a battle cry for most organizations in 2020. Facing a host of new challenges and disruptions, organizations learned what many of their competitors already knew: in the absence of complete supply chain visibility, managing the flow of goods and services is nothing more than a crapshoot.

Facing challenges that included—but certainly weren't limited to—a global pandemic, a massive uptick in e-commerce orders, labor shortages, and a capacity-constrained transportation environment, companies across all sectors were forced to redefine their global supply chain operations.

Through it all, the need for better supply chain visibility and control was a common thread. The great divide between the "haves" and "have-nots" on this front became alarmingly clear when manufacturing lines shut down, essential products disappeared, and retailers' shelves sat empty.

In the lack of good visibility and control over Tier 2 and Tier 3 suppliers' operations, for instance, companies were left to guess when their raw materials would be available to ship. This, in turn, created severe bottlenecks on manufacturing lines, and left both companies and their customers scrambling to find alternate sources of supply. And while this scenario plays out on a daily basis in any business environment, the pain becomes particularly acute during worldwide crises.

As it has during past disruptions, technology played a critical role in helping companies effectively manage through these interruptions and with as little negative impact as possible. By merging specific supply chain management capabilities onto a single operating platform, for instance, organizations could effectively redefine their control tower capabilities and position them for success both during and after the disruption.

AGILITY CAN COME AT A COST

Manufacturers, distributors, retailers, and logistics providers have been outsourcing more of their operations over the last 10 years. Through these broad networks of business partners, companies can improve their agility, be more resilient, and use less of their own capital—all critical imperatives in the competitive business world.

These outsourcing arrangements also come at a cost. Participants not only have to manage their own internal, disparate, siloed point solutions, they also have to manage information from multiple business partners across different tiers. With no access to real-time data or visibility across a variety of trading partners, the individual players in these complex supply chains have to literally guess where goods are within those networks at any given time.

The dangers of relying on guesswork became very public in 2020. Companies quickly realized how little visibility and control they had over their supply chains networks—and the key players within those networks. Lacking insights into the exact location of both stationary and in-transit goods, manufacturers couldn't plan production schedules, distributors couldn't replenish their warehouses, and retailers were left with entire aisles of empty shelves.

"When a global disruption like a pandemic emerges, it calls a lot of attention to the information and data gaps that exist in the world's complex supply chains," says Lori Harner, senior director of product marketing at E2open. "Where the transition to outsourcing made companies more efficient and cost-effective, it also introduced a lot of complexity into the picture."

JUNK IN, JUNK OUT

In many cases, siloed, latent, or unharmonized data is to blame when supply chain visibility is minimal or nonexistent. As these different data types pummel supply chain operators from different angles, manually figuring out which of them deserve attention and which can be ignored is virtually impossible.

"Without an engine that can normalize that data, it's just junk in and junk out," Harner explains. "Some companies deal with thousands of different ecosystem partners, which just further increases the complexity of the problem."

In this making the case, we describe the essential best practices of using a cloud-based supply chain management (SCM) technology platform that integrates a wide range of capabilities into a unified system.

We'll learn how one logistics provider reimagined its own supply chain control tower capabilities in order to accommodate its growing e-commerce customers, and show the return on investment (ROI) that chief supply chain officers (CSCOs), CEOs, and CFOs see when their companies invest in robust end-to-end supply chain visibility platforms that help them to not only see, but understand the data, act on collaborative resolutions, and learn for next time. •

COVERED IN THIS REPORT:

- Supply Chain Control Tower Capabilities Redefined
- Using Data, Visibility, AI and Collaboration to Build Resilient Supply Chains
- Logistics Provider Improves Parcel Shipping Visibility for Global E-Commerce Customers
- Turning Supply Chain Visibility and Control into Strategic Advantages

Go to: www.scmr.com/e2openmtc2021 for the complete report.

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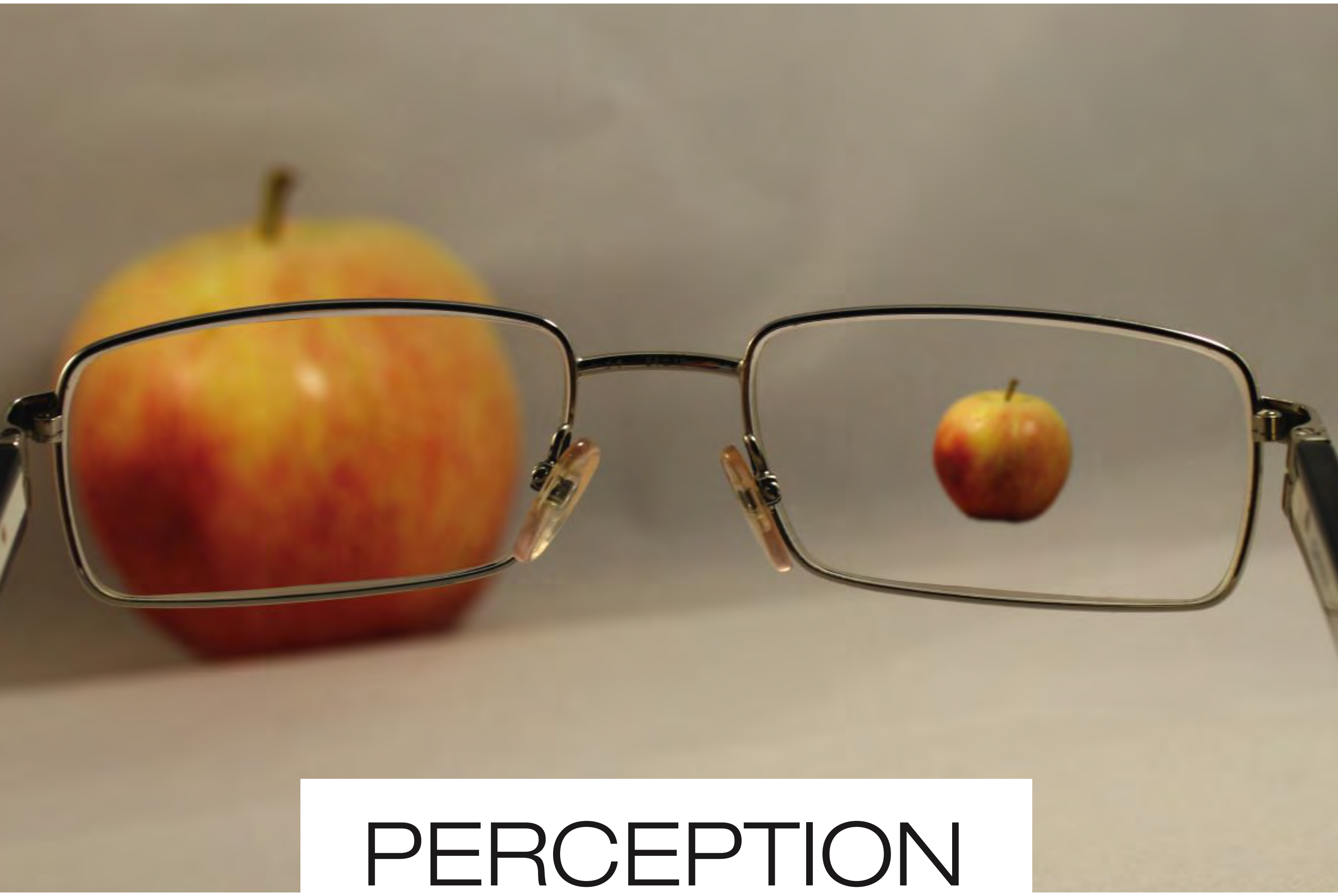

PERCEPTION MATTERS

How your procurement team perceives your suppliers—and their capabilities—can have a profound impact on the performance of your supply chain. Those can be managed.

BY THOMAS CLAUSS AND CHANCHAI TANGPONG

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The role of suppliers has changed. The traditional focus for most procurement professionals was on cost efficiency, often through negotiated cost reductions. Today, as supply chains become more disintegrated, procurement increasingly turns to its supplier base for a substantial share of the value creation process that used to be done inhouse, including the suppliers' roles in new product development and innovation—especially getting access to innovation before competitors. Suppliers are involved in operations at increasingly higher levels than in the past, including technologies, modules and even entire systems. Recent statistics show that suppliers in manufacturing and technology industries account for 60% to 80% of the gross value added.

This has two consequences. The first is that successful supplier relationships are more important than ever in today's agile marketplaces. In particular, purchasing managers need to ensure that suppliers possess the right attributes to contribute to productive relationships. As suppliers become more integrated into their customers' operations, they need attributes that go beyond competitive prices and the ability to deliver on time.

That leads to the second consequence: How procurement, and individual buyers, perceive the suppliers with which they do business. After all, perception is often reality. Traditionally, supplier selection and evaluation methods relied on objective, technical attributes and capabilities that could be measured prior to the relationship. However, many relevant supplier attributes will only be unveiled in the course of the relationship with a buyer firm; they can't be objectively assessed based on checklists and supplier selection sheets.

In contrast, these attributes are often only perceived by those purchasing professionals actively involved in supplier relationships over time. Although these perception-based attributes are not yet considered in supply chain management, they can have substantial effects on the operational performance of supplier relationships. Investigating the role of perception-based supplier attributes in supplier relationships thus yields new opportunities for supply chain management practice.

We conducted an in-depth multi-method study based on interviews with 85 German companies to explore these attributes of suppliers as perceived by purchasing professionals and to unveil their performance effects (see sidebar: About our research). Based on these data, we developed three models on how perception-based attributes of suppliers can stimulate (1) cost efficiency and (2) innovation generation, and may (3) sidetrack purchasing professionals into pitfalls in the relationships at the expense of operational performance. Therefore, besides creating awareness for a new set of supplier attributes, we shed light on the mechanisms that link these attributes with the operational performance of supplier relationships.

Supplier attributes in selection and evaluation

Supplier selection and evaluation typically relies on certain measurable supplier attributes such as competences, organizational factors or reliability and performance indicators. Most of these attributes are objective and are de-coupled from the relationship within which their potential unfolds. However, focusing on these can't capture all relevant attributes for selecting high-performance suppliers. Certain supplier attributes such as integrity, trustworthiness or fairness are inherently intertwined with the relationship in which the supplier and the buyer operates. Therefore, these attributes are often not objectively measurable but dependent on the individual perception of purchasing professionals.

Because purchasing professionals lean on individual opinions, beliefs and attitudes when interpreting supplier attributes in relationships, individual perception influences their behaviors and supply chain management practices in supplier relationships. In investigating this phenomenon, we refer to "perception-based supplier attributes" as the attributes of suppliers that are embedded in the supplier relationship and are inherent in the perceptions of purchasing professionals who manage these relationships.

We explored these perception-based supplier attributes during our first 60 interviews in which purchasing professionals elicited their perceptions regarding various suppliers in their supplier portfolio. These attributes were then aggregated, and their performance implications were explored in another set of 25 interviews. From these data, we identified four primary perception-based supplier attributes that are related to the operational performance of supplier relationships. These are proactiveness, trustworthiness, friendliness and helpfulness; these are defined and substantiated with some example attributes that were mentioned during the interviews with purchasing professionals in Table 1.

In further analyzing the performance effects of these perception-based supplier attributes, our findings provide important managerial insights regarding their role in cost efficiency and innovation generation, along with managerial cautions to avoid pitfalls in managing relationships with suppliers. Those insights are respectively summarized and graphically presented in Figures 1, 2 and 3. Let's look at each in more depth.

Achieving cost efficiency

Key dynamics. As Figure 1 depicts, our findings suggest that the four supplier attributes including friendliness, trustworthiness, helpfulness and proactiveness can help buyer firms achieve improvements in cost efficiency from supplier relationships. Friendliness and trustworthiness help grease buyer-supplier collaboration, reduce frictions and strengthen the relationship between the two parties, in addition to promoting buyer-supplier information and idea exchanges on how to work together more efficiently and reduce costs in the operations.

Echoing our findings, the head of purchasing at a large-sized machine construction company commented that "When you have a good relationship with a supplier, I will more easily achieve the cost goal with this supplier than those with whom I have a negative relationship. There are suppliers with which you know, I do not want to sit at one table with them, because it'll end up emotional."

Similarly, a technical and strategic purchaser at a mid-sized automotive company shared that "…there are some that you trust. And there are others. In my last company, I had suppliers for more than 20 years. With the next topic, the next project, you talk about it quickly, both sides design a solution. The solution progresses. I've got the experience, that if I have worked together with someone for a long time, and at the beginning I do more work, but then I buy a system for 30% to 40% less."

TABLE 1

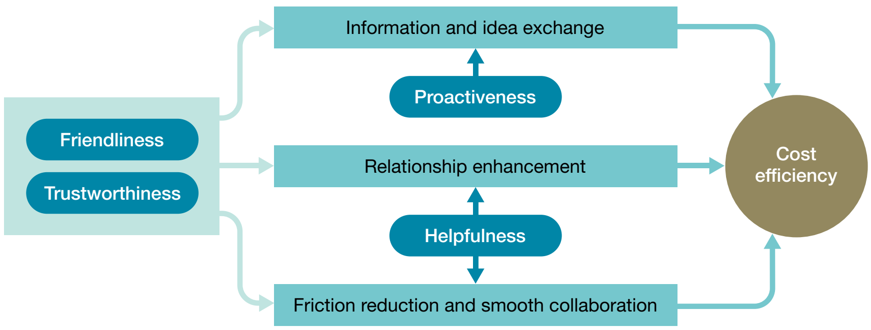
Four primary perception-based supplier attributes

PERCEPTION-BASED SUPPLIER ATTRIBUTES	DEFINITION	EXAMPLE ATTRIBUTES MENTIONED DURING THE INTERVIEWS
Proactiveness	The supplier is proactive and eager to take initiatives regarding joint activities instead of waiting for requests of the buyer.	• Active vs. passive • Autonomous vs. dependent • Proactive vs. reactive
Trustworthiness	The supplier is honest and demonstrates a high trustworthiness in the interaction.	• Honest vs. dishonest • Trusted vs. distrusted • Trustworthy vs. not trustworthy
Friendliness	The supplier is familiar and close to the buyer, which also manifests in personal and informal interaction.	• Close vs. distant, • Family-like vs. anonymous • Friendly vs. distant, professional • Personal vs. impersonal
Helpfulness	The supplier is attentive and inclined to help and to support the buyer.	• Attentive vs. inattentive • Helpful vs. not helpful • Supportive vs. not supportive

Source: Authors

FIGURE 1

Supplier attributes and cost efficiency



Source: Authors

Similar to friendliness and trustworthiness, the supplier's helpfulness can contribute to cost efficiency improvement between the buyer and the supplier by enhancing their relationship, reducing friction and smoothening their collaboration. On the other hand, proactiveness is a supplier attribute that promotes cost efficiency through information and idea exchanges that can lead to a more cost-efficient solution. However, at times a supplier characterized by high proactiveness can also create some tension, or even "displeasure," with the buyer as it takes initiatives in advancing new ideas to the buyer. "It is a mixed bag" as a strategic purchaser and project buyer at a large-sized sensor company put it.

Key takeaways. Managing productive relationships with suppliers to achieve cost efficiency becomes more seamless when suppliers are characterized by friendliness, trustworthiness and/or helpfulness. These three attributes could be part of the supplier selection criteria, particularly when the buyer firm is undertaking a major effort toward improving cost efficiency. Trying to improve cost efficiency at a high magnitude within a relatively short time period can be a stressful process. Having suppliers with the right kind of attributes to work with during this process would make a big difference in the lives of p urchasing managers at the buyer firm.

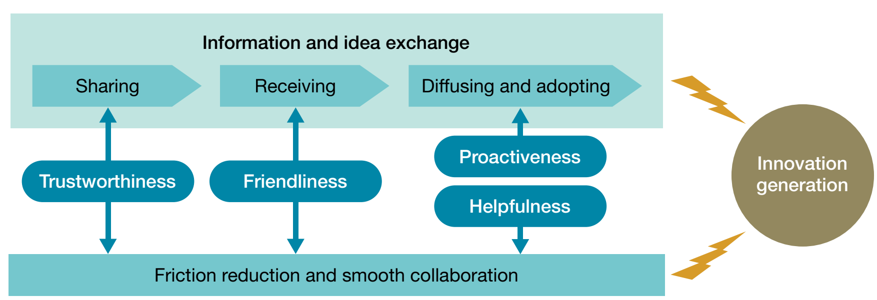
In addition, suppliers with high proactiveness may at times agitate or cause purchasing professionals some discomfort or tension, but they can open purchasing professionals up to new information and new ideas, which eventually can bring about a more cost-efficient solution. Purchasing professionals should be mindful of this possibility and not discount the potential merits of proactive suppliers. Keep in mind that this type of suppliers is a "mixed bag."

Generating innovation

Key dynamics. Figure 2 illustrates the implications of our findings regarding the role of supplier attributes in advancing the generation of innovation in supplier relationships. As described in the above section, trustworthiness, friendliness and helpfulness play an important role in the reduction of friction and the smooth collaboration between the buyer and the supplier, which can in turn contribute to innovation generation in their relationship. In addition, Figure 2 highlights an interesting combination of trustworthiness, friendliness and proactiveness in effectuating information and idea exchanges, which also play a critical role in innovation generation.

FIGURE 2

Supplier attributes and innovation generation



Source: Authors

Trustworthiness opens up the buyer and the supplier to share new ideas and information. "New ideas, new research results, from some research or development project. They will always share it first, or try to develop it first, with those whom they have a trustworthy mid- to long-term relationship," noted a strategic purchaser at a large-sized forklift and logistics systems company. However, new ideas shared by one party do not always guarantee that the other party will take them, let alone adopt and implement them.

Friendliness then helps bring down the barriers to the reception of new ideas. As a strategic purchasing manager at a large-sized metal processing company commented: "You are much more accessible if the chemistry is right. If you get along with somebody, you are more approachable, then you are open to innovations."

Finally, proactiveness plays a critical role in diffusing and getting ideas adopted and implemented. "[The supplier] drops by…examines the machine with our purchasers, and tells them this and this, I can do it as well. And together we think about how we can extend the business," commented a strategic purchaser at a large-sized agricultural machinery company on its proactive suppliers getting new ideas into action. Taken together, these three attributes help make the information and idea exchange process more effective and facilitate innovation generation in the supplier relationships.

Key takeaways. Good things come in packages. In selecting suppliers for innovation generation, purchasing professionals may want to look for complementary attributes of suppliers—namely trustworthiness, friendliness and proactiveness—in facilitating the process of the information and idea exchange. Missing one of the ingredients, the process could be sub-optimized. Helpfulness can also help strengthen the collaborative climate and relationship between the two parties, which also contributes to innovation generation in the supplier relationships.

Avoiding pitfalls

Key dynamics. Our findings also suggest managerial cautions on the "dark side of relationships." There are some pitfalls that purchasing professionals need to be mindful of when working with suppliers with high relationship-oriented attributes including trustworthiness, helpfulness and friendliness.

As Figure 3 illustrates, when working with suppliers characterized by trustworthiness, purchasing professionals over time may be susceptible to the take-it-for-granted practice with their suppliers, assuming things will go as they should based on their experience. From there, the operational performance can unintendedly or unknowingly drift downward. As an example, a strategic purchaser at a large automotive company recalled how they worked for years with a single leasing company, noting: "We just trusted them pretty much completely. So, we just accepted their price hikes, because the purchasing processes ran very smoothly. And then, we just asked for some other offers. After years, we realized that we paid too much."

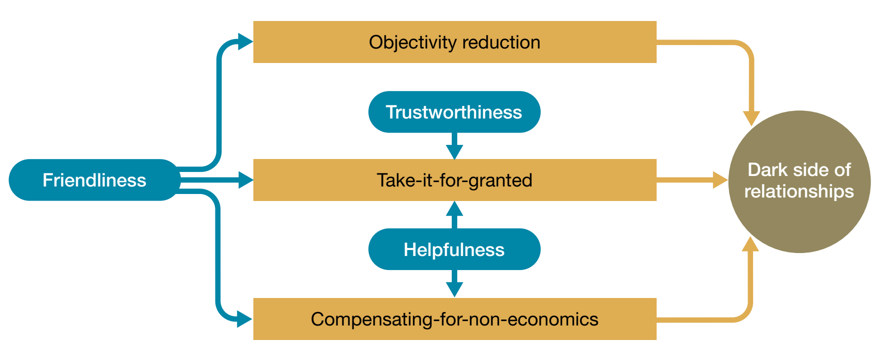
Besides take-it-for-granted assumptions, compensating for non-economics is another pitfall that purchasing professionals may encounter when working with suppliers characterized by helpfulness. Purchasing professionals are human, and place values on social and emotional sides in addition to economics. When the relationships with suppliers hit high marks on the social and emotional sides, purchasing managers may subconsciously accept a lower mark on the economic side. As the head of purchasing at a small-sized machine construction company commented: "If I think of our costs, sometimes we do not reach the lowest costs possible from suppliers with whom we have positive relationships. It is quite pleasant, and you have good feelings and are quite happy to work with them. There, you don't want to exhaust the other. You simply want to continue the relationship." Nevertheless, when taken to the extreme, the practice of compensating for non-economics can be counterproductive.

Finally, objectivity reduction is another pitfall that purchasing professionals should be aware of, particularly when working with suppliers characterized by friendliness. The effects of supplier friendliness can not only be in the form of take-it-for-granted and compensating for non-economics, but can also cause purchasing professionals to become less objective and less critical in their assessments of suppliers—even when seeing glaring issues. A buyer at another large-sized machine construction company noted: "People got along very well with their sales reps, and attended their company's parties. They quite often just closed their eyes and became less critical."

Left unguarded, these three pitfalls can

FIGURE 3

Supplier attributes and relational pitfalls



Source: Authors

considerably compromise the operational performance of supplier relationships.

Key takeaways. Guarding against these pitfalls is easier said than done, particularly when the overall relationships with suppliers are harmonious. We're all human, and we tend to be a prisoner of our own perceptions and prone to certain biases. Purchasing professionals are no exception.

To safeguard against this, we recommend that purchasing professionals pay attention to early warning signs, such as excessive efforts from suppliers to make up for the capabilities they lack or the noticeably high desire to preserve harmony in the supplier relationships from purchasing managers. It is also advisable for purchasing professionals to establish procedures to reveal potential biases in their practices.

For example, purchasing professionals may seek information from outside of their current supplier relationships into their evaluation processes to help increase the objectivity in their assessments. Periodic considerations of market or industry benchmarks and information obtained from people outside their purchasing function, such as technical departments, marketing units, and higher-level management, can provide useful, new information outside the ongoing supplier relationships. This outside-view information can thus enable purchasing professionals to put things in perspective and make better-informed judgments in managing their supplier relationships.

About our research

This research project aimed to answer two questions: (1) What are the predominant attributes of suppliers that are perceived by purchasing professionals during ongoing supplier relationships? (2) How do these perception-based supplier attributes influence relevant supply chain management practices and therefore the operational performance outcomes of supplier relationships?

In exploring this inquiry, the study relied on a research design with multiple methods and utilized data from 85 interviews with purchasing professionals from companies of various sizes across different industries in Germany. In the first part of this study, 60 interviews were conducted, applying the so-called repertory grid technique that allows people (i.e. purchasing professionals) to elicit their implicit perceptions about others (e.g. supplier firms). During these, the interviewees initially provided 420 perception-based attributes of their related suppliers. These could then be aggregated to a set of key attributes of suppliers.

In the second part of this study, another 25 interviews were conducted to explore the role of these key attributes of suppliers in influencing supply chain management practices and operational performance outcomes. These interviews helped to elaborate the complex relationships between the perception-based supplier attributes and the success of supplier relationships.

More information on the study can be found in the original research article "Perception-based Supplier Attributes and Performance Implications: A Multimethod Exploratory Study," published in the *Journal of Supply Chain Management*. It can be downloaded open access via https://doi.org/10.1111/jscm.12211.

Perception is reality

The research presented here sheds light on a set of new supplier attributes that should be considered in supply chain management: Perception-based supplier attributes as perceived by purchasing professionals in the course of repeated interactions and supplier relationships.

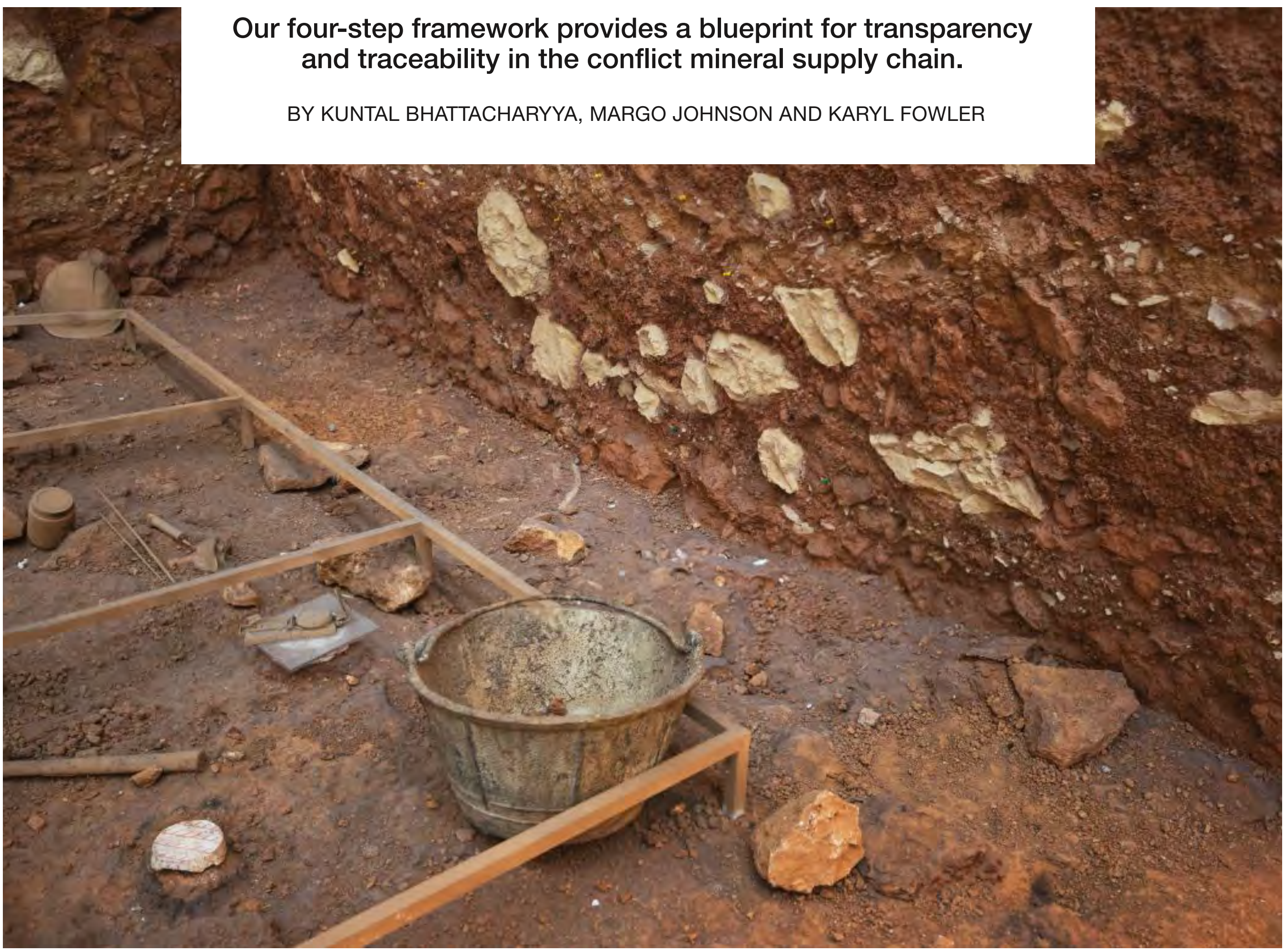
Because of the benefits of these attributes and their potential pitfalls, purchasing professionals should be aware of their own perceptions and should realize which attributes should be part of their considerations in supplier selection and evaluation decisions. As these perception-based supplier attributes are however of a primary subjective nature, some supplier attributes may only become evident in the course of ongoing relationships, which calls for dynamic and iterative supplier assessment procedures. This may require the development of new measures for supplier evaluations.

In addition, the pitfalls related to perception-based supplier attributes should not be taken lightly and may call for regular and formalized mitigation mechanisms. We hope that these insights from our research will be thought-provoking and can help purchasing professionals reflect upon some of these perception-based supplier attributes in their daily supply chain activities.

Tracking CONFLICT MINERALS

Our four-step framework provides a blueprint for transparency and traceability in the conflict mineral supply chain.

BY KUNTAL BHATTACHARYYA, MARGO JOHNSON AND KARYL FOWLER



"…as Tesco and Walmart have discovered, there is little point in trumpeting the excellent conditions for stitching of jeans if the cotton is being harvested unethically."

—Dr. Steve New, Harvard Business Review*, 2010*

The world's human population is estimated at around 7.8 billion. Close to 70% of this population has access to a mobile device, putting the electronics consumer base at roughly 5.4 billion people worldwide. Only a well-oiled electronics supply chain can manage end-to-end fulfillment for a global diaspora of such magnitude. Apple is a case in point. While the design of every iPhone is completed in Apple's Cupertino, Calif. headquarters, Apple depends on a staggeringly complex global supply chain comprising 43 nations and six continents to bring its design to reality.

A quick look at the A12 chips that go into these iPhones reveals the level of complexity. A global workforce orchestrates the different processes, from chip fabrication in Taiwan to testing in Indonesia to assembly in China. If you dig deeper, the substrate, minerals and interconnect that go into the printed circuit boards, or PCBs, are sourced from different parts of the world. Jim Morrison, Apple's vice president of technical intelligence, aptly mentioned in a December 2018 interview with CNBC that "tracing the origin of a wide array of parts and minerals that go into even a single component is, at best, tricky."

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Traceability is critical to building transparency of information interchange in a connected world. What makes the topic interesting is how the functionality of certain minerals in the electronics supply chain are intertwined in our daily lives.

The iPhone, or any mobile phone, is a great example. The next time you put your phone on vibrate during one of your many virtual meetings in this new normal, understand that it is the metal tungsten in your device's circuit board that causes this vibration. When you take pride in the touch capabilities of your screen, understand that those capabilities are a function of a thin layer of electric film on top of the screen produced from an amalgamation of multiple elements, one of which is tin, which is also used as a solder on circuit boards. The electrical connections that carry all of the data are made of gold, among other metals. Tantalum is used for micro capacitors that regulate the flow of electricity.

These metals—tin, tantalum, tungsten and gold (also referred to as 3T-G)—are branded as "conflict minerals." Those are defined by a 2005-2006 report of the International Development Committee as "natural resources extracted in a conflict zone and sold to perpetuate the fighting" (see Figure 1).

Consequent steps taken by governments, international organizations and watchdogs have made the presence of such conflict minerals a serious threat to their underlying supply chains.

I am the end-user: Should I be worried?

It depends. Let us present a perspective. If you were made aware that the tungsten in your device was mined in a West African nation by the use of forced labor, would that tickle your conscience? *Probably yes.*

Furthermore, how about knowing that part of the price you paid for your phone travels all the way through its supply chain and helps fund activities for rebellious armed forces and terrorist organizations, all because that small quantity of tin/tungsten/tantalum/gold in your phone was unethically mined? *Now, perhaps we have your attention.*

While the earliest note of conflict minerals was in blood diamonds (essentially how diamonds used to be mined in certain West African nations by child and forced labor), these 3T-G metals are mined in the Democratic Republic of Congo and adjoining areas. They go into almost all electronics products that work off printed circuit boards. The utilization of money that flows into this supply chain is worrisome, to say the least.

Managing operational sustainability is a need of the hour

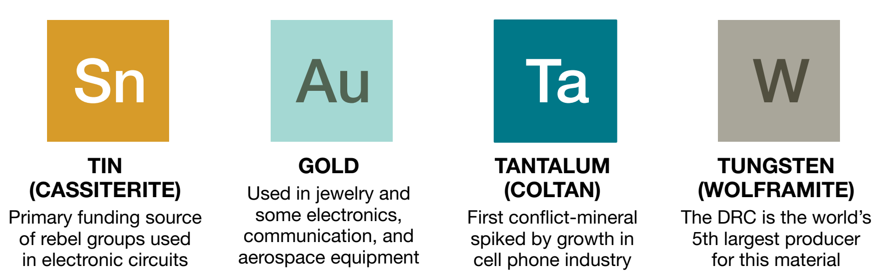
Over the past 200 years, the world population swelled from 1 billion to about 7.8 billion people. In retrospect, it took more than 200,000 years of human history to get to a population of 1 billion. To appease this ever-surging world population, environmental needs for sustainability and industrialization have been at crossroads over the past couple centuries.

Of recent, acute global warming and abrupt climate change coupled with ecosystem imbalance and the extinction of species have forced businesses and governing bodies to seek a compromise between environmental and social actions and economic profit by forging accountability within a supply chain.

While it is true that the bottom line is all about economic profit, of late, it has also been about social responsibility and environmental sustainability, or the triple bottom line (TBL). The TBL approach to sustainability has shifted operational dynamics over the past quarter century. Consumer awareness and changing consumer demands (the quest for a greener lifestyle, aligning personal values to corporate values and a rising voice for social and environmental consciousness) are forcing

FIGURE 1

3TG conflict minerals and context for use



Source: Authors

Conflict minerals factsheet

At a glance

- 3T Mining is a multi-trillion dollar hotbed; generates upward of **$200 million** annual revenue for **military** and armed groups in the DRC
- **65-80%** of word's tantalum is used in **electronics** products. **50%** of the word's tantalum reserved are in the DRC; Congolese armed groups earn an estimated **$6 million** per year from trading of tantalum alone
- **98%** of the artisanal gold from Congo is **smuggled** into neighboring nations to avoid the tag of "conflict minerals"

The social stigma

- **$$** flowing into the supply chain has been linked with financing violence, killings, rape, and child labor, among other **human rights abuses**
- The average miner in Congo earns an equivalent of **$1/day,** while the wealth of mineral resources in the country is estimated at **$24 trillion**
- Around **40,000 children** are working in mines across the DRC

The economic equation

- **Tungsten: $4 million** annual revenue; **$2.5 million** used for funding the war and local militia
- **Tantalum: $6 million** annual revenue; **$3.5 million** used for funding the war and local militia
- **Tin: $133 million** annual revenue; **$80 million** used for funding the war and local militia
- **Gold: $62 million** annual revenue; **$37 million** used for funding the war and local militia

The environmental hazard

- **Toxic public health** consequences from ~**12 hours** manual labor in the mines without safety precautions
- **Deforestation** due to chemical discharges
- **Blood contamination** due to prolonged exposure to minerals
- High levels of **radioactivity** in mining regions

Source: Center For Supply Management Research, Scott College Of Business, Indiana State University

stakeholders to be cognizant of the need for transparency across supply chains and investigate specific areas of vulnerability where there is a possibility of conflict.

As an example, the U.S. regulatory board that looks at global supply chains for the electronics industry that have the 3T-G mined from certain West African nations figured that there is a tremendous disservice to human dignity when humans are misused in mining these metals (see factsheet). Further, the revenue from mining in these nations has given abusive armed groups and terrorist organizations the means and incentive to operate.

Considering the need to accept ownership and accountability for its own supply chains, the U.S. Congress passed the Dodd-Frank Act in 2010. Section 1502 of Dodd-Frank requires publicly-listed U.S. companies to check their supply chains for tin, tungsten, tantalum and gold, if they might originate in Congo or its neighbors; to take steps to address any risks they find; and report on their efforts every year to the U.S. Securities and Exchange Commission. Failure to do so can lead to enforced intervention by the Justice Department and the freezing of operations for that specific supply chain.

Building traceability in the conflict mineral supply chain

It is complicated. Tracking materials from more than 2 million artisanal miners in the Eastern Congo that smelt small amounts of metals and determining their links to guerrilla operations is like trying to "apply modern supply chain logistics to the equivalent of the 1849 California gold rush," Chris Bayer, an independent research consultant, said in a 2015 interview with the *Wall Street Journal*. Indeed, by 2016, fewer than 24% of the U.S.-based companies reached full compliance in accordance with Dodd-Frank. Two-third of the companies, including the likes of Google and Amazon, couldn't describe the country of origin of their metals, and about 45% failed to disclose the framework they used to conduct due diligence.

The diverse businesses involved in this supply chain often stand to benefit from the current gaps in mineral supply chain transparency. There is significant money to be made, given the millions of electronic devices to be sold, and human and environmental consequences will persist until enforcement becomes real.

Traceability is a precursor to enforcement, and traceability without a proper framework is a nightmare. A stepwise approach to unraveling the supply chain is critical to trace any presence of conflict minerals in this very complex supply chain network that spans multiple continents and nations and are connected to commodities that serve the entire global population. Following, we provide a four-step approach to validate conflict mineral presence in your supply chain, especially in the context of 3T-G.

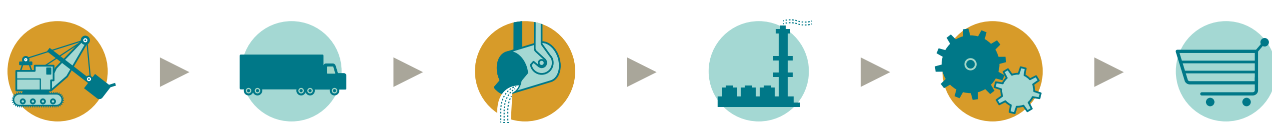
Step 1: Understand the structure of a conflict mineral supply chain. While the DRC continues to remain a hotbed for the mining of 3T-G, it is not alone. Adjoining nations like Angola, Uganda, Tanzania and Rwanda are heavily invested in the transit and transportation of metals from DRC and in serving as trading platforms.

These nations act as sellers of the raw materials to smelters in Southeast Asia via African ports like Mombasa and Dar-es-Salam, where the minerals are processed and sent to refiners in East Asia and/or Europe. These refined minerals are then shipped to electronic manufacturers across the world to produce components like PCBs and capacitors, which eventually end up in electronic devices like cell phones, laptops and digital cameras. Figure 2 below provides a skeleton structure outlining the parties (nations and regions) involved and the logistics track for conflict mineral supply chains. Mapping out these core components and their relationship to one another creates a foundation for subsequent steps.

Step 2: Identify areas of vulnerability in accordance with the TBL. Standardization of traceability and audit efforts are antecedents to accelerated commercial adoption and broader compliance. In accordance with TBL expectations, our framework builds on threshold points around the three pillars of TBL—economic, environmental and social. Therefore, while the economic pillar investigates the transparency of revenues and fairness of pay-ratios, the social pillar investigates worker demographics, hours of work, wages, miner health and ownership; and the environmental pillar investigates possible contamination by lead, mercury and arsenic in the mined region. An unfavorable outcome of

FIGURE 2

Simple example of the conflict mineral supply chain



MINE
Armed groups often control transit roads in the Eastern Congo

TRADER
Minerals are transported from DRC and traded in adjoining countries

SMELTER
East Asian smelters process the minerals

REFINER
Minerals are refined in East Asia and parts of Europe

MANUFACTURER
Refined minerals are shipped to manufacturers in the U.S. and Europe

CUSTOMER
Final products are sold to consumers around the globe

Mining and trading predominantly occurs in DRC and adjoining countries (**Angola, Uganda, Tanzania, Rwanda**, etc.) in addition to **Myanmar** and **Colombia.**

Source: Authors

investigation along any of the pillars will raise a flag and render the entire supply chain at risk of being in "conflict."

Step 3: Utilize blockchain technology to communicate verifiable information. A framework built around TBL using blockchain technology promotes transparency among stakeholders and connects the three arms of the TBL.

Blockchain technology provides a common reference point for the myriad of systems used by supply chain stakeholders to communicate verifiable information. Unlike writing to a traditional database, anchored data on a blockchain entails irreversible timestamps that serve as key proof points along a supply chain, supporting regulatory compliance and transparency needs. Leveraging blockchain anchoring in combination with other emergent technologies like decentralized identifiers, verifiable credentials and secure data storage makes traceable communication across disparate supply chain management systems possible.

For the conflict mineral supply chain, each stakeholder (mine, manufacturer, transporter, auditor, etc.) of the mineral would be required to register a unique fingerprint for their organization. They would then use this fingerprint (which is technically powered by a public/private key pair for those familiar with public key infrastructure) to sign off on documents and transactions involved in the creation and movement of the minerals. These signed documents become verifiable credentials, and a reference point to the document is anchored to a public blockchain.

The document itself can be securely stored, and anyone who wants to see private details must obtain permission. However, the blockchain anchors fortify confidence that the exact evidence in question was created by the specified company, at a precise moment in time. These pieces of verifiable evidence are linked together by their shared relationship to the mineral product. The information can also be combined and presented in formats that meet the needs of regulatory bodies, retailers or even consumers.

Step 4 provides an example of how this might work.

Step 4: Integrate and standardize audit requirements via a "no-conflict summary." Our proposed framework requires that each stakeholder engaged in the mineral supply chain (as identified in Step 1) will contribute verifiable information to a certified no-conflict summary.

This summary will build on investigating and documenting "conflict" points, capturing the mineral's journey through the supply chain along the three pillars of TBL. So how might this approach be used to help companies and regulators determine the conflict status of minerals?

The no-conflict summary will include a link to each piece of shared evidence, such that all data can be verified back to its original source and process for creation. For example, standardized evidentiary documents such as the *Conflict Mineral Report Template* (*End-to-End Mineral Tracking,* Google Report) used by Google can be added to the summary. This audit capability can also be conducted by machines, which are able to read the standardized, context-aware data model behind the verifiable information.

A further benefit of this approach is that the same verifiable document model can be used to provide evidence of the legitimacy of a supply chain stakeholder. For example, a mine can include evidence of its business license, legal entity identifier, CT-PAT or other relevant certifications.

This could also include business-specific audits such as Apple's Supplier Assessments (*Supplier Responsibility,* Apple Report). Because the blockchain anchors pointing to the evidence include immutable timestamps, the system builds and self-enforces a reputation system whereby the stakeholder is incentivized to ensure that their operating credentials remain in good standing (i.e. up to date, not expired, etc.). This reputational evidence layer helps regulators understand business identities as a pattern in time, comprised not just of their legal documents, but also including their past supply chain actions.

Looking forward

Today's electronics supply chains are more global and more distributed than ever, necessitating supply chain managers to be cognizant of the triple bottom line, which is germane to sustainable operations around economic, social and environmental conditions. Transparency of information interchange across the three arms of the triple bottom line is critical.

The framework outlined in this article provides a blueprint that enables organizations to streamline the audit process within 3T-G supply chains and identify traces of conflict minerals. Powered by blockchain, this blueprint can be utilized to program the audit process and secure transactions for all stakeholders.

Blockchain coupled with other emergent technologies provides a transparent and flexible way of capturing a mineral's journey along the supply chain. Aggregating referenced information into a no-conflict summary provides a shared access to verifiable data across global trade networks.

Getting to a win-win with the Department of Defense

Who says you can't change for the better what has been considered to be best practices by the U.S. government for the past 30 years? Here's how a 4PL formed a public/private partnership to improve the supply chain to Diego Garcia.

BY STEVEN P. KNEPP AND ROBERT A. NOVACK

What better gig could any supply chain professional want—supplying an island paradise with a nearly guaranteed flow of a limited number of SKUs at regular intervals using a well-established sea carrier? Furthermore, the contract pays a bonus for cost reductions and service improvements. That said, don't be fooled by the cool ocean breeze.

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To begin, the U.S./British island paradise is Diego Garcia, situated more than 1,000 miles from the closest land mass (India), 2,100 miles from Tanzania, and almost 10,000 miles from HQ in Washington D.C. And, well, it's a desert island—talk about working remote.

Between 2,500 and 5,000 U.S. troops live on the island, which features a 12,000 foot runway that accommodates any aircraft in the Department of Defense's air fleet. A notable naval fleet also calls the island home. In other words, the island can deploy U.S. fighting resources in a very short period of time to an area of conflict on the other side of the world from the Pentagon. About now the strategic importance of the island and its supply chain snaps into focus.

Fortunately, this is not a one off. Many U.S. bases around the world are managed by civilian companies, called base operating support (BOS). This is a form of public/private partnerships (PPPs). A PPP is an arrangement between a U.S. federal contracting agency representing the military and a privately owned company, where the privately owned company performs activities to support military operations. It is estimated that 40% or more of all overseas DoD bases are managed through the BOS concept. And its practices have been in place for more than 30 years.

In the case of Diego Garcia, the PPP focuses on supporting the daily infrastructure and operating needs of the island's civilian and military population. The BOS contractor performs all activities associated with operating a small city. That includes purchasing everything from private and public sources and having it somehow arrive in a normal operating logistics environment.

The contractor, known here as Company A, is essentially a fourth-party logistics provider (4PL) that brings intellectual capacity, not physical capacity, to run the operation. If managed properly, the BOS contractor is not only compensated for completing its required tasks but also receives bonuses for initiating cost reduction activities. This gives the company an incentive to operate effectively as well as efficiently.

In many 4PL relationships, the client is dominant, which tends to guarantee that established practices remain unchanged. And the Diego Garcia arrangement was not any different. Clearly, this was a disadvantage to the 4PL with a contract that offers incentives for cost reductions and service improvement. And that was how this story started. In fact, the 4PL was in danger of losing the contract because it had not cut costs or improved service in three years.

The big turnaround came when the 4PL figured out how to manage the client so all could win. The outcome is a roadmap for future PPP success stories that breaks down in four strategic steps.

The first is mapping the original fragmented process. Second is identifying key client entities involved in the current process. Third is determining client priorities and responsibilities. And the key final step is designing a supply chain that reduces cost and improves service.

In dollars and cents, that came to a $6 million annual savings for the Diego Garcia supply chain. Here's what it took to make that happen.

Discovery

To put it simply, Company A had only a partial understanding let alone partial control of key activities in the Diego Garcia supply chain. And that was after managing it for more than three years.

The goal of the redesign was the integration of all activities in the supply chain. To understand every transaction and decision activity, every department involved from Company A, as well as the DoD, needed to come together, share their perspectives and decide how to integrate it all into one smooth process. This was not a sure bet given 30 years of standard practice by the government and all the moving parts, which didn't always consider other perspectives.

As to the moving parts, Company A was the purchasing agent for Diego Garcia. The supplier for each of the 3,000 SKUs would arrange for ground transportation from a U.S. location to the consolidation point on the West Coast—Alameda, CA. From there, the U.S. Navy would take control of the ocean movement to Diego Garcia. However, there were circumstances that made the process less than optimal.

Three government entities had complete control over ocean transportation to the island. In fact, 30-year-old DoD contract terms gave control over the ocean transportation to the Military Sealift Command (MSC), the Military Traffic Management Command (MTMC) and the Naval shipping facility at Alameda. Each had its own separate command and control structures with separate budgets. Communication between the groups was less than optimal, too. And transit times as long as 120 days due to scheduling snafus were not uncommon.

None of these entities were built to either cooperate or even integrate their functions. Furthermore, within Company A, the individuals in purchasing responsible for vendor selection rarely sat down together to discuss issues and problems to develop methods to integrate their own activities with each other.

While Company A knew its contract was in danger, it did not have any idea of the specifics of how the logistics support from DoD would affect its ability to receive performance bonuses. But Company A did know what it wanted—a single point of contact that could manage the entire transportation process; both domestic and international. That single point would be Company A itself.

As the single point of contact, Company A would take on several functions. These would include receiving the LTL shipments from suppliers, processing the cargo, loading the containers and sending the goods on their way to Diego Garcia. This would provide a complete transportation cycle, bundling all services into a single cost along with a single invoicing process. The transportation cycle included domestic land and international water.

The goal of the new process would be the integration of the U.S. Navy and commercial ocean carriers to bring the total transit time down to a consistent 70-day to 73-day process from its historical 120 days. The other target was to reduce the damage and loss ratio from 20% to only 3%. Clearly, significant improvements could be made.

Negotiating changes

Company A started the review internally to understand its own current practices and needs. Besides those understandings, the participants determined what could be achieved with a different supply chain model and presented it to corporate officers.

The next step was to bring all parties, including executives, into one room to finalize a single vision. This included a timeline for departments to open their books individually for review of their current departmental practices and present them to the executives and other departmental managers. This process review resulted in a management directive that defined timelines to ensure a better probability of winning the rebid based on overall cost reductions though a redesigned supply chain.

There is no understating the amount of work required to get that rebid. Company A needed to address not just the long and uncoordinated logistics process. It also needed to address the FARS (Federal Acquisition Regulations) detailing the overall terms and conditions to satisfy not only the Scope of Work (SoW) but also the relationship between the Government Contracting office and BOS contracts during the past 30 years for the island.

This required Company A to find a way to change the government's business plan so that it could not only keep its contract, but also earn the bonus money promised. Fortunately, as the process progressed, the key DoD contracting officer was very receptive to a review and took the lead to work with the MSC and MTMC. He acted as the meeting chairperson for the direct conversations with the Navy, greatly simplifying and streamlining the review from the start.

Streamlining domestic transport

As described in the terms and conditions of the existing contract, everything purchased by Company A was free-on-board (FOB) terms West Coast at the Alameda Naval Yard in California. The goods transferred from each seller to Company A with the domestic freight cost included in the cost of goods. FOB terms of sale determine where the title to the commodities transfer from the seller to the buyer in domestic moves. Meanwhile, INCO terms determine the same for international transportation. Because the freight moves to Diego Garcia involved both domestic ground and international water transportation, both terms were used.

The internal process review revealed that, on this particular contract, 80% of all vendors were either in the Midwest or Southeast with average transit times via common carriers on LTL shipments from 7 days to 10 days.

The terms of sale allowed only discounts from the carriers to be applied for the seller's benefit. Additional fees were adjusted to reflect: the original extended inventory carrying cost of title transfer between buyer and seller; extended domestic transit time, and; the extended timeline of processing the purchase orders after receipt at the Navy's consolidated freight station (CFS) in Alameda. Due to the extended payment terms involved, Company A could not take advantage of terms such as net 10%. Another issue for payment to vendors was an internal accounting requirement for Company A to only pay vendors after 30 days receipt or net 60 days.

The direct disadvantage to the extended terms was the additional cost of how invoices were paid. The added domestic transit time under the terms of sale on this specific project added to the net terms from the seller for payment, and cash flow was a concern. Furthermore, shipments to Diego Garcia required all associated transport costs to be either added to the commercial invoice as an additional item or built into the item's cost of goods sold. With most of the vendors located in the Southeast and the Midwest, extended transit times and lack of control with the LTL carriers were huge problems.

Company A, as part of the process review study, realized that by minimizing the truck moves from vendors' docks to Alameda, the domestic trucking transit time could be reduced from an average of 10 days to 12 days to only four days. The cargo could be inspected the day of arrival and the commercial invoices could be processed in just a few days instead of an historical high of 20 days. It also eliminated the added travel cost of their employees having to visit the consolidation point periodically to inspect cargoes. This led to the idea to move the FOB point from Alameda to Huntsville, Ala., where Company A had a major facility.

The new system not only reduces domestic travel times, but the CFS receives cargo and processes the invoices next day. This makes it possible to take advantage of net 10 to net 15 days discounts from the suppliers.

Also, the new arrangement allows for streamlining accounting and payment processes with all associated cost of goods sold on a single invoice. Further, it is able—due to the shortened domestic transit times—to obtain purchase price reductions through payment terms net 30 days instead of a minimum of net 60 days as directed by the DoD.

By changing the FOB point from the West Coast to Huntsville, both parties found a balance to enhance their positions by allowing Company A to have more control over the domestic freight move, and by separating the freight charges from the cost of goods on the invoice. With 1,500 purchase orders and 3,000 line items moving separately on a less-than-truckload basis with domestic ground transportation, Company A processes the shipments from Alabama in half the time than previously possible while reducing shipping costs 30% to 50%.

The matter of ocean transport

Then there was the matter of the U.S. Navy contracting directly with ocean containers on a global basis. Unfortunately, this approach was not focused on specific trade lanes that could reduce costs.

Normal practice was for the Navy to contract with U.S. flag carriers in accordance with the Jones Act on a minimum bill of lading basis. The selection of a carrier and the booking of the containers could only be made when the shipment size was defined. This determined how many containers were needed for a specific voyage. The Navy CFS made the container bookings directly with MTMC, which would make the booking for the sailing directly with the carrier sailing to Singapore. There, goods were discharged from the U.S. flag carrier for consolidation and final shipment to Diego Garcia.

At times, containers arrived in Singapore a day or two after the Navy chartered vessel had already sailed for Diego Garcia. They would then sit on the dock for an additional 28 days, waiting for the next chartered rotation. As Company A discovered, there were unexplored possibilities here to speed up shipments.

Until the time of the review, SeaLand had the exclusive rights to all government cargo sailing off the West Coast for Singapore and Korea. The other

U.S. flag carrier was American President Lines (APL). While MTMC would not book APL, doing so was actually an option.

In the mid-1980s the Federal Maritime Commission (FMC) created vessel rationalization also known as vessel sharing. Under this model, any carrier on the same trade lane can put their containers on the "bottom" of another carrier to ensure a higher payload per sailing and to minimize the operating cost of the carriers. Suddenly there were many more shipping options to Diego Garcia.

Company A approached a very motivated APL for a service contract for this specific trade lane with a Huntsville point of origin. The additional inland cost, by issuing a Huntsville bill of lading, was minimal. Upon arriving at the Long Beach port, the containers only sat for two to three days before being loaded on either the Sealand bottom or the APL top. Between both carriers, there was at least one sailing weekly to Singapore.

Regardless of which carrier was used, the cost remained the same. More immediate sailings eliminated detention charges for poor management of the arriving cargo. In fact, the APL rate was 35% to 45% lower than the MTMC minimum bill of lading contract with Sealand.

Additionally, the CFS was operated by the U.S. Navy in Alameda and staffed by Longshoremen charging a flat rate of $48 per hour. High labor rates did not guarantee high service levels. In fact, it was not uncommon for Company A to send people from Huntsville to the Bay area to perform simple inspections of cargo and perform their own inventory audits. Those audits were necessary to reduce the 20% combined pilferage and damage ratio. Through joint efforts between Company A and another 4PL, the Longshoremen rates were reduced from $48 per hour to $14 per hour.

The biggest elephant in the room

While much had already been accomplished, the biggest elephant in the room remained—the MSC.

In preparation for the first meeting with MSC, Company A developed an assessment of the current Navy controlled logistics support process and a plan for improvement. The primary focus was how the established process affected Company A's ability to receive purchased products and ship them to Diego Garcia.

A new plan was inclusive from purchase order generation through delivery to the island. Each specific activity in the process was addressed and discussed by Company A's finance and purchasing executives. A change in issuance of the commercial bill of lading was central to the changes.

Company A wanted a Non-Vessel Owning Common Carrier (NVOCC) bill of lading. An NVOCC buys slots on vessels below market rates through volume, allowing the NVOCC to make a profit on every container moved or in groups on a port-to-port basis. This recommendation would be the hardest to obtain MSC approval because it would shift the process from MSC to an NVOCC freight forwarder on a point-to-point basis.

With both APL and SeaLand sharing the same tops and bottoms, an opportunity surfaced for the NVOCC to sign a discounted rates and services contract for the same vessel rotations by SeaLand and APL. In accordance with the Jones Act, all U.S. owned cargo transported to either U.S. possessions or facilities must be transported on U.S. vessels registered as American owned or sailing the U.S. flag. Because these two American carriers shared space on each other's vessels, the requirements of the U.S. flag legislation were maintained. With the help of the DoD contracting officer who had become involved with this process, the shift to an NVOCC was accepted by MSC.

Clearly, Company A had many different possibilities to trim costs and improve services in the Diego Garcia supply chain. And it all became possible after considerable research and examination of the practices in place. Once the Navy and DoD agreed to a contract modification that converted a highly fragmented supply chain into a fully integrated one with a single source supply chain manager, it took 60 days to implement. And in the end, all parties involved benefitted from a streamlined supply chain to an island paradise with cool ocean breezes in the middle of the Indian Ocean.

It's a great time to be in procurement

By Elouise Epstein

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The procurement function stands at the precipice of a new decade, one that will be punctuated by endless macro disruptions, massive technological innovation and a new generation of professionals. It's an era of uncertainty. Institutions created after World War II (such as the United Nations, North American Treaty Organization and the European Union) long provided a stable operating and legal foundation on which to conduct business—but those institutions are now imperiled. Indeed, governments and global institutions once addressed intellectual property protection, R&D, security, financial stability and risk, but now businesses likely must put greater efforts into all of these areas.

As COVID-19 demonstrated, businesses need to build extensible, flexible and resilient supply chains that can adapt locally or globally based on changing political and economic conditions. Yet it's a challenging time to work in operations because many enterprises seem more focused today on the commercial side of their business, in pursuit of earnings targets and short-term profit.

Nevertheless, the procurement profession has matured from people who simply ended up there to a new generation of motivated, highly capable difference makers. This new generation is hyper-networked and prone to collective success beyond the four walls of an individual enterprise. They no longer see business as a zero-sum game of information hoarding, posturing and arrogance. Part of this change can be attributed to the fact that procurement organizations are far more diverse and inclusive than they have ever been in the past. This internal change of generations and cultures—as much as external events such as hurricanes or pandemics—should prompt leaders to question whether traditional "best practices" and "best-in-class" templates remain relevant.

Surprisingly, manual processes still dominate today's procurement organizations. They're like white-collar versions of 1970s manufacturing facilities, with legions of people handling low-value activities, in this case, sourcing and demand management. Time and attention are consumed by routine, labor-intensive transactional activities such as pricing negotiations, contract awards and supplier performance monitoring. Procurement workers spend hours piecing together fragmented information flows from myriad transactions—a task that technology could perform in seconds.

Indeed, automation has transformed other business functions. So internal stakeholders from those functions grow frustrated by what they perceive as slow service from procurement. They yearn for self-service options and direct access to more comprehensive information about the purchasing process. And procurement should be able to satisfy them: Digital technologies are on pace to automate and create transparency for most routine processes within three to five years. Of course, such a prediction assumes that the procurement function will embrace these new digital technologies.

Drivers of change

Customers are always the biggest drivers of change. Today, ever-changing customer preferences are entering the era of hyper-transparency. Thus, companies need to make good on environmental, social and governance (ESG). Most ESG programs are inadequate; at best they're a check-the-box marketing activity. Tomorrow's supply chains will need to put environmental impact front and center. Consumers are increasingly demanding it, and governments will too. Most people can see that global climate change is real and that it's having tangible impacts. People have less tolerance for the destruction of native habitats to produce cheap palm oil or the burning of rainforests to produce beef. Individual consumers can't avoid these issues as they permeate the collective consciousness via social media. These concerns thus affect how products get packaged and delivered, and, most importantly, from whom they are sourced. Procurement experts need to be ahead of these trends.

Ultimately, the world is moving to more micro, on-demand-based economies. To see how painful supply disruption can be, you need look no further than recent tariffs, natural disasters in Puerto Rico or predictions about Brexit. Coming years will see more and more of these disruptions and challenges.

Given the decline of transnational institutions such as the United Nations and European Union, businesses must put greater efforts into their own intellectual property (IP) protection, R&D, security and financial stability. Thus, building and operating a supply chain in the future will become both more complicated and more crucial.

In short, procurement is about to pivot to become a digital-first operation. That change will ensure that the function becomes a strategic imperative for all corporations.

Digital will facilitate this change

Digital exploded into the collective business lexicon in the late 2010s. Like so many other buzzwords, it lacked a clear definition or common understanding. When we say digital, do we mean the digitizing of paper processes? Do we mean the adoption of digital tools? Do we mean changing fundamental processes and making them digital? All of the above? Something else?

At a theoretical level, any of that sounds good. Who doesn't want to be digital? It's so 21st century. And so many organizations, goosed by consultants' PowerPoint slides, are undertaking "digital transformations." But few people can articulate what such a transformation means for individual functions. Nowhere is this more evident than in procurement. What's missing are the details of what will become digital and how.

Simply defined, digital procurement applies sophisticated technology and insights to a company's need to procure goods and services in order to create value. That's the goal: creating more value by applying better insights. For the sake of illustration, following are some brief summaries of basic examples of good digital procurement:

- reducing approvals and workflow complexity by using smart oversight controls;
- reducing the number of people involved in a transaction;
- proactively generating insights;
- improving relationships with fact-based information; and
- reducing the burden forced upon suppliers.

Digital principles rely on free-flowing data with a singular golden supplier record. Once that data is available, procurement folks need to know what to do with it. In some cases, actions simply need to be automated. With digital procurement, it should be easy to onboard new clients or plug in new tools, suppliers and requisitioners.

Digital procurement is not about dashboards, which are largely useless. Digital procurement is not about mobile, which is equally useless. If you're going to ask your technologists to send something to a mobile device, why not just automate it? Why do category managers need to sign off on $100,000 invoices on their phones? The problem isn't the device used for signing—it's that most organizations create meaningless approval tasks. When you move those tasks to mobile, guess what? They're still meaningless. This is not an effective use of technology and re-inscribes the idea that procurement is a shadow budget control function rather than a value creator.

Furthermore, digital procurement is not about the variations of Artificial Intelligence (AI), Machine Learning (ML) or Robotic Process Automation (RPA). Those are enablers. Procurement does not purchase AI, ML or RPA—if it does, they're being taken for a ride. As a procurement professional, your vision is never "a blockchain"—your vision is a seamless and transparent supply chain with minimal administrative overhead. If someone can deliver that using blockchain technology, then good for them. But your vision is focused on results, not enablers. So, if someone is trying to sell you on the finer points of blockchain technology, it's like they're trying to sell you on the quality of rivets in the Brooklyn Bridge. The correct answer is not: "I need to figure out how rivets work." The correct answer is: "I'm happy to pay a reasonable toll to cross the East River, but I don't want to buy the Brooklyn Bridge."

To succeed in this disordered world and complex business environment, we need an ecosystem approach, a procurement operating system that's built on a solid data foundation, offers plug-and-play integration of easily on-boarded apps, gives users a delightful, burden-free experience and features an intelligence layer that produces insights across the entirety of the operating system. Imagine having an iPad of apps that are tied to a central hub. All you have to do is pop open whichever app you want to use and start doing your work. You can run your sourcing event, make a requisition or do market research, all from apps on this hub. Behind the scenes, they're seamlessly integrated to provide you with the data and functionality you require.

Operating on the fly

By now it's obvious that macro disruptions are part of doing business in a globalized world. It's no longer about "black swan" once-in-a-generation events, but a never-ending series of "gray swan" (not-so-improbable) events. The true measure of our ability to operate digitally, whether from home or in the office, will be our ability to change processes on the fly.

In the midst of the next global crisis, can we talk to our suppliers and see a need to change payment terms, extend emergency funds or even do a joint investment with other companies to support the supplier? Can we do that quickly, effectively and efficiently? We need to get away from rigidly defined teams and toward more flexible teams that can be directed at hot spots. This is dependent on our ability to stop haggling over small contracts or pursuing phantom savings.

It's no longer about being invited to the table in support of the business. It's not "us vs. them." This is about asserting our agency to open the door, sitting down at the table and making useful contributions. Our contributions are going to be the data and insights that we bring. Data and insights about supply markets, about supplier performance, about optionality, about how best to effectively engage with third parties or where there is supplier/supply risk. These are procurement's contributions; digital procurement is the end-game—the way we will get there. It really is a great time to be in procurement.

****

This column was adapted from the upcoming Kearney book, "Trade wars, pandemics, and chaos: How digital procurement enables business success in a disordered world."

Priorities in sourcing and procurement for 2021

To thrive today, organizations must develop employees' soft skills.

By Marisa Brown, senior principal research lead, Supply Chain, APQC

Marisa Brown is senior principal research lead, supply chain management, APQC. She can be reached at mbrown@apqc.org.

After a year of upheaval and uncertainty, supply chain professionals are beginning to regain their footing and plan for what comes next. In early 2021, APQC conducted its seventh annual "Supply Chain Management Priorities and Challenges" research to learn about organizations' priorities and trends. As part of this research, APQC looked at the areas of focus for sourcing and procurement.

Nearly all of 2020 was rough for supply chains, and the effects of the COVID-19 pandemic have extended far into 2021. As part of its survey, APQC asked how well supply chains have responded to the pandemic. Based on the survey results, it appears that one in five supply chains barely survived.

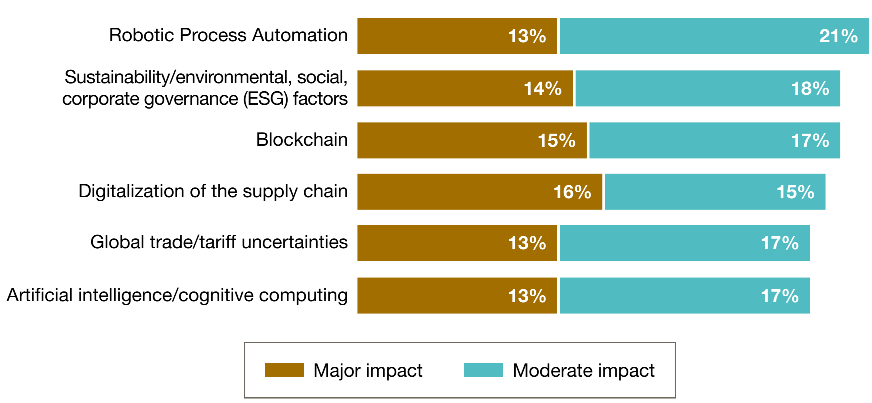
Against the backdrop of the COVID-19 crisis, there are ongoing changes to the supply chain that began prior to 2020. Sourcing and procurement will remain a priority, with organizations focusing on improving several areas within procurement. To ensure that they can remain relevant past the pandemic and keep up with the changing supply chain landscape, organizations should consider how better relationships with their suppliers and enhanced talent development for procurement staff can help them move forward.

Current trends

Many of the trends in supply chain directly affect sourcing and procurement. As shown in Figure 1, technology developments make up the majority of the top trends expected to affect supply chains by 2023.

FIGURE 1

Top trends anticipated to impact supply chains by 2023



Source: APQC

The top trend is Robotic Process Automation (or RPA). Organizations stand to benefit from RPA because it enables them to automate repetitive tasks that do not require human oversight. In fact, removing human involvement in transactional work reduces the potential for errors. This technology creates opportunities for procurement staff to take on more valuable work.

Having more time for strategic tasks will enable organizations to increase their focus on environmental, social and corporate governance (ESG) factors, which make up the second trend anticipated to impact supply chains. ESG factors will prompt organizations to more closely evaluate how they perform as stewards of the environment, how they manage relationships with employees and their community and how their suppliers perform in these areas. Sourcing staff will also be able to more carefully consider these factors as they identify and evaluate potential new suppliers and monitor existing suppliers.

The growth of blockchain also looks to make a significant impact on the supply chain in the near future. It can enable traceability and visibility within the supply chain, which can support an organization's sustainability efforts. This further emphasizes the need for staff to create strategic, close relationships with strategic suppliers, as it can affect supplier contracts and how they are constructed.

At this time of great change, many supply chain professionals find it challenging to improve their processes. In fact, 42% of those surveyed by APQC consider too much change to be an obstacle for their organizations. Close behind is a lack of support for collaboration, which is considered an obstacle by 40% of those surveyed.

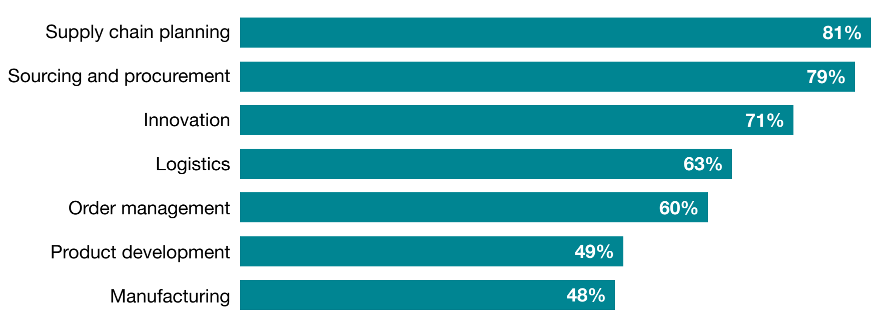
The good news is that 68% of respondents indicate they have modified their supply chain strategy to address current challenges. These organizations know that remaining flexible during times of uncertainty is essential to both their survival and success. Even when performance is poor, organizations should still track performance data. This enables them to evaluate practices and their associated results over the longer term to spur reflection and ultimately improvement.

Areas of focus

As shown in Figure 2, sourcing and procurement is one of the top areas of focus in 2021 for supply chain organizations. Across all industries, supply chain planning is the only area rated higher. For some industries, such as aerospace, automotive, consumer products/packaged goods, financial services/banking and petroleum/chemical, procurement is the top supply chain area of focus for the year.

FIGURE 2

Supply chain areas of focus for 2021 (cross-industry)



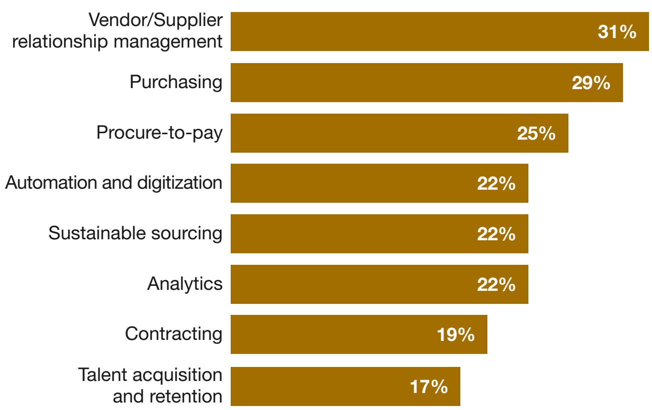
Source: APQC

These results indicate that finding the right suppliers is of strategic importance to organizations in 2021. The immediate effects of the pandemic on the supply chain and events such as the disruption in the Suez Canal serve as stark reminders that organizations should be mindful of the geographic locations and companies from which they source.

Within sourcing and procurement, organizations are focusing this year on core responsibilities. As shown in Figure 3, supplier relationship management, purchasing and procure-to-pay are the top three areas of focus.

FIGURE 3

Sourcing/procurement areas of focus for 2021



Source: APQC

These results are a shift from the previous year. Going into 2020, the top procurement area of focus was automation and digitization. This year, it has fallen to fourth on the list. The pandemic has reinforced the importance of suppliers to organizations' success and realigned focus areas in the process.

The re-emergence of supplier relationship management and procure-to-pay as top areas of focus indicates that organizations are looking at collaboration opportunities to improve their positions. New approaches to supplier relationship management affect the entire procurement process by creating long-term, mutually beneficial partnerships. Streamlining the end-to-end procure-to-pay process helps overcome internal resistance to collaboration by showing the benefits of cross-functional alignment.

2021 priorities

As with their areas of focus, organizations' 2021 priorities for sourcing and procurement have shifted since last year. Supply chain professionals indicate in APQC's research that their top five sourcing and procurement priorities for 2021 are as follows:

1. implement methods to reduce supplier costs;

2. standardize processes;

3. focus on sustainable sourcing;

4. identify and implement best practices; and

5. improve collaboration and communication.

In 2020, the top priority for sourcing and procurement was to standardize processes. The greater emphasis on reducing supplier costs again reflects the impact of the pandemic on supply chains. Organizations are looking at new approaches to sourcing that can be cost efficient and prevent disruptions that impact the business. They also are prioritizing sustainability more than in the past. In 2020, sustainable sourcing was not named as a priority, and now it is among the top three.

Collaboration continues to be a theme for procurement in 2021, with it being in the top five priorities. It is key to implementing effective supplier relationship management. The crises of the last year have shown that organizations must work closely with their key suppliers to mitigate risk and quickly address unexpected situations that arise. Through collaboration and stronger relationships, they can identify weaknesses and create solutions that are mutually beneficial. Encouraging collaboration within the organization can also help make the business more resilient.

Although the reduction of supplier costs is a top priority for organizations, they should take care in their approach. The constraints of the current business environment make it tempting for organizations to take drastic steps to reduce costs, but they should not sacrifice relationships and collaboration with key suppliers. Strategic relationships can provide valuable support during periods of uncertainty.

Use talent development to achieve goals

Sourcing and procurement make up a key supply chain area of focus and a top priority for organizations. The impact suppliers can have on the business plays an important role in how organizations are approaching this year. They understand that strategic collaboration with key suppliers can position them for success.

This focus indicates a needed shift in strategic supplier relationship management for many organizations. Rather than using their position to push for the lowest cost, organizations must focus on mutually beneficial objectives. This enables both the organization and its strategic suppliers to develop pricing models that benefit the relationship. Creating and maintaining these kinds of relationships requires that procurement staff no longer view suppliers as a risk to mitigate or as the source of a purely transactional relationship.

As the needs of organizations shift, the skills required of procurement staff are also shifting. It is not common for employees to already have the soft skills needed for the development and maintenance of strategic supplier relationships. Procurement and sourcing not only need strong communication skills, but also stakeholder management, relationship building and leadership skills. In the absence of a steady source of professionals with these skills, organizations must provide development opportunities to their talent. APQC's research on talent development in sourcing and procurement shows that there are still large gaps when it comes to these opportunities.

Procurement professionals have access to certifications, university programs and online development courses, and although these are helpful, they do not provide valuable on-the-job experience. The solution is that organizations should not rely on one method for developing the skills in their employees. They should look to employ a combination of traditional training programs, mentoring with more experienced staff and on-the-job experiences to develop the soft skills needed for procurement's more strategic tasks. By developing the soft skills that support collaboration, organizations can improve their relationships with strategic suppliers and support their objectives for the current year.

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.

A SPECIAL SUPPLEMENT TO:

SUPPLY CHAIN MANAGEMENT REVIEW

Top 50 Trucking Companies: The STRONG get STRONGER

The top carriers learned how to adapt, improvise and improve over the pandemic-dominated year. While harmful for some, the situation has proven to be transformative for others. Here are the secrets of how top carriers are staying ahead of the pack.

BY **JOHN D. SCHULZ**, EDITOR AT LARGE

It has been a 12-month period like no other. However, to the best operators in the trucking industry, leading executives say the effect of the worldwide pandemic has been, in the word of Pitt Ohio president Chuck Hammel, "transformative."

Transformative, that is, if you survived. Some 3,140 fleets did not, and were forced to shut down over the past year. That's a 185% jump from 2019, according to Donald Broughton, principal of data firm Broughton Capital. Roughly half the 2020 failures came in the second quarter, when freight volumes plummeted amid widespread shutdowns aimed at limiting the spread of COVID-19.

Big decisions about staffing and productivity had to be made on the fly, and nobody could foresee what the future would hold—not even over the course of the coming week, much less the next quarter.

"In my 33 years in this industry, this was by far the most unusual situation we've ever faced," says Mark Rourke, president and CEO of Schneider, the nation's 2nd-largest TL carrier. "We're accustomed to going through cycles, but to bounce from a material freight recession in the second quarter and then flip it completely in the third quarter—plus all the unknowns—was incredible."

Top trucking executives say that the key to success in such an unusual year was flexibility, quick strategic thinking and the ability to motivate people. "We changed everything we did and how we did it—overnight," explains Rourke. "However, that demonstrated how resilient people

TOP 25 LESS-THAN-TRUCKLOAD CARRIERS: 2020 REVENUES

(Including fuel surcharges)

Rank	Carrier name	2019 Revenue ($ million)	2020 Revenue ($ million)	YoY % Change 19-20
1	FedEx Freight	$7,454	$7,115	-4.5%
2	Old Dominion Freight Line	$4,055	$3,961	-2.3%
3	XPO Logistics	$3,841	$3,575	-6.9%
4	Estes Express Lines	$2,824	$3,055	8.2%
5	UPS Freight	$3,004	$2,898	-3.5%
6	YRC Freight	$3,049	$2,844	-6.7%
7	ABF Freight System	$2,088	$2,036	-2.5%
8	R+L Carriers	$1,972	$1,973	0.1%
9	Saia Motor Freight Line	$1,787	$1,822	2.0%
10	Southeastern Freight Lines	$1,242	$1,256	1.1%
11	Holland	$1,084	$994	-8.3%
12	Central Transport International	$856	$871	1.8%
13	Averitt Express	$873	$831	-4.8%
14	Dayton Freight Lines	$679	$669	-1.5%
15	Pitt Ohio Transportation Group	$670	$653	-2.5%
16	Forward Air	$675	$626	-7.3%
17	AAA Cooper Transportation	$612	$602	-1.6%
18	Roadrunner Transportation	$433	$430	-0.7%
19	Reddaway	$421	$389	-7.6%
20	A. Duie Pyle	$386	$380	-1.6%
21	Daylight Transport	$262	$270	3.1%
22	New Penn Motor Express	$278	$261	-6.1%
23	Central Freight Lines	$232	$256	10.3%
24	Oak Harbor Freight Lines	$230	$237	3.0%
25	Ward Trucking Corporation	$186	$183	-1.6%
TOTAL TOP 25 LTL CARRIERS		**$39,193**	**$38,187**	**-2.7%**
ALL OTHER CARRIERS		**$3,806**	**$3,918**	**2.9%**
TOTAL LTL MARKET		**$42,999**	**$42,105**	**-2.2%**

Note: Revenue for LTL operations only, unless otherwise indicated and includes Canadian operations
Source: Companies and SJ Consulting Group estimates
Prepared by SJ Consulting Group, Inc.

TOP 25 TRUCKLOAD CARRIERS: 2020 REVENUES

(Including fuel surcharges)

Rank	Carrier name	2019 Revenue ($ million)	2020 Revenue ($ million)	YoY % Change
1	Knight-Swift Transportation*	$3,953	$3,786	-4.2%
2	J.B. Hunt Transport Services*	$2,518	$2,659	5.6%
3	Prime	$2,107	$2,088	-0.9%
4	Schneider National*	$2,397	$2,066	-13.8%
5	Landstar System*	$2,057	$2,033	-1.2%
6	Werner Enterprises*	$1,887	$1,826	-3.2%
7	U.S. Xpress Enterprises*	$1,521	$1,513	-0.5%
8	CRST International	$1,469	$1,388	-5.5%
9	Daseke*	$1,395	$1,182	-15.3%
10	Crete Carrier Corp.	$1,151	$1,171	1.7%
11	Penske Logistics	$1,110	$1,101	-0.8%
12	Ryder Systems*	$1,163	$1,008	-13.3%
13	CR England	$995	$888	-10.8%
14	PS Logistics	$744	$832	11.8%
15	Ruan Transportation Management Services	$885	$812	-8.2%
16	NFI Industries	$604	$756	25.2%
17	Western Express	$684	$722	5.6%
18	TFI International*	$759	$714	-5.9%
19	Marten Transport*	$644	$689	7.0%
20	Heartland Express*	$597	$645	8.0%
21	Stevens Transport	$646	$638	-1.2%
22	Cardinal Logistics	$622	$620	-0.3%
23	Anderson Trucking Service	$636	$600	-5.7%
24	Covenant Transportation Group*	$677	$591	-12.7%
25	First Fleet	$551	$534	-3.1%
TOTAL TOP 25 TRUCKLOAD CARRIERS		**$31,772**	**$30,862**	**-2.9%**

Revenues primarily for truckload operations and may include less than ten percent for non-truckload services
*Publicly Traded Company
Source: Company Reports and SJ Consulting Group estimates
Prepared by SJ Consulting Group, Inc.

are when change is forced upon them. People can do great things."

Hammel agrees. "Being agile especially in this environment is critical," he says. "We adjusted in so many different ways from our terminal operations and office staff to our sales efforts that we hardly look the same as we used to. However, all of the changes have been positive and productive."

Now that we're heading into the spring of 2021—a full year from the onset of the pandemic—let's take a deeper dive into the internal strategies of some of the top trucking carriers in the nation and examine how they coped with a worldwide pandemic, stayed safe and continued to stay ahead of one of the most competitive industries in the world.

COVID-19 effects

The effects of the pandemic tested all of trucking operations last year, and continue to this year, say trucking veterans.

Derek Leathers, vice chairman, president and CEO at Werner Enterprises, the nation's 7th-largest truckload (TL) carrier, says planning was "clearly one of the more difficult challenges" that he's faced in his career. "When the dust settled, volumes were up for trucking for the year," he explains. "What's *not* understood was how vast the peaks and valleys were."

During last year's second quarter, some Werner shippers saw volumes spiking 50% to 60% while others went to zero. "That puts pressure on your network balance," says Leathers. "A customer's portfolio based on load volumes went out the window, as people were counting on that product getting to them. What it meant for us was a network that

was highly disruptive."

Many Werner customers endured complete operational shutdowns, while others had their shipping volumes "go through the roof," says Leathers. For Werner, it meant a lot more empty miles and slack in its usually tightly run system. "Nevertheless, you had to find a way to deliver," he says. "We kept it moving and got it done."

Rather than focus on the bottom line, Leather says that the "driving force" was the desire to work with customers with whom Werner has longstanding relationships. "As they saw their business levels spike, we wanted to be there for them."

However, it came at a price, as Werner was forced to take on less new, transactional business. "We absolutely had to allocate a scarce resource—our trucks," adds Leathers. "Those folks who stood with us in tough times were the ones we had to stand with, while others with a more transactional viewpoint would have to wait."

Werner wasn't alone. Pitt Ohio's business levels, beginning last April, fell off 17% year over year. But soon after freight levels dipped precariously, they began to rise just as unpredictably. Thus began an early-summer surge to the point that it was overcapacity and service was suffering, Hammel recalls: "We made a decision to sacrifice business in order to get our service back to historic levels."

It was a timely decision. Hiring additional drivers was next to impossible, and on any given day Pitt Ohio had a number of employees who either tested positive for COVID-19 or were in close contact with someone who did. "So, labor planning was somewhat unpredictable," says Hammel.

But Pitt Ohio softened the blow by being more discriminating with whom it chose to do business. And in this tight less-than-truckload (LTL) market, privately held Pitt Ohio actually got more profitable while getting slightly smaller, Hammel adds.

At ArcBest, parent of ABF Freight System, the nation's 7th-largest LTL carrier, CEO Judy McReynolds says the pandemic "challenged us in new ways." However, because of the character and heart shown by its employees, McReynolds says: "We turned many of those challenges into opportunities."

The result was improved efficiencies throughout the corporation, says McReynolds—and they were tangible to the bottom line. ArcBest recorded the second-best operating income in the last 14 years, earning $71.1 million net income last year, compared with $40 million net income in 2019. In fact, at one point early in last year's pandemic lockdown, ABF reported a 48% increase in residential delivery business—a improvement that requires a much

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different approach than typical LTL business-to-business freight.

"We were able to navigate through that period and handle it well," says McReynolds. "So, I credit our operations team for being able to do that well. It just shows the adaptability and flexibility of the network in different circumstances."

Making changes on the fly

One of the potential success stories is the revival of Yellow Corp., which controls 10% of the LTL market through its four subsidiaries—long-haul Yellow Freight and regional units New Penn, Holland and Reddaway.

Flush with a $700 million cash infusion from the federal government as part of the $2.2 trillion Coronavirus Aid, Relief, and Economic Security Act (CARES Act), Yellow is once again buying trucks and fine-tuning its network to achieve long-term financial stability.

That cash is helping Yellow in several ways. It's buying new equipment, and it's beginning a costly driver-training initiative that aims to bring up to 1,500 new drivers into the trucking industry. Yellow will pay the new trainees during a four-week program that the carrier hopes will help it expand.

However, the biggest change may be in its operations. It's no longer one long-haul operation (YRC Freight) with three regional subsidiaries. Yellow president and CEO Darren Hawkins looks at his trucking operation as one "super-regional" LTL operator with emphasis on speed, quick turnarounds and efficiencies.

For example, in Birmingham, Ala., where Yellow previously operated separate Holland and YRC freight terminals, they're now operating together. "So rather than having two drivers from two of our companies at one customer, we're able to service that with one driver, one tractor, one set of equipment," says Hawkins. "That's what drives that asset utilization in the right direction."

Yellow's revival is designed to optimize and structurally improve a network that includes more than 300 North American terminals. In last year's fourth quarter, it implemented an intermodal change of operations in Memphis, Tenn., that allows for the movement of shipments on intermodal containers to and from their Western operations—saving money on trucks and drivers that can be utilized elsewhere.

In January, Yellow continued its network optimization efforts by integrating five legacy national terminals into operations at a regional terminal. This allows it to now serve markets in Louisville and Lexington in Kentucky, Evansville, Ill., Birmingham, Ala., and Des Moines, Iowa, with one brand, one operation while providing customers with a broader network of Yellow services. This change brings the number of facilities in use to 327.

And according to Hawkins, there's more such integration coming. When completed, he says that the enterprise transformation is expected to increase property and rolling stock asset utilization, expand service offerings and leverage operational flexibilities gained in its 2019 labor agreement with the Teamsters union.

Rates going in one direction

All these changes, the effects of the pandemic and surging freight demand translate into bad news for shippers who continue to face steep rate increases—perhaps as high as low double digits in TL and mid- to high-single digits in LTL, according to *Logistics Management*'s top trucking sources.

"The economy is choppy and better in some industries than others," says Pitt Ohio's Hammel. "But overall demand continues to be strong."

Yellow's Hawkins observes that rate negotiations with customers are returning increases of nearly 6%. "Demand is solid," he says, "and right now the consumer is standing up well. Construction is strong, and manufacturing is looking good."

In truckload, if you take a combination of spot and contract rates, Leathers adds, the result is low double-digit increases. "Plus, nearly all carriers' costs are rising—driver pay, fuel, tolls and insurance," he says. "There's also a need for a lot of these companies to become more financially healthy—a lot are not covering their cost of capital."

According to Hammel, the cost of trucking has spiked especially with regard to driver wages, benefits and tolls. What this means to shippers is that they're going to have to pay for dependable, on-time service. "As a trucking company, we have to be able to attract the best qualified new employees, and the only way to do that is to be among the best employee-driven companies in the industry," he says. "Doing that is expensive, but worthwhile in so many ways. Rates must go up to compensate for giving our customers the best of the best."

These are all encouraging signs for top carriers in 2021. They hope that the operational and strategic changes forced upon them over the last year pay dividends straight to the bottom line this year.

—John D. Schulz is an editor at large for Supply Chain Management Review

ProMatDX in review

A virtual show held April 12 to 16 this year, ProMatDX featured 360 sponsors, 655 product demonstrations, 106 educational sessions, 18 roundtables, four keynotes, and five daily recaps, according to show sponsor MHI.

HONEYWELL INTELLIGRATED HELPS DC OPERATIONS TO THE NEXT LEVEL

DC Next warehouse automation solutions improve workplace safety, reduce labor challenges, and increase operational efficiencies.

Honeywell Intelligrated showed attendees how to take operations to the next level. Using virtual demos, the company will feature its DC Next warehouse automation solutions, which collectively can help attendees to improve workplace safety, reduce staffing challenges, and increase operational efficiencies.

The company showcased several sessions designed to show attendees the potential of integrated, end-to-end DC control within the four walls to help achieve optimum results in current operations or build the foundation for future fulfillment requirements.

"The pandemic has only accelerated the transition toward advanced automation of the distribution and fulfillment sector," said Chris Feuell, chief commercial officer. "Automation technologies have quickly become essential tools for DC and warehouse operations seeking to meet rising customer service levels."

Honeywell Intelligrated's virtual demos will include robotic mixed-SKU depalletizing, mobile robotics, AS/RS shuttles, enterprise performance management, and other innovations. Key leaders from Honeywell Intelligrated will be presenting seminars on micro-fulfillment strategies and mobile robotics use cases and trends.

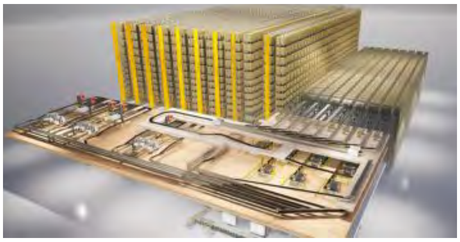
DEMATIC EXHIBITS FLEXIBLE MIXED-CASE FULFILLMENT SOLUTION

Dematic showcased its Flexible Mixed Case Fulfillment (FMCF) solution that dramatically reduces picking labor while rapidly building high-density, store-ready pallets and carts. With both fully automated and semi-automated palletizing options, Dematic's FMCF can handle a variety of packaging materials, shapes and weights.

Leveraging Dematic software to manage the entire operation, including high-density pallets, operations can use the Dematic FMCF solution in ambient, chilled or freezer environments.

Products are stored in a high-density case/tote buffer system, where they are retrieved and automatically transported to the manual or automatic palletizing station. Cases are then arranged, wrapped, labeled and ready to ship.

"We understand the important role automation plays in streamlining product flow," said Michael Larsson, EVP, Dematic Americas. "Our FMCF solution is both efficient and compact, providing highly accurate results and a condensed footprint to enable optimized growth."



Dematic's FMCF can handle a variety of packaging materials, shapes and weights.

ORBIS DISPLAYS ITS ODYSSEY RACKABLE PALLET

A forklift operator moves a heavy load onto an Odyssey rackable pallet.

To support heavy load applications, ORBIS Corporation presented its Odyssey rackable pallet, which has been added to its suite of reusable plastic pallet offerings.

Measuring 40 x 48 inches in size, the pallet has been developed for an array of racking applications within various market segments, from agriculture and dry goods, to general food processing. Due to its first-class racking performance, the Odyssey pallet can effectively rack heavy loads—more than 2,800 pounds—in unsupported racking.

Also offering users stability, due to its distinct design features, including permanent, molded-in frictional elements, the pallet diminishes load shifting, prevents slippage off of fork equipment and eliminates the risk of product damage.

"ORBIS is always exploring new product innovations in the packaging industry to support the circular economy, along with consumer demand, resulting in a more sustainable supply chain," said Alison Zitzke, senior product manager for ORBIS Corporation. "The Odyssey pallet provides ORBIS yet another opportunity to better serve customers' unique application requirements and reduce their ecological footprint."

KARDEX REMSTAR HIGHLIGHTS ADVANCED PICKING STRATEGIES

Kardex Remstar, a manufacturer of automated storage and retrieval systems, is featuring advanced picking strategies during ProMatDX.

Kardex Remstar, a manufacturer of automated storage and retrieval systems (AS/RS), showcased its advanced picking strategies. Well known for vertical lift modules and vertical buffer modules, the manufacturer has added innovative solutions for increasing throughput, picking productivity and accuracy to their portfolio.

Integrating scalable and intuitive pick-to-light technology, Kardex Remstar's new Color Pick enables higher picking throughput and maximum labor efficiency to manage demand fluctuation common with e-commerce business. The company's Frame Pick solution combines pick carts, put frames with put-to-light displays and AS/RS (most often, the LR 35 Vertical Buffer Modules or Shuttle XP VLM), for maximum throughput.

To support automated storage and retrieval systems from afar, Kardex Remstar offers Remote Support, a proactive monitoring tool to help reduce errors before they occur. "From advanced picking strategies utilizing vertical buffer modules to basic storage and picking applications," said Mark Dunaway, president of Kardex Remstar, Region North America, "we offer a range of solutions for your growing operations."

AI-ENHANCED PICK-IT-EASY ORDER PICKING ROBOTS FROM **KNAPP**

KNAPP and Covariant delivered their latest industrial grade order picking Pick-it-Easy Robot. The robot is field proven, work hardened and designed for demanding, high availability applications including retail, healthcare, grocery, healthcare and e-commerce.

Leveraging the latest AI technology, grippers, image recognition systems, software and controls, the Pick-it-Easy robot is fast, flexible, capable and modular. It can address a large range of SKUs as well as constantly changing packaging and seasonal changes. It even learns on the fly; communicating and teaching other robots on the network as they move.

"Making order picking robots work in the lab is not that hard to accomplish," said Kevin Reader, KNAPP's director of business development and marketing. "The difference between the industrial grade Pick-it-Easy robot and a robot just emerging from the lab, is miles apart."

KNAPP and Covariant introduce the latest industrial-grade order picking robots.

QUADIENT LAUNCHES THE HIGH-SPEED CVP EVEREST

CVP Everest's dual induct station enables high-speed packing to maximize operational efficiencies.

Quadient showcased its CVP Everest, a system that can auto-box up to 1,100 custom-fit packages every hour.

Aside from its ability to enhance the speed of package fulfillment, the high-speed automated packaging system also constructs, labels, measures, seals and weighs every single- or multi-item order of either soft or hard goods—all during one uniform process. Using a patented gluing system, the CVP Everest is able to attach a custom-fit lid to every package, enabling a quicker fulfillment process.

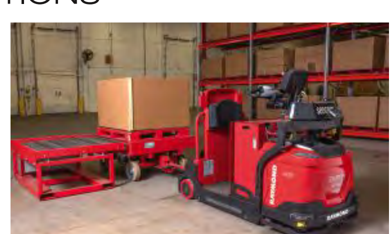
Additionally, the system provides users a dual induct station that is used by two operators, resulting in high-volume speeds and maximum operational efficiency, as up to 20 packing stations can be eliminated.

"And, since the CVP Everest can also create small packages every 3 seconds, it optimizes every step of parcel fulfillment," said Sean Webb, director of automated packaging solutions, North America, at Quadient.

RAYMOND SHOWCASES INTRALOGISTICS SOLUTIONS

The Raymond Corp. displayed various intralogistics solutions, which help create connected operations—from operator assist technologies to automated solutions like the Raymond 3220 Courier Automated Tow Tractor.

Enabling users to decrease labor costs and improve productivity, the flexible automation solutions are ideal for repetitive and time-consuming tasks, as they enable plant managers to reallocate operators' time to more value-added jobs. In particular, the Raymond Courier automatic guided vehicle (AGV) line provides a range of easy-to-implement vision-guided automated vehicles—AGVs



The Raymond Courier 3220 automated tow tractor provides users a towing capacity of up to 15,000 pounds.

that efficiently perform repetitive horizontal transportation and pallet handling applications, freeing operator labor for other tasks. Additionally, they're quickly commissioned and operational from day one, while also highly dependable, enabling users to immediately start moving more products.

"Perfect for pulling cart or trailer loads in batch picking, parts-to-line and end-of-line applications, the Raymond 3220 Courier Automated Tow Tractor offers users a high towing capacity (15,000 pounds), and it's ideal for pulling heavy loads on flat ground or up ramps," said Dave Norton, VP of customer solutions and support at The Raymond Corporation. "Available with a low clearance arch as a standard design, it is also easy to maneuver through areas with low overhanging structures."

MHS HIGHLIGHTS ROBOTIC MULTI-PICK SOLUTION AND HC LOOP CROSS-BELT SORTER

Multi-pick robotic end effector solution processes up to 36 items at a time.

MHS showcased its multi-pick robotic end effector solution, which processes up to 36 items at a time while also acting as an on-demand buffer. Nominated for an Innovation Award, the solution holds some items while packing orders of various quantities, as available. The multi-pick robotic end effector offers significant productivity advantages for businesses with large amounts of multi-item orders to fulfill.

"Today's e-commerce landscape pushes supply chains to meet faster service levels and overcome labor challenges in the face of intense cost pressures," said Chuck Harris, vice president of distribution and fulfillment at MHS. "The HC Loop sorter and robotic multi-pick are examples of how advanced technology helps companies reduce dependency on a shaky labor pool, control costs and boost output."

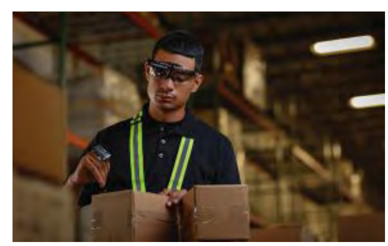
MHS also presented its HC Loop cross-belt sorter, which boosts throughput of a range of products and packaging types in an efficient footprint. The HC Loop sorter offers an efficient solution to keep orders flowing and meet strict delivery deadlines, handling everything from flats and bubble mailers to bagged items and corrugated cases.

ZEBRA SHOWCASES PICKING SOLUTIONS FOR WAREHOUSES OF ALL SIZES

Zebra Technologies demonstrated how its picking technologies can help warehouses increase order fulfillment without expanding their workforce. From touch-optimized devices and hands-free and heads-up wearable solutions, to software that dynamically orchestrates workers and robots for optimized workflows, Zebra is helping warehouses increase their daily throughput and accuracy of orders.

"Coming out of the pandemic, supply chain companies learned that they needed to be more agile to compete in today's on-demand world," said Mark Wheeler, director of supply chain solutions. "Now more than ever, companies must ship products out the door faster, more accurately and using fewer human workers."

Zebra's picking solutions include a broad portfolio of handheld and wearable mobile devices, the HD4000 Heads-Up Display, and Zebra Fulfillment Edge solution that modernizes warehouse management systems by optimizing workflows, maximizing worker productivity, and improving employee onboarding without costly and risky upgrades or back-end changes that could disrupt operations.



Zebra Technologies demonstrates how its picking technologies can help warehouses increase order fulfillment without expanding their workforce.

4SIGHT SUITE HELPS COMPANIES IMPROVE EFFICIENCIES AND AUTOMATE

Data-centric dock and yard management tool helps companies operate more efficiently, automate their operations and leverage company-specific KPIs.

4Front Engineered Solutions showcased its 4SIGHT Connect suite of digital yard, dock and gate management tools including the company's newest 4SIGHT Logistics Solution development, 4SIGHT Connect Data. Using industry-standard API technology, the solution helps operations easily integrate data from the dock into their logistics operations to improve efficiencies, automate processes and develop company-specific KPIs.

"Warehouse and DC dock operations (both enterprise and non-enterprise) rely on 4SIGHT Connect Data from 4SIGHT Logistics Solution," said Daryl Day, IoT product manager, "to seamlessly integrate and improve the accuracy of a wealth of data generated from a variety of loading dock event data points into their process flow using industry-standard methods and practices."

With 4SIGHT Connect Data, end users can integrate dock operations into different systems; obtain more accurate operational insight and tailor data to fit individual needs; leverage existing technologies for required connectivity to either a Kelley or Serco Digital Master Control Panel; and create custom reports and dashboards, KPIs and metrics.

SWISSLOG VIRTUALLY DEMONSTRATES AUTOMATED MICRO-FULFILLMENT CENTER TECHNOLOGIES

Swisslog demonstrated automated micro-fulfillment center technologies for simple and compact last-mile delivery solutions that can be placed anywhere to bring fulfillment closer to consumers. The live virtual experience demonstrated how an automated micro-fulfillment center works to fulfill e-commerce orders. As part of the experience, users were able to select a gift and then watch a live feed of the gift being picked and fulfilled in real-time by micro-fulfillment technology.

"This highly effective virtual experience is an excellent way to give supply chain executives an opportunity to experience firsthand how a robotic, data-driven automation solution provides the efficiency and flexibility needed for e-commerce fulfillment," said Markus Schmidt, president of Swisslog Logistics Automation, Americas.

Swisslog offers robotic, data-driven and flexible automated solutions for the entire supply chain, from the fulfillment centers extending the distribution network to the warehouses and distribution centers supporting that extension.

Swisslog unveils a live virtual experience to show users a robotic, data-driven, automated micro-fulfillment center technology in action.

TOYOTA MATERIAL HANDLING INTRODUCES NEW AUTOMATED LINE

Toyota Material Handling is introducing a full automation offering for the modern warehouse environment.

Toyota Material Handling introduced a line of automatic guided vehicles (AGVs) that includes two automatic guided carts (AGCs), center-controlled rider and a core tow tractor automatic guided forklifts. Toyota also previewed its latest future addition to its automated lineup—a three-wheel electric automated forklift.

The new vehicles are easy to install and seamlessly integrate with existing warehouse management systems. Trint Castetter, senior product marketing specialist, said the products support Toyota's commitment to being the industry's leading materials handling solutions provider.

Toyota also showcased advanced logistics solutions that are available through Toyota dealerships through their partnership with Bastian Solutions, a Toyota Advanced Logistics Company. "We want to demonstrate our automation capabilities—from simple to advanced," said Castetter. "ProMatDX's virtual format will allow us to do that in new and innovative ways to reach a wider audience through a digital environment."

CONVEYCO TECHNOLOGIES SHOWCASES ITS NEW AS/RS SYSTEM

Conveyco Technologies presented its new robotic, high-density and automated Shuttle automated storage and retrieval system (AS/RS).

A hybrid system, the Shuttle AS/RS is able to cost effectively store and retrieve hundreds to millions of SKUs. Every SKU is fully accessible all the time, which is especially beneficial for organizations that require placed orders to be filled within the same day.

The system's reliability and uptime performance numbers are considerably high, as there is no single point of failure. System components are redundant and hardened for 24/7 usage, and all inventory is accessible in emergencies.

"This robotic AMR (autonomous mobile robot) AS/RS system saves up to 90% of floor space and more than 60% in labor usage—with a rapid deployment and tremendous levels of agility. Organizations can grow, change and move the system to meet their changing requirements," said Ed Romaine, VP of marketing and business development at Conveyco Technologies.

The AMR AS/RS bot moves up the workstation ramp and presents its contents for the operator. The operator's display reveals the product's location, SKU description and quantity to pick, as well as where to place it for high accuracy and throughput performance.

YALE HIGHLIGHTS NARROW AISLE REACH TRUCK AND END RIDER PALLET TRUCK

Yale showcased its narrow aisle reach truck and end rider pallet truck, two products designed to increase warehouse productivity. The narrow aisle reach truck provides operator comfort that staves off fatigue, exceptional visibility and increased productivity that shaves seconds off each pallet pick. The end rider pallet truck series helps operations boost labor efficiency and increase throughput in case-level order picking, unloading and other warehouse tasks.

"With space and labor becoming scarce and more expensive, warehouses are looking to narrower aisles and higher-level storage locations to manage growing inventories," said Brad Long, brand manager at Yale Materials Handling Corporation. "We engineered the new reach truck to be the gold standard, helping operators efficiently service high-density storage configurations and achieve faster cycle times, with the ergonomic features for performance all shift long."

Yale Materials Handling markets a full line of materials handling lift truck products and services, including electric, gas, LP-gas and diesel-powered lift trucks; narrow aisle, very narrow aisle and motorized hand trucks.

Yale's narrow aisle reach truck provides operator comfort and visibility.

SOUTHWORTH PRODUCTS DISPLAYS PALLETPAL 360 LEVEL LOADERS

By ensuring the top layer of boxes are at a comfortable height, the PalletPal 360 eliminates bending and stretching.

Southworth Products Corp exhibited its PalletPal 360 spring level loaders. Developed to enhance users' productivity and safety, the level loaders offer fully automatic height adjustment as they load and unload pallets.

Their heavy-duty springs automatically lower or raise pallets as boxes are added or removed, while maintaining the top layer at a comfortable, accessible height, eliminating bending and stretching.

"By allowing workers to maintain good posture, worker fatigue, along with the risk of injury, is minimized and productivity is improved," said Randy Moore, director of sales at Southworth Products Corp.

Additionally, due to a turntable ring (or an optional solid turntable platform) at its top, the PalletPal 360 also allows operators to spin loads so they can stand in the same spot during the entire loading and unloading processes. As a result, they can work faster, safer and more easily.

The PalletPal 360's compact base design also provides workers complete 360-degree access to loads. Since all of its components are contained within the diameter of its turntable ring, there aren't any obstructions, projections, protrusions or reach-over zones to interfere with the loading or unloading process.

"Furthermore, the PalletPal 360 can accommodate a wide range of loads—from 400 to 4,500 pounds," Moore added.

STEEL KING PRESENTS NEXCALIBER STRUCTURES

Steel King Industries introduced NexCaliber Structures—systems that offer turnkey solutions for engineered elevated work platforms.

Developed to accommodate high-speed scales and sorters, induction conveyors and singulator systems, NexCaliber Structures platforms can be scaled to multi-level systems, and they offer all components that users may need, including crossovers store systems, gates, ladders, railings, staircases and stair-towers.

Dedicated to solving the industry's most complex storage and equipment support challenges, the proprietary design system leverages material data and engineering calculations, accelerating accuracy overall.

"By providing scalable solutions, we will help large integrators increase processing capacity in their existing structures and new distribution or micro-fulfillment centers, and are well-poised to meet compressed design schedules," said Chris Pahls, product manager at NexCaliber Structures. "We are excited to introduce NexCaliber Structures' line of elevated work platforms and accessories to the materials handling industry."

Project manager Tom Andres and product manager Chris Pahls (right) with the structure. While the ProMatDX demo model is a single platform, size is no limitation for NexCaliber Structures' line of elevated work platforms.

BASTIAN SOLUTIONS SHOWCASES ROBOTIC PICKING SYSTEMS POWERED BY AI


AI reasons and determines the optimal pick target for the robot.

Bastian Solutions displayed its AI-powered robotic systems that allow robots to see, reason and act to unknown inputs and produce desired outputs. These systems use artificial intelligence and a vision system that can see various types of products within a homogeneous or heterogeneous mix.

The AI reasons and determines the optimal pick target for the robot. “With these systems, we’ve achieved rates up to 1,400 picks per hour with 99% accuracy,” said Bastian Solutions field application engineer Clay Britton. “Overall, these systems are extremely reliable and can meet or exceed the rates and accuracies delivered by humans.”

Configured into the AI, the robot’s end-of-arm tooling provides coordinates and angles for the robot to pick the product without colliding into external structures. Customized toward a customer’s products, Bastian Solutions’ end-of-arm tool designs factor in product dimension and shape, product weight, product material, interface with vision system, interface with robotic programming and securing the product during robotic movements.

CIMCORP SHOWCASES ITS ROBOTIC ORDER FULFILLMENT SOLUTIONS

Cimcorp Automation shared its robotic order fulfillment systems, using on-demand demos. Created to help warehouses and DCs overcome an array of operational challenges—including demanding lead times, labor shortages, narrow storage space and seasonal variations in order volumes—the systems include case, crate and layer picking.

For instance, Cimcorp presented its newest case picking solution, which integrates an AS/RS with automated case picking, along with mixed case palletizing—all managed by a warehouse control system. At the same time, it also displayed its MultiPick, a crate-picking solution that combines buffer storage and order picking into one continuous operation. As a result, it’s able to handle a high volume of products that are stored in industry-standard crates, totes and trays within a high-density storage area.

In addition, the company featured the Layer Pick system, which uses gantry robots—each of which are equipped with a vacuum-picking head and clamp gripper—to pick products that are stored in layered quantities. Offering users a seamless end-to-end picking solution, it’s especially ideal for facilities, including third-party logistics providers, that pick more than 1,000 layers a day from inventories of 50 to 500 SKUs.

“For facilities struggling to maintain operational efficiency with manual order picking, automated solutions like Cimcorp’s offer an optimal, flexible solution that can not only meet one’s present needs, but also scale for future growth and fluctuations in consumer demand,” said Derek Rickard, director of sales at Cimcorp.


The speed and precision of Cimcorp’s case picking can enable facilities to perform just-in-time order fulfillment and meet short lead times, so companies can keep up with their need for speed in e-commerce and grocery distribution.

HYSTER EXHIBITS HYSTER TRACKER TELEMETRY SOLUTION FOR DATA-DRIVEN DECISION MAKING


Hyster Tracker offers intuitive, user-friendly dashboards using an online portal to help operations make sense of data from materials handling equipment.

Hyster showcased its telemetry solution, Hyster Tracker, which helps businesses turn data into actionable insights. Hyster Tracker offers intuitive, user-friendly dashboards using an online portal to help users make sense of data from materials handling equipment and make data-driven decisions to optimize operations.

“When operations have more data than they know what to do with, a key challenge is breaking through the clutter to identify what data points are most valuable,” said Steven LaFevers, VP of emerging technology at Hyster Company.

Hyster also offers the Hyster Battery Tracker, a fleet management solution that provides valuable insights to better care for batteries and maximize their performance and life.

Supported by one of the industry’s largest dealer networks, Hyster builds lift trucks that offer high productivity, low total cost of ownership, easy serviceability and advanced ergonomic features, accompanied by parts, service and training support.

JBT UNVEILS ITS WAREHOUSE FREEZER AGV

JBT exhibited its Warehouse Freezer AGV, which can operate in an array of temperatures, from -10°F to 110°F. Offering operations a lift capacity of 2,500 pounds, the automatic guided vehicle (AGV) features a triple stage hydraulic mast, which has an integrated side shift and tilt. In addition, it provides a variety of lift heights—from 357 inches (or less) to the top of its forks, to 422 inches.

Also offering a minimum aisle width of 11.5 feet, the Warehouse Freezer AGV is able to travel bidirectionally at up to 5.9 feet per second. Furthermore, it uses a 48 VDC battery and has two lift speeds: 10 inches per second to lower and 11 inches per second to raise.

"The freezer is the 'last frontier' for AGVs. As a part of a food machinery company, our market research indicated that nobody was servicing this market," said Cory Flemings, global sales director at JBT. "So JBT took on this challenge: We produced and fielded an AGV that can live in a freezer, service 10-foot 6-inch aisles and reach storage locations up to 422 inches."

He added, "How many employees want to work in freezing temperatures all day? Now AGVs can manage the work 24/7."

Cory Flemings, global sales director at JBT.

RAMGUARD DEMONSTRATES RACK COLUMN PROTECTION CAPABILITIES

Easy to install, the RAMGuard offers users more rack column protection than plastic and steel protectors.

The patented RAMGuard, a rubber guard that features a "U-shaped" steel insert, along with force distributing rubber voids, was exhibited. Weighing 9 pounds, the RAMGuard offers users reliable rack column protection, as its Rubber Armored Metal (RAM) design absorbs a considerable amount of energy during angled, front and side impacts when compared to plastic and steel protectors.

In addition, unlike plastic protectors, the RAMGuard can be hit by forklifts multiple times without having to be replaced. And it is cost effective when compared to anchored steel protectors, which require frame replacement and concrete floor repairs once they're damaged.

Available in 12-inch heights, the RAMGuard, which is easy to install, can snap onto rolled or structural steel columns that are 3 inches wide and up to 3 inches deep.

"Unlike other protectors in the market, the RAMGuard can withstand dozens of impacts," said Josh Carniewski, marketing manager at Ridg-u-Rak. "As a result, it pays for itself in one hit."

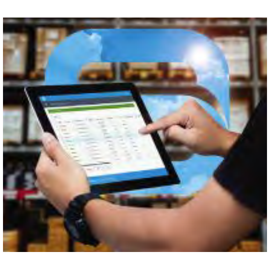
LUCAS SYSTEMS PREVIEWS NEW AI-BASED TOOLS

Lucas Systems previewed new AI-based tools that are being rolled out in the Lucas warehouse optimization suite featuring Jennifer Intelligence. "The new tools use machine learning technology for dynamic slotting, workforce planning and performance management," said John H. Schriefer, Lucas' marketing communications manager.

Lucas Systems is previewing new AI-based tools.

Lucas hosted a virtual demonstration of its AI-based dynamic travel optimization solution that has generated productivity gains of up to 122% in two dozen DCs in North America, Europe and Asia-Pacific. Lucas also hosted an education session outlining Practical Uses for AI in the DC. This presentation described practical examples of how AI can be used to give managers actionable, data-driven insights they need to improve warehouse management and operations.

OPEN SKY GROUP DEMONSTRATES WMS AND LMS PLUS NEW STREAMLINED BILLING



Open Sky is demonstrating Blue Yonder's warehouse and labor management solutions.

Open Sky Group demonstrated Blue Yonder's warehouse and labor management solutions as well as the newest version of its Enhanced Client Billing application.

Attendees saw how Blue Yonder's warehouse management system (WMS) helps companies cut fulfillment cost, increase throughput and speed dock-to-stock times. They'll also learn how Blue Yonder's labor management system (LMS) helps increase visibility and facilitate coaching for supervisors, as well as maximize productivity and employee retention.

"Blue Yonder's warehouse and labor management solutions have earned industry acclaim for good reason," said Darcy Reeves, VP of marketing for Open Sky Group. "Those solutions, combined with Open Sky Group expertise and implementation approach, help optimize supply chain operations, lowering risk and cost, while increasing agility, ROI and customer satisfaction."

As a bonus, attendees got an inside view of Open Sky Group's Enhanced Client Billing for Third Party Logistics, which integrates with any WMS.

PANASONIC'S LOGISCEND 2.0 SOFTWARE HELPS MANUFACTURERS INCREASE EFFICIENCIES

Panasonic Logiscend InSights Software allows manufacturers to analyze trend data over time and across areas to maximize efficiency and improve operational processes.

Panasonic introduced its next generation software from the Panasonic Logiscend system, which was created to offer increased material flow efficiency and data analytics for complex manufacturing customers. Logiscend Software 2.0 brings additional efficiency-boosting features to Panasonic's paperless, industrial IoT solution for applications of Pick, Replenishment, Asset Tracking, Container Management and Work Instructions.

"This latest software version delivers features that make it easier for our customers to meet the material flow demands in modern manufacturing," said George Daddis, VP of Panasonic PIDSA-IIoTS. "Users will benefit from enhancements designed to improve productivity, quality and cost."

A new data visualization and analytics option, Panasonic Logiscend InSights Software allows manufacturers to analyze trend data over time and across areas to maximize efficiency and improve operational processes. They can assess performance across shifts, areas, people and plants, as well as identify trends using easy-to-read dashboards that track important metrics and key performance indicators.

PRESTO ECOA FEATURES ITS P4 ROLL-ON LOAD LEVELER

Presto ECOA displayed its P4 Roll-On Load Leveler with Turntable, a platform that essentially sits flush to the floor when it's fully lowered, enabling operators to place or remove pallet loads with ordinary hand pallet trucks.

Offering operations a capacity of 2,500 pounds, the leveler also has a built-in 44 x 48-inch turntable platform that accepts a range of pallets and skids. In addition, due to the platform, operators can also rotate full pallet loads 360 degrees. As a result, operations can build or break down loads from fixed positions without having to walk around or reach across the pallet.

"Because workers don't have to wait for a forklift and operator to place or remove loads from the platform, productivity is greatly improved," said Rick daSilva, national sales manager at Presto ECOA.

The leveler's platform height—which can be up to 30 inches when it's in its fully raised position—can be controlled by operators using a footswitch or hand pendant control. In turn, loads can be precisely positioned to the most comfortable height for loading and unloading. And, as a layer of goods is loaded or unloaded, operators can also raise or lower the platform so the next layer is at a height that's easy to access.

By positioning the P4 Roll-On Load Leveler with Turntable's platform at the correct height, employees can load and unload faster and with less fatigue.

TOPPER INDUSTRIAL REVEALS ITS TUGGABLE BAR CART

The Tuggable Bar Cart has a removable towbar.

In response to customers' desires to unload long lengths on materials from outside docks as well as throughout their facilities—a task they were unable to previously complete, due to narrow aisles and tight floor layouts—Topper Industrial showcased its Tuggable Bar Cart.

Long and narrow, it has a 36 x 192-inch frame. The heavy-duty cart is able to carry longer lengths of material since it's comprised of long bar stock. Equipped with a removable tow bar, fork tubes and front axle steering, the cart's alternative steering options produce high flexibility as it maneuvers long materials.

With a capacity of more than 20,000 pounds, the cart, which is especially ideal for unloading and loading materials outside, also has a heavy-duty thrust bearing.

"This is an intricate component of the cart's design," said Ed Brown, founder and CEO of Topper Industrial. "It not only increases its safety, but also enhances its reliability and strength."

WAYPOINT ROBOTICS INTRODUCES COLLABORATIVE, USER-FRIENDLY MOBILE MANIPULATOR

Waypoint Robotics teamed with Productive Robotics to make mobile manipulation accessible for small to mid-sized companies. With an easy-to-use, capable, omni-directional autonomous mobile robot (AMR) and a seven-axis collaborative robot arm, the solution provides a cost-effective way to deploy a mobile manipulator in manufacturing and logistics applications.

Waypoint Robotics' Vector AMR and Product Robotics' OB7 are integrated to make setup and operation fast and intuitive, with both machines working together to perform tasks. The mobile manipulator's flexible design and interconnected safety systems allow either robot to be the primary controller of a particular operation.

The Vector's omni-directional mobility enables fast, precise docking in any direction or orientation. "The extraordinary dexterity of Productive's seven-axis cobot arm coupled with Waypoint's omni-directional mobility," said Jason Walker, Waypoint CEO and co-founder, "opens up endless possibilities for workers to automate repetitive tasks and maximize robot utilization throughout their facility."

Collaboration makes mobile manipulation accessible for small to mid-sized organizations.