Peerless MEDIA, LLC

JANUARY/FEBRUARY 2020

SUPPLYCHAIN MANAGEMENT REVIEW®

scmr.com

SHIFT INTO REVERSE

FEATURES

14 Resolution 2020: Fix returns
By Gary Forger

20 It's time for your secondary market strategy to play a primary role
By Zac Rogers, Dale Rogers and Haozhe Chen

28 Are your performance measurements destroying your supply chain?
By Steven A. Melnyk, Michael Bourne, David Frayer and Will Rifkin

34 Navigating global trade
By Tan Miller and Bob Trebilcock

40 Thriving on the supply chain high wire
By Stanley E. Fawcett, Amydee M. Fawcett, A. Michael Knemeyer and Sebastian Brockhaus

COMMENTARY

Insights.. 4
Innovation Strategies.................. 6
Benchmarks 10
GLOBAL LINKS 48
OPERATIONS ADVANTAGE 70

SPECIAL REPORTS

50 Retail under pressure

56 Supply Chain Management Virtual Summit recap

65 Modex 2020 show planner

Shift into reverse

If the holidays at your household were like most, the gifts were chosen and wrapped with care, and then half were returned in the week after Christmas. Maybe more than half. After all, who among us hasn't bought four shirts in a variety of sizes and colors with the intent of keeping one and returning three. And why not: Retailers and e-tailers alike have made returns seamless, easy and cheap.

At least for the shopper. For the supply chains of the retailer, manufacturer or brand owner, returns are a once-neglected area that is growing into a major focus of supply chain managers who don't want to see their organizations lose their shirt taking back our shirts. As supply chain managers, we're all learning to shift into reverse.

Reverse logistics is the theme of the first two articles in the January issue of *SCMR*. In the first, special projects editor Gary Forger takes an in-depth look at the process of getting your goods back from the customer to the point of origin. In the following article, Zac Rogers, Dale Rogers and Haozhe Chen explain why every supply chain manager needs a secondary market strategy to dispose of all that returned merchandise. Returns, by the way, are one reason why dollar stores are among the fastest-growing segments of retail today.

We round out the issue with part two of our series on developing an effective performance measurement system, one that enhances rather than destroys your supply chain. This is the latest installment of Steven Melnyk's look at the supply chain manager of the future. That's followed by a timely article on how to navigate global trade issues in an era of tariffs, increased scrutiny by customs, shifting alliances and uncertainty. The article draws on the experience of four experienced global trade experts.

Bob Trebilcock,
Editorial Director
btrebilcock@
peerlessmedia.com

Last, but not least, have you ever wondered why some companies in a given industry thrive while others wither on the vine? The answer, according to the authors of "Thriving on the supply chain highwire," is choreography, a competence I believe every supply chain manager needs to master. They'll explain why Ringling Brothers had to take down the Big Top while *Cirque du Soleil* plays to millions every year.

Last, we hope you'll check out—and register—to attend *SCMR*'s second NextGen Supply Chain Conference, which will be held April 27-29, 2020 at the historic Chicago Athletic Association hotel in Chicago. Designed for senior-level supply chain executives—like you—the conference will offer educational sessions and networking opportunities to learn about the emerging technologies that will power tomorrow's supply chains. Last year's inaugural event was an unmitigated success. You can find more information about the conference at nextgensupplychainconference.com.

As always, I look forward to hearing from you and seeing you in Chicago next April.

Bob Trebilcock

SUPPLYCHAIN MANAGEMENT REVIEW

Editorial Offices
111 Speen St., Suite 200
Framingham, MA 01701-2000
1-800-375-8015

MAGAZINE SUBSCRIPTIONS
Start, renew or update your magazine subscription at scmr.com/ subscribe.

Contact customer service at:
Web: scmr.com/subscribe
Email: scmr@omeda.com
Phone: 1-847-559-7581
Mail: Supply Chain Management Review
PO Box 677, Northbrook, IL 60065-0677

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

JANUARY/FEBRUARY 2020 Volume 24, Number 1

SUPPLYCHAIN MANAGEMENT REVIEW

FEATURES

14 Resolution 2020: Fix returns
There's real margin and customer satisfaction sitting in those piles of returns over in the far corner of the distribution center. Now is the time to create effective processes to gain control of returns. By mid-year you'll be glad you did.

20 It's time for your secondary market strategy to play a primary role
With the rise in the number of returns and overstocks, secondary markets, like factory outlets, dollar stores and salvage dealers, have become an increasingly vital part of the product lifecycle. What's your secondary market strategy?

28 Are your performance measurements destroying your supply chain?
The performance measurement system is the most misunderstood, confusing, misapplied and frustrating element of most supply chains. Yet, an effective performance measurement system is one of the foundations on which the strategic supply chain is built.

34 Navigating global trade
The outlook for global supply chains has never been more volatile. Four experts in trade and compliance look at ways to navigate today's choppy waters.

40 Thriving on the supply chain high wire
The difference between supply chain winners and also rans is choreography, a competence every supply chain manager needs to master.

SPECIAL REPORTS

50 Retail under pressure

56 Supply Chain Management Virtual Summit recap

65 Modex 2020 show planner

COMMENTARY

4 Insights
Oil Update: Fracking challenged with cheaper oil
By Larry Lapide

6 Innovation Strategies
Time to overhaul supply chain design
By Milena Janjevic, Jarrod Goentzel and Matthias Winkenbach

10 Benchmarks
Trends and pratices in supply chain analytics
By Marisa Brown

48 Global Links
Coping with the convergence of complexity
By Patrick Burnson

70 Operations Advantage
Moving beyond the chain in supply chain
By Richard J. Sherman

To subscribe: Subscribe or renew online at www.scmr.com/subscribe or call (800) 598-6067. (Outside of the U.S., call (508) 663-1500 x-294). Email customer service at scmrsubs@ehpub.com.

Author's Guidelines: Interested in writing an article for possible publication in *Supply Chain Management Review*? See our Guidelines for Authors on www.scmr.com.

Reprints: For reprints and licensing please contact Brett Petillo, 877-652-5295, ext 118, peerless@wrightsmedia.com.

Supply Chain Management Review® (ISSN 1521-9747) is published 7 times per year (Jan/Feb, Mar/Apr, May/Jun, July/Aug, Sept/Oct, Nov, Dec) by Peerless Media LLC, 111 Speen St, Ste 200, Framingham, MA 01701. Annual subscription rates: USA $199, Canada $199, Other International $241. Single copies are available for $60.00. Send all subscription inquiries to *Supply Chain Management Review*, PO Box 677, Northbrook, IL 60065-0677 USA. Periodicals postage paid at Framingham, MA and additional mailing offices. **POSTMASTER: Send address changes to: Supply Chain Management Review, PO Box 677, Northbrook, IL 60065-0677.**

Oil Update: Fracking challenged with cheaper oil

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.

I was a survivor of the Arab Oil embargo in October 1973, when the members of the Organization of Arab Petroleum Exporting Countries (OPEC) proclaimed an oil embargo against nations perceived as supporting Israel. It lasted about six months and resulted in an oil crisis, with prices rising and sporadic shortages of gasoline. I was a student and living off campus. Gas was rationed so that you could only buy gas on even days or odd days, depending on the last digit of your license plate. I panicked because my tank was virtually running on fumes each time I went to get gas, wary that nearby stations might be out of it. Since those days, I've tried to be as energy efficient as possible, especially realizing that non-renewable carbon-based energy might someday be depleted.

Thus, when I began researching oil as part of the MIT Supply Chain 2020 Project in 2005, I espoused a reduction of oil consumption in global supply chains by slowing them down and developing cost- and energy-efficient networks, in contrast to cost- and asset-efficient ones. The position was based on two major demand-supply assumptions. While oil would be readily available into the foreseeable future: 1) its price would rise in the long-run as demand for it rose with robust global economic growth; and 2) oil extraction costs would continue to rise over time because it was getting harder to extract it from the earth.

However, two years ago I noted that both assumptions no longer held. The updated analysis postulated that recent oil prices have flattened to an "era of cheaper oil."

History of oil pricing

Each annual oil update I've done is reflected in Figure 1, a historical chart depicting "real" quarterly imported crude oil prices over the past 40+ years. The chart shows the various pricing levels experienced. From the demand side, the first signs of cheaper oil appeared as a precipitous drop as a result of the Great Recession, which drastically depressed worldwide economies and the demand for oil. This was followed by a three-plus year period, termed the "$100+ Plateau" before reaching cheaper oil. That plateau still ominously looms in the rearview mirror as a reminder of what could happen if worldwide economic and supply conditions reach the levels seen prior to the recession.

From the supply side there was a new picture, as well. In considering the supply of oil, one normally has to evaluate the overall energy market of renewable vis-à-vis non-renewable energy. However, oil is a supply chain's most important energy source because transportation operations mostly run on diesel fuel. That is, until electric vehicles start replacing today's fleets. Natural gas is becoming the energy source de jour for electricity generation, replacing old coal-fired electric generators. However, liquid natural gas (LNG) will not change the energy picture much for transportation until LNG-fueled vehicles replace fleets, as well as until a network of fueling stations is in place.

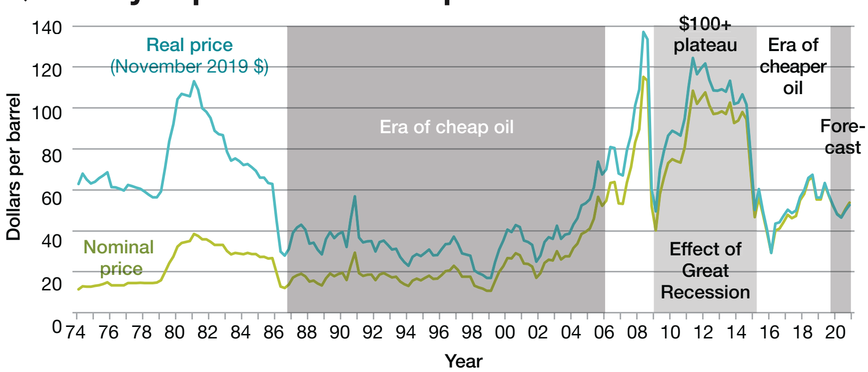
The major change in the supply picture involved shale-oil fracking. Over the period of higher oil prices, U.S. oil fracking operations came on-line because the prices were high enough to economically justify them. U.S. frackers used the opportunity to innovate to reach a point where fracking operations were flexible enough to easily turn on and off as oil prices went up and down. The fracking industry made the U.S. the world's top oil supplier and also a net exporter. In addition, fracking output caused a worldwide oversupply of oil that has kept the era of cheaper oil going.

Review of the past year

As Figure 1 shows, recent 2019 oil prices (in real terms) are still in the realm of cheaper oil with prices significantly higher than during cheap oil. (About $40 per barrel to $60 per barrel vs. $25 per barrel to $35 per barrel, in real dollars). Not a lot of significant changes to the oil picture have occurred recently.

FIGURE 1

Quarterly imported crude oil prices



Source: EIA Short-Term Energy Outlook, November 2019 (http://www.eia.gov/forecasts//steo/realprices/)

News articles published in 2019 on oil pricing issues consistently noted that lower, cheaper prices were putting U.S. frackers under intense financial pressure because of a glut in oil supplies. Their actions have helped to keep cheaper oil pricing. The titles of articles in the *Wall Street Journal* last year told the story:

- "Frackers Scrounge for Cash as Wall Street Shuts Spigot" (6/8/19)
- "Oil Has a Shale Problem, Not an Oil Problem" (8/2/19)
- "Growth in Oil Demand Slows Down" (8/7/19)
- "Fracking Lingo Gets an Overhaul" (9/10/19); quoting: "Shale leaders are talking more about profits and less about growth"
- "U.S. Oil's Growth Challenges Investors" 11/11/19)
- "U.S. Oil Production Keeps Prices in Check" (11/16/19)

What about the future?

So, what have we learned about the new demand-supply picture? First, from the demand-side, world economies need less oil to grow. Second, from a supply side, the cartels have lost their control over oil pricing. Third, today's global oil market may be behaving as a "true market" in the sense it is largely dictated by demand vs. supply. All told, cheaper energy appears to be the new normal for now—but coupled with significant price volatility.

However, my advice stays the same. It will always be prudent to reduce the use of non-renewable carbon-based energy sources by making your supply chains as energy-efficient as possible. (For those who worry about CO2 emissions, it will also help the earth.) Look to reduce oil-dependency in the following four general supply chain areas.

1. *Revisit just-in-time operations that require shorter lead times and smaller shipments, and which are inherently less energy-efficient. For example, support slow-steaming for ocean freight.*

2. *Reduce the use of carbon and oil-based manufacturing and packaging materials.*

3. *Manufacture and stock product closer to customers, as last mile shipments are smaller and less energy efficient. For example, follow a simple general rule that "airplane travel is for moving people, not goods."*

4. *Don't offer free delivery, especially emergency shipments.*

Eleven years ago, with oil prices rising, it was easy to convince your company to save energy because it also cut costs. Without high energy prices, energy-efficiency may not translate to cost saving, so it will be harder to make the case to executive teams.

Time to modernize supply chain design

By Milena Janjevic, Jarrod Goentzel and Matthias Winkenbach

Milena Janjevic is a research scientist at the Megacity Logistics Lab in the MIT Center for Transportation & Logistics (MIT CTL) and can be reached at mjanjevi@mit.edu. Jarrod Goentzel is director of the MIT Humanitarian Supply Chain Lab at MIT CTL, and is an early developer of supply chain design technology. He can be reached at goentzel@mit.edu. Matthias Winkenbach is director of the MIT Megacity Logistics Lab at MIT CTL and can be reached at mwinkenb@mit.edu. Together they are spearheading the launch of the Supply Chain Design Lab at MIT CTL.

In light of the dramatic changes that supply chains have undergone over the last 20 years, companies need new, innovative approaches to supply chain design that shift the focus from cost-minimization toward value creation. And the design process must mature to capture the complexity, volatility and uncertainty of the competitive environment in which modern supply chains operate.

These challenges can be met with the support of advanced methods that combine the power of analytical models with the implicit knowledge of expert human-decision makers. The new approach improves decision-making transparency, enriches design solutions and reflects the real-life challenges that companies now face.

A new environment

The field of supply chain design is rooted in conventions developed through studies carried out in the 1990s. These studies primarily focused on the physical configuration of supply chains, such as facility location and customer allocation decisions. Supply chains were designed to minimize costs such as those associated with facilities, warehousing and transportation. Also, in the conventional approach, the design of a supply chain is typically reviewed once every few years; these exercises are rarely linked with tactical planning decisions.

Such conventions are no longer adequate. The competitive environment in which firms operate has changed over the last two decades. During this time, the acronym VUCA has been employed to describe the increasing volatility, uncertainty, complexity and ambiguity of business conditions.

Today, operating in a VUCA environment is no longer the exception but the reality to which companies must adapt daily. Globalization, multi-outsourcing and proliferation of brands are driving structural and organizational complexity of contemporary supply chains. Increasing economic and political volatility creates uncertainties on the demand and supply side of global operations. Furthermore, new models such as omni-channel retailing and shifting customer expectations in terms of service responsiveness and flexibility are radically changing the way we think about supply chain design. As supply chains have become a major competitive differentiator, design has moved center stage in the development of corporate strategy.

Traditional supply chain design approaches fail to capture these realities in several ways. First, conventional methods fail to capture the complexity of contemporary supply chains. The decisions that underpin these designs were historically constrained by limits on computational power and data availability. Also, traditional design processes rarely incorporate factors such as demand uncertainty, supply chain disruptions and multi-channel distribution.

Second, the focus on cost minimization is outdated. Traditional approaches mainly focus on decreasing the logistics costs under a given demand, which often results in the use of centralized facilities in areas with low real estate costs. Today, proximity to the end customer and delivery speed are major drivers of competitive advantage. Consequently, when deciding on the deployment of logistics assets, companies must consider aspects of revenue management. Design approaches need to implicitly consider trade-offs between the ability to capture additional revenue by meeting customers' increasing delivery expectations and the need to keep fulfillment costs under control.

Third, given the highly volatile and uncertain conditions that now prevail, success in contemporary markets requires decision-making agility and speed. As a result, supply chain design must be evaluated much more frequently than before. Thus, supply chain design must become an ongoing process that involves continuous updates of the variables and methods used, rather than one-shot exercises carried out every few years.

In addition to these changes, in recent years there have been significant advances in data science and a massive increase in the amount of data available to supply chain professionals. Data analytics and machine learning tools make the structure and performance of complex supply chains more visible.

Furthermore, advanced network science methods enable companies to characterize the complexity of relationships between multiple suppliers, manufacturers, distributors and retailers.

Fresh approach

With the benefit of these developments, traditional optimization and simulation models can be extended to include more information and complexity. Consider, for example, a network design study carried out recently by the MIT Center for Transportation & Logistics (MIT CTL) for a major e-tailer that looked at multiple sales channels. The study explored the integration of direct sales and third-party flows as well as multiple distribution channels with deliveries to customers or traditional stores. Additionally, multiple delivery services, including same-day and instant delivery and customer and transport infrastructure information at the level of each neighborhood, were part of the study.

The shift toward value creation also extends supply chain design models. In addition to traditional decisions such as the number, location and size of facilities, models can now incorporate go-to-market decisions including distribution channels, tactical asset deployment and operation governance rules.

Importantly, studies no longer need be confined to decision-makers within logistics and the supply chain function; executives from strategy, finance, sales and marketing can now participate in design projects, bringing a level of cross-functional collaboration that is rare in traditional modeling exercises.

The ability to include other disciplines in the design process is a hugely significant development that will enrich supply chain designs and make companies more responsive to an ever-changing competitive environment.

For example, in a project carried out recently in MIT CTL's CAVE Lab, a team of executives from a leading manufacturer modeled iterations of a supply chain design. Participants from various disciplines, including logistics, finance, sales and marketing, worked jointly on defining key features of the design. The exercise revealed that increasing the density of warehouse and asset deployment throughout the United States enabled the company to increase its market share significantly. This increased revenue more than compensated for the additional logistics costs incurred. Direct engagement of sales and marketing executives in the design process injected critical knowledge of market conditions. The co-design event was essentially a sales and operations planning exercise at a strategic level, quickly aligning intuition and accelerating the market response.

Given the central role that supply chain design now plays in corporate strategy, the modeling process must reflect the corporate goals of each company and the decisions needed to implement design changes. This level of specificity requires a shift from generic supply chain design solutions to a highly customized approach. Rapid prototyping and software development enables companies to implement tailor-made design solutions at a lower cost and update them more frequently.

Visualization adds value

These analytical advances are a promising avenue for capturing the structural and organizational complexity of contemporary supply chains—but are not sufficient. The sheer amount of data now available can lead to information overload and decision-making paralysis. Furthermore, "black box" model solutions can cause a lack of engagement, especially in the context of decision-making in cross-functional teams.

To address these challenges, it is necessary to provide intuitive interfaces with analytical models as well as the underlying data. Here, interactive visualization enables human decision-makers to grasp all of the information contained in large datasets, identify trends and patterns and build data narratives to support decision-making and engagement.

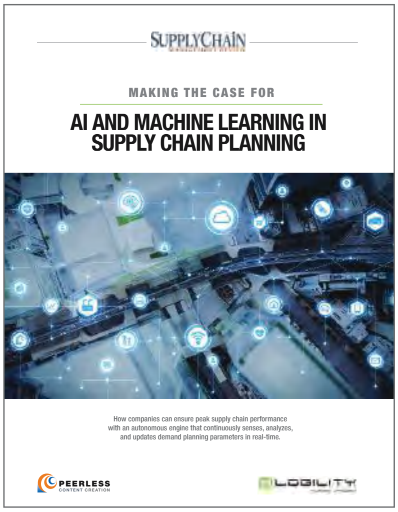
Also, decision-makers often have knowledge about implicit constraints or objectives that are not comprehensively captured by the analytical tools. Interactive visualization was essential in capturing local salesforce expertise in the previously mentioned case. Decision support systems utilizing mixed-initiative approaches—which combine the inputs of expert users and the analytical power of the machines—allow design teams to arrive more quickly at solutions that address more realistic challenges.

For example, a company was investigating better network configurations for its global distribution network that comprised hundreds of facilities and tens of thousands of customers. For each of the thousands of products manufactured by the company, researchers used network science methods to identify the best warehouse locations. Using a visual analytics tool, users selected the most promising locations based on their knowledge of the specificities of each product. Finally, a machine learning algorithm recomputed the performance metrics for the newly constructed network, and a visual interface enabled the participants to fine-tune the analysis and arrive at appropriate designs quickly.

Accepting change

Today's supply chain design processes must capture both structural and organizational complexities that have emerged over the past two decades. The focus needs to be broader, to emphasize value creation based on the ability to serve customers speedily and flexibly. Moreover, the design process must be more inclusive, tailored and carried out regularly.

We have the technology and the data to redefine supply chain design—but we also need companies to acknowledge that conventional methods are outmoded, and to seek the development of new design paradigms.



MAKING THE CASE FOR

AI and Machine Learning in Supply Chain Planning

How companies can ensure peak supply chain performance with an autonomous engine that continuously senses, analyzes, and updates demand planning parameters in real-time.

ON ITS OWN, SUPPLY CHAIN PLANNING (SCP) provides the critical set of business processes that companies rely on for optimizing the delivery of goods, services, and information to their customers. Focused on balancing supply with demand, SCP manages real-time demand commitments, "what-if" scenario analysis, inventory optimization, and sales and operations planning (S&OP), among other functions, according to Gartner.

Valuable in its own right, SCP's value proposition gains even more momentum when advanced technologies like artificial intelligence (AI) and machine learning (ML) are layered into it. As the development of computer systems that perform tasks that historically required human intelligence, and the ability to automatically learn and improve from experience (and without being explicitly programmed), respectively, these two technological innovations are taking SCP to new levels in the modern-day supply chain.

"Supply chains are moving faster and faster," says Hank Canitz, Logility's director of product marketing, "and most are not only global in nature, but also 24/7/365." On any given day, the same supply chains may face multiple disruptions (i.e., a truck accident that delays deliveries, a supplier that files for bankruptcy, a geopolitical event like Brexit, etc.)—a reality that always-on supply chains must be able to quickly identify, address, and respond to.

Hitting all of those goals isn't easy in today's fast-paced business environment, where creating a positive customer experience means being able to deliver shipments faster than ever before (in exchange for low or no delivery charges).

"In general, everything is speeding up," says Canitz. "For example, Amazon is beginning to offer 2-hour drone delivery in certain areas. The supply chain has to be the enabler of that speed, and one way to make that happen is by using AI and ML to automate and shorten the times to complete planning processes."

Using AI and ML, for example, companies can start to make faster decisions and execute more quickly with less need for human interaction. The idea is catching on and vendors are responding accordingly. According to Gartner, 95% of SCP vendors will be incorporating ML into their solutions by 2020. By 2023, AI techniques will be an embedded or augmented component across 25% of all installed supply chain technology solutions.

Deloitte has also been watching the convergence of AI and ML with SCP, noting that these "smart" technologies are helping firms make smarter planning decisions. In return for their technology investments, Deloitte says companies are effectively reducing costs; removing reliance on "tribal knowledge"; gaining deeper and broader insights into their supply chains; improving decision-making processes; and increasing supply chain agility.

"With the overall volume of data doubling about every 18 months, there's a wealth of information available for companies that want to improve their supply chain planning," says Canitz. "However, it's getting to the point where humans can't conceivably sort through all of that information. They need help."

For many companies, that "help" will come in the form of AI- and ML-enabled supply chain planning. In this Making the Case, we explore the opportunities that these advanced technologies present and show how organizations can ensure peak supply chain performance with an autonomous engine that continuously senses, analyzes, and updates planning parameters in real-time. •

COVERED IN THIS REPORT:

- **Harnessing the fast-moving supply chain**
- **Using AI and ML to solve supply chain planning problems**
- **If artificial intelligence is the engine, data is the fuel**
- **Give CSCOs a boardroom seat and watch the magic happen**

Go to: www.scmr.com/logilitymtc0119 for a full report.

Trends and practices in supply chain analytics

Organizations have made great strides in the use of analytics in the supply chain, but barriers remain.

By Marisa Brown, senior principal research lead, APQC

As procurement becomes more digital, data-driven and strategically important, it's increasingly clear that organizations need a new breed of procurement professionals. Tomorrow's procurement professionals need to be equally fluent in technology, data and relationship building. They must be able to zoom in to analyze processes and data points, and then zoom out to deliver strategic insights and collaborate with suppliers. Some of today's professionals will need to bone up on their job-specific skills, but most will need to add new tools like business acumen, interpersonal skills and deep work (the ability to focus without distraction on cognitively demanding tasks) to their toolkits.

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

With the availability of vast amounts of data, supply chain leaders continue to turn to analytics to help make business decisions. APQC has watched how organizations have steadily incorporated analytics into their business operations, as well as the technologies they have adopted to support their analytics efforts. APQC recently conducted research across the entire supply chain on the use of analytics. The survey of 202 respondents across 16 industries gathered insights on the types of analytics used and in which parts of the supply chain, how the efforts are structured and how organizations measure performance.

APQC conducted its last major survey on supply chain analytics in 2016, and some trends have remained constant. Supply chain professionals in both 2016 and 2019 indicated that their organizations have increased investment in analytics over the last three years. In APQC's most recent study, it categorized supply chain analytics into the following five types.

- ***Descriptive.*** What is happening or has happened.
- ***Diagnostic***. Why it is happening?
- ***Predictive.*** What will happen?
- ***Prescriptive.*** What should be done?
- ***Cognitive.*** Using machine learning, describing what could or should be done.

APQC's research in 2019 found that many organizations have made great strides in their supply chain analytics efforts since 2016. However, they should keep in mind key enablers and barriers to analytics success.

Analytics trends

APQC's research indicates that analytics has gained a foothold in business operations. Seventy-eight percent of respondents to the 2019 survey agree or strongly agree that analytics is ingrained in how their organizations conduct business and manage performance. This is an increase from 2016, when just under 60% of survey respondents indicated that they agree or strongly agree.

The research in both 2016 and 2019 looked at how organizations structure their analytics programs at the enterprise level and at the supply chain level. For its research, APQC defined analytics program structures as follows.

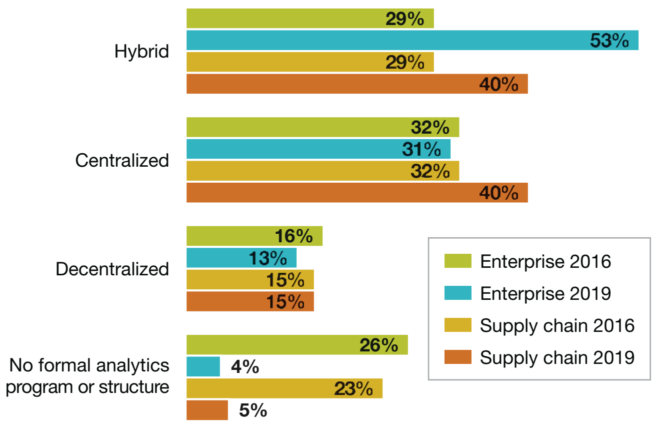
- ***Centralized.*** Managed through a central corporate department or center of excellence.
- ***Decentralized.*** Analytics staff or programs are

located within business units.

- ***Hybrid.*** Combines a centralized oversight structure with staff embedded in the businesses.

FIGURE 1

Analytics structures: 2016 vs. 2019



Source: APQC

Figure 1 compares the structure of the enterprise and supply chain levels in 2016 and 2019. The data shows a clear decrease in organizations with no formal analytics program or structure at both the enterprise and supply chain levels. Although the percentage of organizations with a decentralized structure has remained relatively static over the last three years, there has been a marked increase in organizations using a hybrid structure at both the enterprise and supply chain levels.

The use of a hybrid structure at the enterprise level helps organizations combine the holistic perspective and control of centralized guidance with the flexibility and insights into business needs provided by decentralized implementation. At the supply chain level, in 2019 a nearly equal percentage of organizations use a hybrid structure as use a centralized structure. These results indicate that in the supply chain, organizations see value in both centralized guidance and the hybrid structure. It will be interesting to see whether this trend changes over the next few years.

Application of analytics

As part of its most recent research on analytics, APQC looked at how organizations apply advanced analytics. APQC asked survey respondents to indicate the goals for their supply chain analytics programs. As shown in Figure 2, organizations have a variety of purposes for using analytics in the supply chain.

The top two goals most widely named in the survey are: contribute to supply chain optimization and reduce cost; less important are reducing risk and improving productivity. Clearly, organizations are seeing supply chain analytics as a way to increase their planning accuracy, which can result in reduced costs in running the supply chain.

With this in mind, APQC considered the use of the five different types of analytics within the supply chain. As shown in Figure 3, a majority of organizations use descriptive analytics across the supply chain to understand events that have already occurred. To a lesser extent, organizations use diagnostic analytics and a slight majority of organizations across supply chain areas use predictive analytics to anticipate what will happen.

Less than half of organizations across supply chain areas use prescriptive analytics to determine actions that should be taken. Even fewer use cognitive analytics, which employs machine learning to determine what organizations should or could do. Although organizations have yet to widely adopt cognitive analytics, they are using machine learning in other ways. Sixty percent of respondents indicate that their organization uses machine learning in predictive analytics. This practice allows for large amounts of structured data to be processed with seemingly disparate data, thus enabling more accurate determinations of what will happen.

FIGURE 2

Top 5 goals for analytics in the supply chain

Note: The values in the graph do not add up to 100 percent because respondents could select multiple options

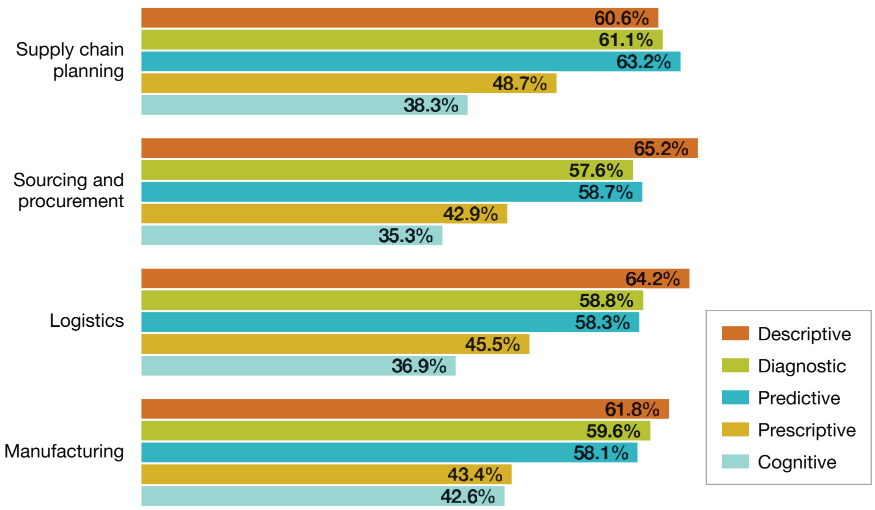
Source: APQC

Measures, enablers and barriers

With the increased investment in supply chain analytics and the greater adoption of more advanced types of analytics, organizations' analytics programs have become more successful. In 2016, only 33% of organizations considered their analytics programs to be very effective or effective in solving strategic challenges. Compare that with 2019, when more than 66% of organizations consider their programs very effective or effective.

FIGURE 3

Use of analytics in supply chain functions



Note: The values in the graph do not add up to 100 percent because respondents could select multiple options

Source: APQC

This trend continues with satisfaction with access to data. In 2016, only 23% of organizations were very satisfied or satisfied with their ability to access relevant supply chain data for timely decision making. In 2019, that number jumped to 63%.

To evaluate the effectiveness of their analytics programs, organizations should consider measures of engagement and business performance. For engagement, organizations often look at the use or consumption of analytics, the number of analytics support requests and the number of employees requesting analytics training. To determine the effect of analytics on the business, organizations measure cost/benefit or return on investment, stakeholder satisfaction, revenue, customer and employee retention and cost savings.

Ultimately, organizational practices help ensure the success of a supply chain analytics program and lead to superior performance on both engagement and business measures. According to APQC's 2019 survey, articulating the benefits of using analytics, the availability and quality of data, and the ability to interpret results are key enablers of supply chain analytics success. An analytics program will not succeed without easy access to high quality data and an organization certainly will not benefit from analytics if it is unable to interpret the results of its analysis. Most importantly, organizations will fail at analytics if they are unable to gain buy-in from employees.

APQC's research also reveals that the top barriers supply chain analytics efforts encounter are finding the financial resources for analytics, finding people needed to carry out analytics activities, and garnering executive buy-in and approval for analytics activities. Successful analytics programs require investment, and without financial resources an organization's efforts will not yield results. Similarly, an analytics effort cannot get off the ground if there are no individuals in the organization with the skillset to carry out analytics activities. In addition to setting the organizational attitude toward supply chain analytics, leadership that does not support analytics activities will limit financial and tactical resources, thus ensuring that the results of the analytics program will be limited.

Analytics in practice

APQC recognizes that not all organizations have achieved the success of the organizations represented in its survey. However, it is imperative that organizations effectively manage their data to streamline their work to set a solid foundation for improvement and analytics.

A large healthcare organization interviewed by APQC faced this challenge because it lacked the processes, tools and structures for managing its data. Its solution was to create a supply chain data management program to not only manage its data, but also to reduce waste and create more effective risk management and reporting.

The program consists of three core components: people, process and technology. It uses process to standardize data management and analytics tools and the data management team performs diagnostic, predictive, prescriptive and cognitive analytics. As part of the program, the organization has undertaken several key projects:

- consolidating and supporting business responsibilities to a limited number of individuals involved in data creation and maintenance;
- creating data dictionaries for various types of data (such as material, customer and vendor master data) to provide definitions and rules, as well as guidance for data fields;

- initiating a chatbot feature so that internal customers can ask questions at any time of day; and
- creating playbooks that provide a single source of truth for all master data documentation.

The organization measures its success through cycle time, data quality and stakeholder engagement. As a result of its efforts, it has significantly reduced cycle times. It is able to deliver monthly dashboards to provide full visibility into the customer and vendor master data creation process. It has also stabilized its data governance.

The organization has identified several key enablers for its program's success. When it began the program, the organization was proactive in change management and ensured that stakeholders saw data as an asset for the company. It was also able to prioritize aspects of its analytics projects to stay within the defined budget for analytics adoption.

Consider enablers and barriers to advancement

APQC recommends that organizations consider the key enablers and barriers of supply chain analytics, whether they are just starting out in analytics or if they have already established a program. Without mature processes in place, organizations may be limiting their success.

Over the last three years companies have made much progress with analytics, as evidenced by an increase in the effectiveness of analytics programs and the availability of quality data. Within the next three years, APQC expects to see greater numbers of organizations use cognitive analytics to make more precise predictions and decisions.

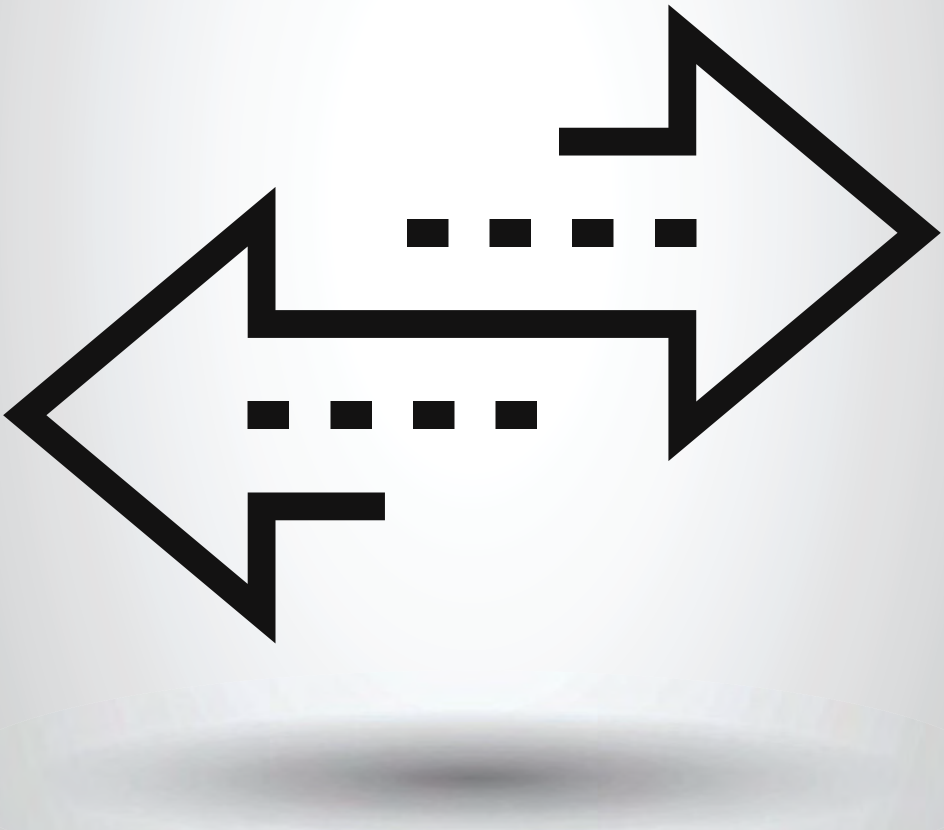
About APQC

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

RESOLUTION 2020: FIX RETURNS

There's real margin and customer satisfaction sitting in those piles of returns over in the far corner of the distribution center. Now is the time to create effective processes to gain control of returns. By mid-year you'll be glad you did.

BY GARY FORGER



Gary Forger is special projects editor of Supply Chain Management Review. *He can be reached at grforger@gmail.com.*

It seemed like such a good idea at the time.

Why not pick up something not on your must-read list. And besides, the five-volume set of "Game of Thrones" was on sale. Buy it.

And then reality set in. The five books are roughly 3,500 pages. Are those tomes really going to get read? This year or next? Probably not. Back they went to the store with a couple days left on the return period.

There were no hassles at the counter. The person there just took back the set and instantly refunded your card. That's exactly how returns should work—from the consumer's perspective.

It was even easy to manage your return from the retailer's perspective. It just went back onto the shelf and was added to the store's inventory. All relatively straightforward.

So, why all the eye rolls by supply chain professionals when it comes to returns?

To begin, that scenario accounts for only a small percentage of returns in today's retail environment. It is the low-hanging fruit.

Furthermore, the return occurred within the specified returns window, and did not require special handling or processing. It didn't even have to go back to a distribution center and be re-integrated with existing stock. The return didn't really cost the retailer much, if anything, to make it available once again to another consumer. Even the internal accounting was simple, as was the immediate credit to the consumer's card.

But for the vast majority of returns, their complexity is so overwhelming that they get pushed off to an obscure corner of the distribution center.

"For many organizations, the returns management process has remained a cost center with low visibility that contains products to be restocked, repaired, recycled, repackaged or disposed of properly," says Adam Robinson, director of marketing at third-party logistics provider Cerasis.

Trouble is, returns are not going away. Sure, there are times when Amazon and others tell you to keep your purchase and credit your card anyway. But that's just a stopgap. It is not a trend.

Returns ready to explode

"Returns is a massive trend starting to rear its head. Volumes are poised to explode," says Rob Dold, senior account executive at Fortna.

There's no hyperbole there. Numbers from the National Retail Federation back up Dold's contention. In 2017, the value of returns was $170 billion. In 2018, that number more than doubled to $370 billion. And while 2019 numbers are not yet available, there is no reason to think the magnitude of the returns trendline changed in the past 12 months.

That total number will exceed $1 trillion in just a few years, says Zac Rogers, assistant professor of supply chain management at Colorado State University.

Most of us think of returns as sending an item back to a retailer. But there are other aspects to returns. In fact, returns are, in some ways, its own industry known as the secondary market.

Roughly 85% of retailers sell returns into the secondary market, according to a survey by Rogers. Furthermore, 40% of those companies say they "have increased greatly" in the past five years.

An example is the TJX Companies, which is the umbrella for T.J.Maxx, HomeGoods and Marshalls. A significant portion of what's for sale in those stores are returns from other retailers to manufacturers. Some say TJX is the largest returns channel today.

Then there all those refurbished electronic products you can buy from Bose, Apple and others. They are all returns. Even Amazon is getting in on the action with Amazon Renewed. It "is a program where you can discover and buy quality certified refurbished products that have been tested and certified to work and look like new by a qualified manufacturer or a specialized third-party refurbisher," says Amazon.

In fact, there is a relatively new retail category that assumes there will be returns—curated subscriptions. While there are an estimated 2,000 of these businesses, probably the best known is StitchFix. At your request, they select and send a box of clothing that you might like. You can keep all or some of the items or return them within a set time period. While that's all that StitchFix does, Adore Me has added subscriptions to its lineup, requiring the company to develop a sophisticated returns process. More on that later.

There are also online flash sales and consignment. And all those returns that just can't be salvaged are simply liquidated and written off.

Clearly, returns are complicated and becoming more so. But that's of little to no concern to the consumer, who expects returns to be an integral part of the purchase process. It doesn't matter where the purchase is made. Rogers goes so far as to say "returns are just part of the e-commerce culture."

His studies show that returns activity is less than 10% for most brick-and-mortar purchases and close to 30% for e-commerce. Returns levels of specific types of merchandise vary, Rogers adds. He says brick-and-mortar returns of general electronics run about 9% while general merchandise and department stores are 6%. However, all brick and mortar returns activity triples regardless of item type when it comes to online.

Experts are starting to identify some key consumer behaviors related to the returns process.

At the initial purchase, Dold says the decision to buy or not on the e-commerce side often comes down to weighing the returns policy against free shipping. A recent survey by XPO and Goodmind shows that returns policy is a strong influencer in 86% of consumer buying decisions.

Interestingly, how returns are handled can lead to future sales. According to a survey by Cerasis, 70% of online shoppers who return product to a store make an additional purchase in the store. Meanwhile, only 45% of online shoppers that make returns online make an additional purchase online.

Like it or not, returns are here to stay. And that means it's time for companies to deal with the issues associated with returns front and center. Now is not too soon to start.

Chaos at best

To be fair, returns are not easy. The biggest problem is their unpredictability, says Bryan Jensen, chairman and executive vice president of St. Onge.

"Returns are a complete unknown and are entirely a customer decision. The seller has no say in the decision. But the seller has to both satisfy the already unsatisfied customer and minimize the disruption to its own operations," adds Jensen.

There can also be a fundamental misunderstanding of the returns process. "The implication is that returns are simply the reverse of forward logistics. Nothing could be further from the truth. Reverse logistics is not forward logistics backward," says Jim Tompkins, chairman and CEO of

Tompkins International.

L.L. Bean understood that more than 20 years ago. That's when the mail order giant opened a standalone building to handle returns to more efficiently re-integrate them with existing stock. Few companies followed their lead.

Eighteen months ago, Dematic did a global study of reverse logistics. Mike Khodl, vice president of global solutions management, explains the company learned three key truths:

1. *every company surveyed is managing returns differently;*
2. *returns processing is chaos at best; and*
3. *all are trying to figure out the optimal way to manage returns.*

All three points were underscored last year when Kohl's announced it would accept Amazon returns at its stores. Yes, you read that correctly. Meanwhile, Walgreens and Nordstrom announced they would handle returns for brands such as Levi Strauss, Urban Outfitters and Cole Haan.

Dematic also asked about the time required to process returns. The average was five days with 14 days as the worst case. There are two down sides to that.

To begin, the longer returns sit, the less valuable they become to future consumers. For instance, light colored women's shoes are more likely to sell in warmer months than during winter.

In addition, delays in processing returns also delay crediting consumers, irritating them precisely when they want to be done with that transaction.

With that as a backdrop, companies are starting to address their returns challenges in innovative ways. And well they should. Rogers says the typical retailer spends 4.4% of total revenues discharging returns.

"Returns don't just have to be the cost of doing business," says Navjit Bhasin, founder and CEO of Newmine. "Better returns management can add to margins," he continues.

The question is how to do that most effectively. There is no single answer for all.

Getting started

It has already been established that there is great complexity to the world of returns. But starting to take control of the chaos isn't so complicated.

The first step, says Tompkins, is to establish a strategy before setting up a structure for handling returns. "Unfortunately, few companies start with strategy. And that inevitably leads to people in the distribution center mishandling returns and the CFO going crazy," he adds.

Bhasin says a basic returns strategy should be quite straightforward—reduce the number of returns in the first place. He identifies four key benefits from returns reduction:

1) *every $1 million return reduction adds $500,000 to the bottom line;*
2) *improved margins due to fewer markdowns;*
3) *cost savings in labor, shipping and DC space; and*
4) *increased brand loyalty as a direct result of a better buying experience.*

So the real challenge to executing the strategy is to figure out why returns happened in the first place. For instance, Newmine has identified five top reasons for apparel returns. Without regard for order, they are: wrong item shipped; item displayed inaccurately online; damaged product; quality; and size/fit.

Such information can go a long way to reducing returns because they are all actionable items prior to a sale of any item, says Bhasin.

Another cornerstone of successful returns management for both the retailer and consumer is a clear returns policy, says St. Onge's Jensen. "If the returns policy creates a problem, that can be fatal to future purchases by that consumer," he says. He strongly advocates a returns policy that is clear, easy-to-follow and customer friendly.

One of the greatest sticking points in returns management at the retailer is who has responsibility. For most companies, where that sits is not very clear.

The departments with responsibility for returns range from merchandising to supply chain. "Other" is also a leading contender.

According to a survey done by Newmine and the Retail Value Chain Federation, "lack of returns ownership is a significant obstacle to implementing and executing an initiative that embraces the entire returns problem—and opportunity."

According to a survey done by Newmine and the Retail Value Chain Federation, "lack of returns ownership is a significant obstacle to implementing and executing an initiative that embraces the entire returns problem— and opportunity."

Bhasin is a strong advocate of designating a chief returns officer in the company. That person might already hold another title such as CEO or CFO, he says, or it could be a standalone title. It all depends on the company and its structure.

In any case, that person should be responsible for unifying the departmental silos involved in returns. Vital here is a team of veteran employees from merchandising, digital, marketing, supply chain and finance departments. And they should be working to a set strategy and returns performance metrics.

According to Robinson of Cerasis, key metrics include:

- disposition cycle time;
- amount of product reclaimed and resold;
- waste;
- percentage of cost recovered; and
- per item handling cost.

Also critical are formalized processes using technology whenever possible. According to Robinson, there are six benefits to using technology to manage returns. Those are:

- reduced administrative, transportation and aftermarket support costs;
- increased velocity;
- increased market share;
- higher achievement of sustainability goals;
- greater customer service and higher retention levels; and
- recovery of capital investments in assets.

It's important to note here that the physical handling of returns is only part of the resolution of the return. The other is the handling of the consumer's credit, be it partial or full.

The speed of that transaction leaves the consumer with a lasting impression. Ultimately, it may become the deciding factor in doing business with the retailer again. Quite simply, it's vital to realize that when it comes to returns, the retailer is working with "other people's money" until the final resolution. "Ultimately, the distribution center becomes responsible for the speed of the customer's refund," explains Jensen of St. Onge.

That interdependence is critical. It also puts pressure on the speed and accuracy of handling the return.

The role of technology

As everyone agrees, technology to handle returns is an interesting quagmire.

On the one hand, the lack of internal popularity of managing returns appears to make automation that much more desirable. However, "it is almost impossible to eliminate all manual elements of returns handling," says Dematic's Khodl.

That said, Khodl is the first to acknowledge that automated returns handling is a huge opportunity to reduce the current chaos in part. Fortunately, automated handling systems as well as artificial intelligence and advanced software are on the cutting edge.

Both Dematic and Knapp offer automated systems to manage returns handling. Both are pouch systems that automatically carry returns above the warehouse floor to a designated drop off point for inspection or restocking. Neither system eliminates all manual steps. However, they both expedite the restocking of returns to active inventory, minimizing carrying costs.

"The idea is to be space efficient while processing returns more quickly than possible without automation," says Kevin Reader, director of business development and marketing at Knapp.

While restocking an existing distribution center is a common approach, there are many companies that use other channels to dispose of returns. One option is to use third-party logistics providers.

Taking the pain out of returns

"The whole idea is to reduce the pain of managing returns," explains Krutin Shah, director of distribution for Adore Me, a Victoria's Secret disruptor. Along with order fulfillment Shah is responsible for the returns management process.

The company launched in 2012, and added a curated subscription service for its lingerie in 2017. Each month, three to five lingerie items are sent to roughly 30,000 customers. Each customer decides what they want to keep and returns the rest. Shah says about half of those customers return half of the items originally sent to them. Their accounts are billed accordingly seven days after receipt by the customer.

It was clear from the beginning, says Shah, that returns were going to be a major challenge internally. As a result, the subscription service launched incrementally, allowing the DC a better chance to better manage returns. Today, a dozen people manage returns on one shift six days a week.

Processes were put in place and modified as associates learned the most effective techniques. It helps that nearly half of returns come back in the unopened packages they were shipped. That allows immediate restocking for future sale.

The other returns require inspection and disposition. Fewer than 10% of items are trashed, says Shah. He offers three key tips for managing returns effectively. The first is the hardest—make returns as predictable as possible. Often more aspirational than practical, he admits. Second, identify patterns of the condition of returns to streamline handling in the DC. And when returns have been processed, restock in groups rather than individually.

Shah also strongly recommends against trying to build the perfect process from day one. "Things will change and you will have to rely on your associates to identify what is changing and the best way to deal with it."

Today, he says Adore Me's returns process is 60% effective. Shah says an 80% level is probably about as good as it can get. Getting to that 80% will likely involve technology, says Shah. Quite simply, he is experimenting with automation that will replace hand scanning of every unopened return package. That's a major goal for 2020, he says. But it's going to take some work to get there.

But it doesn't stop with physical handling. Software and artificial intelligence are part of the answer too.

Bhasin of Newmine talks about his company's AI-powered returns reduction software platform. Rather than expediting returns that have already occurred, the software uses AI to anticipate returns and reduce them. "By collecting data about each SKU and using data analytics to evaluate the likelihood of returns, the software alerts teams to the potential causes of returns before they happen," says Bhasin.

While Newmine addresses the root cause of returns to avoid them, goTRG addresses the final profitable disposition of actual returns. The company uses data analytics and machine learning to help retailers receive the highest price for their returns down to the SKU level, explains John Lee, vice president of business development a goTRG.

"There are multiple channels where a product can be sold," he says. "But prices are not static. They are very dynamic. Artificial intelligence and advanced software assess pricing for specific SKUs across 20 on-line marketplaces. Companies need this technology to manage returns. People just can't go sufficiently granular fast enough otherwise," adds Lee.

As was said up top, returns are complicated. They come in many different forms and result in at least as many different resolutions. As Newmine's Bhasin says, "ultimately, the best return is one that never has to happen."

However, there is a substantial distance between the ideal world of no returns and the practical world of "what do we do with all this stuff." That distance will not be bridged for some time—and only incrementally for most. Meanwhile, there's a whole lot of work to do in the supply chain to make returns manageable and less costly.

It's time for your SECONDARY MARKET strategy to play a primary role

With the rise in the number of returns and overstocks, secondary markets, like factory outlets, dollar stores and salvage dealers, have become an increasingly vital part of the product lifecycle. What's your secondary market strategy?

BY ZAC ROGERS, DALE ROGERS AND HAOZHE CHEN

Zac Rogers Ph.D., is an assistant professor of supply chain management at Colorado State University Colorado State University. He can be reachd at Zac.Rogers@colostate.edu. Dale Rogers Ph.D., is the ON Semiconductor professor of business, director of the Frontier Economies Logistics Lab and co-director of the Internet edge Supply Chain Lab at Arizona State University. He can be reached at Dale.Rogers@asu.edu. Haozhe Chen Ph.D., is an associate professor of supply chain management at Iowa State University. He can be reached at hzchen@iastate.edu.

If you attended the most recent Reverse Logistics Association conference, you might have noticed two different sets of exhibitors. One set was marketing reverse logistics solutions and services to facilitate swift and efficient returns from customers who had second thoughts about the items they'd ordered. The other contingent was composed of salvage dealers, online auctioneers and software providers with solutions to help retailers and manufacturers do a better job of recouping value from the returned goods.

They illustrated the two steps of the reverse logistics process: First, you have to develop efficient and cost-effective processes to get returned goods from wherever they were shipped back into your hands at your store, distribution center or to the 3PL managing your returns. Just as important is the second step: You have to dispose of those goods once they're back in your control.

Without question, returns handling, the subject of the lead story in this issue of *Supply Chain Management Review*, has long been neglected by supply chain managers. But even more so has been that second step of disposition. In the past, many firms might have donated returned and over-stock items to charity or paid to have them sent to the landfill. The volumes weren't large enough to justify a significant investment in the process. With the rise of e-commerce and the "Amazon-ification" of retail, that's changing.

Today's consumer expects a wide variety of ever-changing product options, with new merchandise available every time they visit a website or a retail store. That means manufacturers are creating new products at a record pace, with more options to choose from than ever before. This is creating an explosion of stock keeping units, all with shorter product life cycles. And, to create an "unlimited shelf" of products, with new product a constant, retailers are both carrying more inventory than in the past while quickly getting rid of the old to make room for the new.

What's more, consumers are engaging with their favorite retailers in multiple ways: Sometimes buying in the store, sometimes online, sometimes online for store pickup and sometimes at that retailer's factory outlet. Consumers may be loyal to retailers, but they aren't loyal to a specific channel most of the time. Add to these shifting expectations, the uncertainty associated with the ongoing trade war and associated tariffs has put pressure on retailers to become more efficient, which includes more carefully managing their reverse logistics and excess inventory. To top it off, more items are returned than ever before, with an estimated $90-$95 billion in returns in the wake of the 2019 holiday season.

All of these factors are generating more inventory in the system, more returns and more unsold goods. What's more, consumers want returns to be easy, seamless and cheap: Buy four pairs of shoes and return three at little to no cost. And, those returns may not always be routed back through the same channel through which they were originally sold and shipped. An item ordered on Amazon.com might be shipped from an Amazon fulfillment center or a seller's facilities, and may now be returned to a local Kohl's or UPS store; an item ordered online from Walmart may get sent back to a distribution center, or returned to a neighborhood Walmart.

That's the reverse logistics process. When it comes to disposition, the rising volume of returns and unsold goods means that firms simply can't afford to send everything to the landfill: They need effective ways to recoup as much value as possible. And, if possible, they need to do so in a way that protects their brand and is environmentally sustainable and socially responsible (see Benefits of the secondary market sidebar).

In short, like all systems, supply chains need a safety valve that can efficiently handle the returns without overwhelming operations. That's where secondary markets, which include salvage dealers, online auctions, factory outlets, value retailers and dollar stores to name a few, provide an often over-looked opportunity for supply chain managers to extract maximum value from their unsold product.

The U.S. secondary market

Despite the existence of secondary market channels, not all retailers have been able to adapt their systems quickly or efficiently. As a result, many have fallen victim to the ongoing "retail apocalypse" in which traditional brick and mortar stores are closing at record rates, along with many of the malls that house them.

At the same time consumer spending remains high, which means dollars are going somewhere other than traditional retail. Much, but not all, of this shift is going to online sales. In April of 2019, for instance, U.S. shoppers for the first time ever spent more retail dollars shopping online than they did in brick and mortar stores. E-commerce, however, isn't the only alternative for shoppers. Over the past five years, secondary markets outlets have experienced explosive growth even as traditional retailers have shut their doors. In the past five years, Dollar General alone added over 2,500 locations. In 2009, approximately $309 billion of goods, the equivalent of 2.1% of U.S. GDP, flowed through secondary markets; by 2018, that number had reached $618 billion, equivalent to 2.9% of U.S. GDP (Figure 1). That was $101 billion more than e-commerce sales for that year.

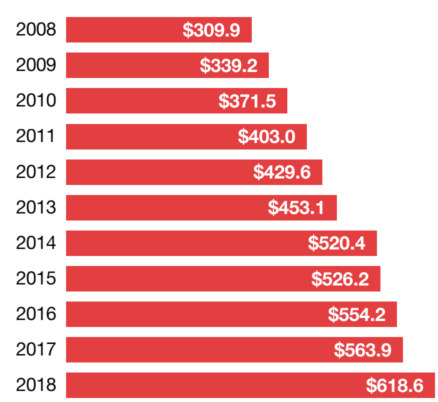
Secondary markets, which we divide into eight discrete channels, provide important revenues to both retailers, manufacturers and brand owners. They are:

Salvage dealers. Retailers routinely sell mixed pallets of returned inventory to salvage dealers, who represent the largest secondary market channel by volume. These pallets are then resold, consolidated and shifted to other secondary market channels for final sale. Much of the growth in salvage dealers over the last 10 years can be attributed to the sharp increase in returns.

Online auctions. Goods moving through this channel have often been purchased at physical auctions from salvage or junk dealers. In this channel, pallets of merchandise are broken down and re-sold as cases or individual units. This category includes auction platforms such as eBay.

Value retailers. This category includes low-cost retailers such as Ross Stores and the TJX brands, Marshalls, T.J.Maxx and HomeGoods. These firms generally sell overstock merchandise from other retailers and manufacturers at significant markdowns, with a goal of moving the merchandise through their stores in less than a month.

FIGURE 1
Size of U.S. secondary market
(in $ billions)



Source: Authors

Dollar stores. In addition to their own products, dollar store operators like Dollar General and Dollar Tree also purchase other firms' unsold inventory and move it quickly at a significant markdown. Value retailers and dollar stores have been the fastest-growing secondary market channels over the last 10 years.

Factory outlets. These stores are often clustered in outlet malls, where they sell overstocked inventory at a sizeable markdown. Some manufacturers, such as Nike, design products specifically for the factory outlet channel. Because of this, only 80% of the total inventory moved through this channel is considered to be secondary market inventory.

Pawn shops. The pawnshops channel is the most reactive to the economy. That's because it's a C2B model, and consumers are more likely to sell their goods to pawnshops when the economy is bad and they need extra cash. Businesses, on the other hand, look to unload unsold or returned merchandise no matter the state of the economy. EZ Pawn and First Cash America are the leading U.S. pawnshops, but this market tends to be highly stratified.

Flea markets. Flea markets are often populated by small vendors that gather together for a pop-up retail festival. The inventory moving through flea markets often flows from salvage or junk dealers through auctions or other mediators.

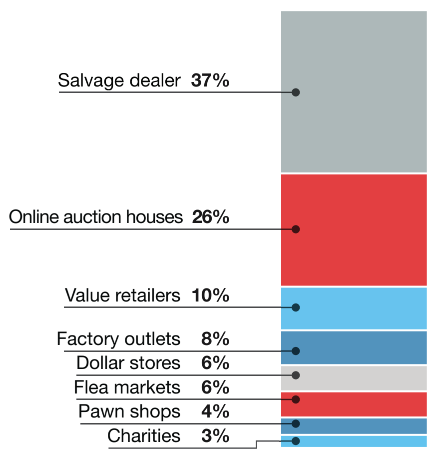
Charities. Charities re-sell inventory donated to them by individual consumers—and sometimes businesses—at a significant markdown. Like pawnshops, the amount of inventory flowing through charities is tied to the health of the economy. Unlike pawnshops, which thrive when times are bad, more inventory passes through charities when the economy is strong and consumers can afford to replace old things with new. Goodwill and the Salvation Army are the largest charities in the United States.

The breakdown of the disposition of secondary market goods by channel is presented in Figure 2.

It's important to note that there's no "one-size-fits-all" solution when it comes to the secondary market. Different products require different methods of disposition, leading to a blurring between some of the channels. In fact, it's common for unsold inventory to be moved from the original retailer to a salvage dealer that auctions off the merchandise to a dollar store or to a power seller on eBay before the goods finally reach a consumer.

FIGURE 2

2018 breakdown by channel



Source: Authors

Last, in addition to providing a channel for unsold inventory, secondary markets are taking a lead role in environmental sustainability and corporate responsibility. In emerging economies, for instance, secondary markets are providing opportunities for impoverished people to make a living by recycling, reusing and reselling unsold goods. And in the United States, some individuals have found a niche selling salvaged products through auction sites such as eBay as an alternative to a conventional job.

Secondary market flows

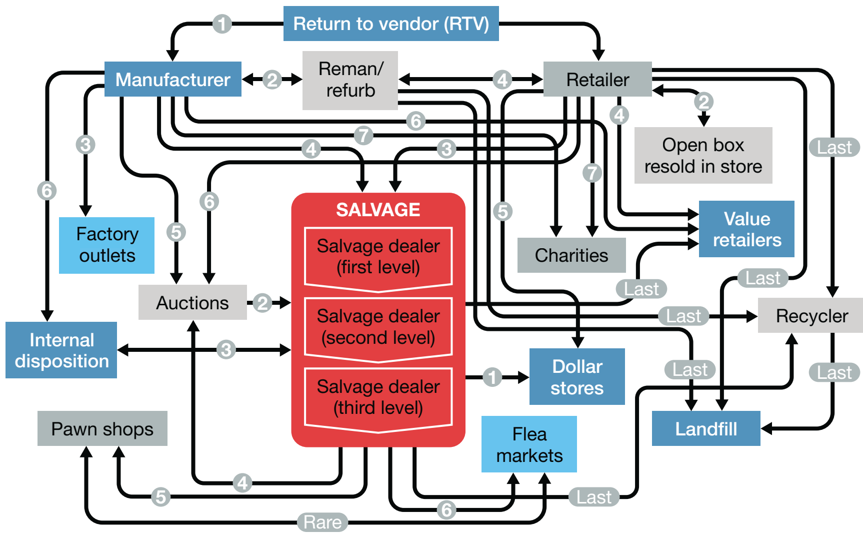
While beneficial, secondary markets can be difficult to manage. A primary reason for this is that supply chain managers find that the overall volume of product in the returns channel is small relative to the forward flow of product. What's more, product flows in the secondary market are much more complex. Figure 3 illustrates the complexity of these flows.

For most retailers, the first choice is to return product back to the vendor (RTV). That is typically a function of the retailer's contract with the supplier, and its relative power in the relationship. The second choice is to put the returned item back on the shelf and resell it as an "open box" return. Some products, such as apparel, can be put back on the shelf as still new; other products, such as electronics, are legally considered to be used once they have been turned on or activated.

The next most likely secondary channel for retailers is to sell to salvage dealers, usually in truckload or multi-truckload quantities. In many reverse flows, product will move through several levels of salvage

FIGURE 3

Returns to secondary market flow



Source: Authors

dealers before getting to the consumer. Typically, truckload volumes will be purchased through an auction system. Those large volumes will then be broken into smaller lots that are sold to the next level where they are resold in pallet or less-than-pallet quantities, and so on down the line. In most of the salvage dealer reverse supply chains we have examined over the years, there are three or four levels of salvage dealers involved in the majority of large transactions, and sometimes up to 10. Salvage dealers exist throughout the world, and provide an important service in clearing out and re-purposing excess and obsolete inventories for other markets.

Unsold goods next move to the other secondary markets, including value retailers, dollar stores, auctions, charities and international dispositions. Like factory outlets, value retailers typically sell items for around 70% of their original price. The savings represent a good deal for consumers, and allow for the profitable recovery of value on items that could otherwise be total losses if they ended up in a landfill.

For manufacturers, the disposition of choice is likely to be refurbishing and reselling products that can be fixed. In an example observed several years ago by one of the authors, small handheld vacuum cleaners that had been returned as defective moved through a refurbishing assembly line where because of previous failure data, three inexpensive fixes were applied to each vacuum. At the end of the line, if the vacuum appeared to function when it was turned on it was sent to a factory outlet or employee store where it was sold as remanufactured. Otherwise, it went to the landfill. For many manufacturers and brand owners, a factory outlet is often the most profitable secondary market. In many instances, outlet stores are more profitable than the primary channel.

Not all secondary market dispositions are created equal—some result in much higher turnover and profitability than others. For instance, pawn shops, flea markets, recyclers, charities and landfills are generally less attractive than the higher priority disposition streams that allow a retailer, manufacturer or brand owner to make a profit on the items in the reverse logistic stream.

A five step strategy

Given that secondary market goods tend to be cheap, fresh and convenient, they fuel customer expectations. This generates a positive feedback loop, depicted in Figure 4, in which the availability of secondary market goods will continue to modify consumer expectations, and feed into their own growing demand.

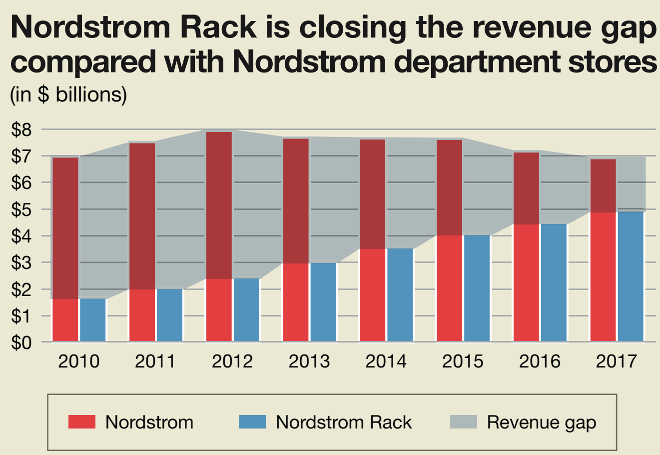
We recommend the following five step strategy to retailers, manufacturers and brand owners that

Benefits of the secondary market

There are several benefits to a successful secondary market strategy that every supply chain manager should consider.

Reduce cannibalization. Since the recession, retail has fallen into a vicious cycle of quickly marking down items on the shelf to make room for newer, full-priced goods. Consumers have been trained to hold off paying full price today for something that will be 50% off next week, or even tomorrow. The secondary market provides the valve we referred to earlier for firms to move older inventory to factory outlets or value retailers rather than cannibalize full priced inventory in their stores. Nike, for example, regularly moves older product to its more than 650 factory outlet stores.

Few retailers have taken this concept as far as Nordstrom with its Nordstrom Rack brand. To appeal to its upscale customers, Nordstrom merchandises its flagship stores with upscale displays, flattering lighting and plenty of open space. By comparison, Nordstrom Rack looks like a T.J.Maxx, with marked-down product crammed onto clothing racks beneath overhead fluorescent lights. Shopping there is a treasure hunt, as customers search for hidden bargains. The concept has been so successful that there were 124 more Nordstrom Rack locations in 2019 than Nordstrom stores. Although Nordstrom stores still generate more revenue than Nordstrom Rack, the gap is closing. Other retailers, including Macy's Backstage and Microsoft's X-Box Game Pass, have rolled out similar strategies.



Source: Authors

Brand protection. Moving unsold inventory to customer-facing secondary market channels, like value retailers and dollar stores, allows firms to better protect their brand because they know where their goods will be sold. The alternative is sending merchandise to the landfill or other undesirable channels, where they might end up who knows where. For instance, 100 pallets of excess lunch boxes sold to a salvage dealer may get resold to 1000 different stores in 1000 different states of disrepair. Those same 100 pallets sold to Dollar General will likely be sold at Dollar General outlets. That control is important in an era when consumers, regulators and the media hold firms responsible for their products from cradle to grave.

Support sustainability initiatives. For companies with a sustainability strategy, secondary markets address the "triple bottom line." Secondary market channels allow businesses to reduce, reuse and recycle inventory that would have otherwise been destined for the scrap heap, and make it available to consumers that may not have originally had access to those products.

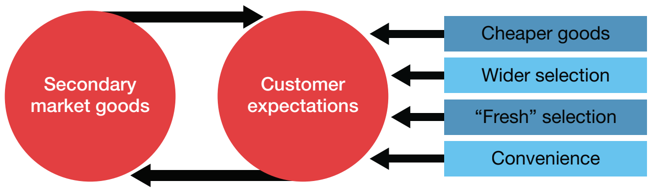
It promotes social responsibility. For years, high-end brands like Nike and Ralph Lauren have destroyed millions of dollars of unsold inventory to protect their brands from discounting. As governments begin to tighten up regulations on wasteful practices (see Global phenomenon sidebar), many companies like Burberry and H&M have embraced the more socially responsible practice of repairing, reusing, recycling or donating unsalable products. Secondary channels are an important part of these efforts.

There are also community benefits. In poorer or rural communities that are too small or remote to support a Walmart, dollar stores are often the major retailer. In many cases, they are located near remote military bases, providing benefits to the families of service members.

What's more, many of the jobs that have been lost in the retail apocalypse can be back-filled by new positions at secondary market retailers. Dollar General alone has added thousands of new locations in the last five years. While these are softer benefits that may be difficult for a supply chain manager to quantify, they illustrate the point that secondary markets are now an essential part of business activities and a driver of sustainability in the United States.

FIGURE 4

Positive feedback loop



Source: Authors

want to create a secondary market strategy that takes advantage of the potential relief.

Step 1. Firms should perform a self-audit to determine the amount of inventory that is currently being disposed of through landfills or salvage dealers. For example, some firms may be inefficiently disposing of a small quantity of inventory and have a lesser need to invest resources into the development of a formalized secondary market strategy. If historical data is available, it's helpful to identify the directions in which excess inventory, and its subsequent disposition, is trending. It's also beneficial to determine if there is a systemic problem underlying the proliferation of excess inventory that goes beyond market pressures and consumer expectations. If excess inventories are high due to forecasting errors or similar structural issues, those need to be addressed before developing a secondary market strategy.

Step 2. Once a firm determines the scope of the issue, it should identify the potential channels of disposition it might utilize. Disposition through dollar stores may be beneficial for consumer package goods retailers, while apparel firms may find that value retailers are more profitable.

Step 3. After the appropriate channels have been identified, it's time to select the specific secondary market outlet. If the volume of returns is high enough and resources are available, a firm may want to control the channel by moving inventory through its own outlet stores or discount chains á la Nordstrom or Macy's.

Step 4. Firms should also develop a well-defined system, potentially including an if/then mechanism to determine which inventory should be sent to secondary markets, when it should happen and which channel or channels of disposition are most appropriate.

Step 5. Finally, firms should engage in a continuous process improvement strategy in which they evaluate their secondary market strategy, and alter it when/if needed.

Metrics that matter

As with any supply chain process, the old mantra that "what you measure gets managed" applies to reverse logistics and the secondary markets. Critical to the management of those processes is the development of metrics that provide good visibility into the reverse logistics flow and the value of various secondary market dispositions. Below are a few suggested reverse logistics and secondary market metrics.

- ***Disposition cycle times.*** Disposition cycle times are generally an important measure of reverse logistics and the secondary market. Shorter cycle times generally lead to lower costs and greater profits. If the processes that manage reverse logistics and the secondary markets are standardized and streamlined, cycle times will be shorter and the firm will likely achieve better results. In our experience, it's often more important to make a sub-optimal decision quickly then to wait and make a"perfect" decision.
- ***Amount of product reclaimed and resold.*** Firms should measure the percentage of product that moves through the reverse logistics system and is reclaimed and resold for each product type. The reverse logistics system is charged with cleaning the unwanted product out of the network while contributing as much as possible to profitability.
- ***Per unit handling cost.*** A cost per-touch metric can be readily computed by calculating all costs associated with handling product above and beyond the original movement in the forward logistics stream.
- ***Value recaptured.*** Firms should have goals in place for the recapture of value. Measurements need to be constructed around all of the costs related to the acquisition of the original product plus the cost

A global phenomenon

The secondary market concept is not unique to the U.S. Companies around the globe are using them as a valve for excess inventory.

Take China, where Chinese manufacturers are adding product variety and production capacity to service the emerging consumer economy. However, their demand forecasting capabilities have not kept pace with their manufacturing prowess. The result: By some estimates, excess inventory in China exceeds $500 billion(U.S.).

In response, China's central and provincial governments have created a number of initiatives in recent years. In 2015, for instance, China launched the Excess Inventory Appraiser license to ensure the fair assessment of products moving through secondary markets. In October 2017, China's General Administration of Quality Supervision, Inspection and Quarantine and China's Standardization Administration issued a joint national standard:"Terminology and Classification for Circulation of Excess Inventory Commodities." This facilitates common terminology, standards and procedures around key processes in the secondary market. Further, the China Excess Inventory Circulation Association (chinakcwz.com), along with several provincial networks, are working to facilitate the movement and reduction of excess inventory. More recently, China published the Barter Trade Development Plan for 2018 to 2028 to develop both international and domestic trade with inventory as payment instead of currency. We expect the Chinese secondary markets to experience more significant developments in the near future.

Excess inventory is also a focus in Europe. By some estimates, more than $730 million worth of returns and unsold inventory are thrown away or destroyed in France each year; Richemont, which owns Cartier, Piaget and Vacheron Constantin, reportedly destroyed $560 million worth of luxury goods in a two-year period rather than discount them. However, in June 2019, French Prime Minister Edouard Philippe outlined plans to outlaw the destruction of non-food goods, including clothing, accessories and cosmetics by 2023, which could put an end to those practices.

of holding it and moving it through the reverse logistics system to the secondary market disposition. Then, the profitability of each product type given total cost should be measured.

- ***Percentage of material recycled.*** While firms don't generally want to recycle material, it's important to know the value and cost associated with recycling. At the time of this writing, the recycling market has been badly damaged because China is no longer purchasing U.S. recycled materials. Tracking the percentage of product in the reverse logistics stream that is recycled in an appropriate manner is also useful in developing sustainability scorecards. This metric can also be used with landfill avoidance by amount recycled and,it can be utilized in conjunction with carbon footprint measurements. A related metric could be the amount of returned product that is moved to landfills, incinerated or disposed of as waste. Note that many ERP installations and supply chain management systems don't adequately address key measures. As a result, these metrics may need to be developed internally.

The time is now

Given the disruptions caused by the "Amazon-ification" of retail, it's surprising that more attention hasn't been paid to the secondary market by supply chain managers. Yet it's clear that as e-commerce continues to grow, retailers and manufacturers will need to develop a well-defined secondary market strategy to handle the increase in returns and unsold inventory. Supply chain managers involved in secondary market management must be able to tightly control their costs while at the same time often moving product long distances. In addition to the financial benefits of taking advantage of this market, a secondary market strategy can enhance a firm's sustainability and corporate responsibility efforts. Given these, in the long-term more firms and other stakeholders well begin to take greater notice.

Are your performance measurements destroying your supply chain?

The performance measurement system is the most misunderstood, confusing, misapplied and frustrating element of most supply chains. Yet, an effective performance measurement system is one of the foundations on which the strategic supply chain is built.

BY STEVEN A. MELNYK, MICHAEL BOURNE, DAVID FRAYER AND WILL RIFKIN

Editors Note: This is the second of a two-part article on performance measurement, and continuation of our series on the future of the strategic supply chain by Steven A. Melnyk. Part 1 appeared in the November 2019 issue of *Supply Chain Management Review*.

The business environment is changing. The rise of new technologies such as the Internet of Things, 3D printing and RFID, the use of Big Data and a change in customer expectations means that issues such as responsiveness, innovation and sustainability are determining the way that companies manage their businesses and operate their supply chains.

While cost will always be important, today's supply chain is changing from one that is driven y price and decoupled from the business strategy to a value-driven supply chain that is tightly coupled to the business strategy. As the supply chain morphs, so too will performance measurement in order to be more consistent with this environment. What follows are nine guidelines that we believe are essential to the strategic supply chain.

Steven A. Melnyk is a professor of operations and supply chain management in the department of Supply Chain Management, Michigan State University. He can be reached at melnyk@msu.edu. Michael Bourne is a professor of business performance action, execution and implementation at Cranfield University. He can be reached at m.bourne@cranfield.ac.uk. David Frayer is director of executive development programs in the Broad College of Business at Michigan State University. He can be reached at frayerda@broad.msu.edu. Will Rifkin is a professor and chair in Regional Applied Economics at the University of Newcastle Australia. He can be reached at will.rifkin@newcastle.edu.au.


Cost savings
Output
Set-up time
Defects
On-time delivery
Innovation
Profit

1. Performance measures must become the vehicle for communicating the voice of the customer and the firm's value proposition.
This is perhaps the most important change, and the one that will consume most of this article. In "The Customer-Centric Supply Chain," an article from the July 2017 issue of *SCMR*, the performance measure links strategy to execution by communicating what the customer wants and what the value proposition promises. To the people involved in the execution of the process, this helps to answer the questions of what the customer wants and what have we promised in meaningful ways. It identifies the shared vision and the priorities of action. As the focus of the supply chain shifts away from cost, we expect the number of measures focused on responsiveness and quality to increase while the number of measures dealing with cost to decrease.

We also expect how these measures are reported and recorded to change. To understand this new point, it's useful to think of performance measures like the instrument cluster on your car. There are some measures like speed and fuel levels that are continuously reported to the user because they are critical to the operation of the vehicle. Similarly, measures related to quality and responsiveness are central to the key customer and to the value proposal. Others, such as cost, should only be reported when they are out-of-alignment with the standards. In other words, they should be like the "trunk open" icon, which only comes on when the trunk is open and shuts off when the trunk is closed.

Here is a test that we commonly use to assess the alignment between measures and the business strategy. First, we ask what do the measures you're evaluating infer about what key customers want and what the value proposition promises. Then, we compare that inference against what top management has identified as the demands of key customers and the value proposition the business has promised to deliver. We cannot stress the number of times that we have found that what is measured and what is wanted (by key customers and the value proposition) are at odds with each other. This lack of alignment will nearly always promise the creation of organizational stress and confusion, combined with customer frustration—elements that will hinder, if not destroy, the strategic supply chain.

When you recognize that there are more outcomes than just cost, you can adjust your measures to reflect this new reality.

To date, the dominant form of performance measure in most firms is still focused on cost and efficiency. Yet, the new strategic supply chain can also deliver:

- responsiveness;
- sustainability;
- security (both of product/service and information/data);
- resilience; and
- innovation.

As these new outcomes emerge as competitive differentiators, it's important that new measures communicate to supply chain partners (1) that these new outcomes are important; and (2) what constitutes acceptable performance.

Measures and security

At first glance, these traits seem to be self-evident. Yet, in some cases, operationalizing these outcomes in the form of measures and metrics is not a trivial undertaking. Consider, for example, cyber security. This outcome is becoming increasingly important in organizations and supply chains, and not just in defense related industries. Yet, a challenge facing most firms is that of developing appropriate measures in this domain to be included by buyers in contracts with their supplier base.

Most of the serious breaches in security have emerged through the supply chain, especially at the second and third tier supply levels, and in small-to-mid-sized enterprises. Consequently, it makes sense to develop output measures and, more importantly, predictive measures. Yet, there are currently no widely agreed-to-measures for cyber security. The result is that some firms are requiring cyber security without the means to measure outcomes. The result: paradox and confusion.

We know that cyber security is important; we know that the threat is most likely to occur at the upstream/supplier side of the supply chain; we know that such threats are expensive to deal with and take a long time to address. We also know that we are dependent on our suppliers as the first line of defense. However, we aren't measuring security other than noting that a breach occurred after the fact, if we're lucky enough to spot it. So, what we are effectively telling our suppliers is that security is not important. Talk about a confused message.

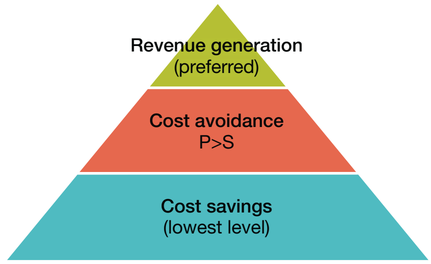
Performance hierarchy

Meanwhile, within the performance hierarchy (Figure 1), cost savings represent the lowest level of execution, but cost is the one most likely to be supported by performance measures.

Know when NOT to measure. This issue came to the fore at a supply chain futures workshop held at Michigan State University in 2006. One participant summed it up as follows: "Cost saving is nothing more than identifying a problem that you have created in the past and then correcting it." Another observed that an emphasis on cost savings encourages the suave manager to identify the ideal solution but then implement the worst approach. At that point, all that has to be done is to move the current system toward this ideal system. The measurement system will ensure that you get rewarded more than if you had implemented the best solution from the outset. Let's call this strategy, "aim low and overachieve."

FIGURE 1

Performance hierarchy



Source: Authors

If cost savings are the least effective measures, then what is better? As Figure 1 shows, there are two other "better" levels of performance. The first is cost avoidance. Rather than implementing bad systems in the first place and then correcting the error over time, let's implement the right solution from the outset. This approach was observed in a sign found posted everywhere at a company visited by one of the authors. The sign read: "P>S." Translation: "Prevention Always Beats Savings."

The highest level of performance, revenue generation, is the one most likely to garner the attention of top management. It shows the strategic power of the supply chain. Despite this hierarchy of performance, why aren't more companies focusing on avoidance or revenue generation? The answer is simple: It's easier to measure cost savings than it is to measure cost avoidance, revenue generation or to determine the exact contribution of the supply chain. Consequently, most firms are unable to break through and realize the promise of a truly strategic supply chain because they are restrained by their performance measurement systems.

At first glance, this guideline does not seem to make sense. But, underlying it is a simple but important insight—yes, you get what you measure, but sometimes it makes sense not to measure. That is when the firm and its supply chain are engaged in innovation, especially radical innovation. As observed by John E. Ettlie, a leading researcher in innovation from the Rochester Institute of Technology, when you're interested in radical innovation, you are focused on new and different solutions. If you institute measures, they will influence and shape the resulting nature of the innovation. For instance, if you measure costs, don't be surprised if your innovations are focused on costs. In these instances, it makes more sense to describe the desired outcomes rather than measure performance dimensions such as cost or lead time. Additionally, innovation involves a learning process that requires deviating from set norms. Why would one want to measure adherence to norms at the same time as trying to challenge those norms?

2. *The key to effective performance measurement and management is that of managing the number of measures.*

The second key change we expect to see is the way firms manage the number of measures. If you are asking managers to effectively manage, prevent and correct problems, then there is a limit to the number of measures for which they can be held accountable. Research suggests that that number is no fewer than three and no more than seven. This range means that firms must be prepared to add and drop measures as the environment and areas of focus change. Piling on measures does not work in the long-term.

The results of such approaches are well documented—gamesmanship (negotiation over how good a level of performance is generated), cherry-picking (let's focus on the measures where we're doing well) and confusion and frustration. The second caveat is that conflicting measures (two measures, where doing well on one results in doing poorly on the other) must be identified and reconciled by management. This issue is very prevalent in supply chain management where, for example, marketing wants high levels of customer service, while finance wants lower inventory and supply chain costs.

3. *Recognize that measures are symptoms, not root causes.*

Measures and metrics are indicators. When we compare actual performance to the standard, we can quickly detect when there is a gap and how large it is. However, it's important to recognize that what we have is a symptom. Symptoms tell us that something is wrong but not why. Finding out root causes requires further study. Such gaps could be due to numerous factors:

- we don't know who are our key customers or what they want;
- we don't know what constitutes an acceptable or unacceptable level of performance (critical in setting the standard);
- we have the wrong measures in place;
- there is a gap between actual and desired performance;
- the people engaged in the delivery of the product or service are not receiving timely feedback; they may think that they are doing a good job when they are not.

One of the best examples of focusing on measures as root causes can be found in the experiences of a well-known fast food restaurant that had a waste problem within its line of chicken products. Management decided to measure how much chicken was being thrown out after it was cooked at each of its stores. Over time, the chain found that the stores that threw out the least amount of chicken experienced the lowest level of sales, not the highest.

Why? Upon investigation, management learned there were two ways store managers reduced the amount of wasted chicken: One was to never throw the chicken out, which resulted in dried out, unappetizing meals, or waiting until a customer placed an order, which took too long to cook for customers in a hurry. Either approach resulted in unhappy customers likely to go somewhere else for a meal. By focusing on one symptom, too much chicken being thrown out, the restaurant chain created another problem, lost sales.

This is the type of outcome that frequently results when you mistake symptoms for causes.

4. Recognize that measures are imperfect proxies of actual behavior

We are often constrained by the data available for capture. So, we tend to use the measures as a proxy for the desired behavior that we, as managers, want to see. Yet, the measures that we use tend to capture outcomes that can be achieved in a number of different ways. Some of these outcomes can be undesirable, even though they may satisfy our measurement criteria.

To understand this point, consider the following experience. When a company wanted to promote innovation, especially radical innovation, management introduced a new "measure of innovation" that captured the percentage of sales due to products that had been in the market for three years or less. Management expected this to encourage the development of new products.

The initial results looked encouraging. More than 30% of sales were coming from these new products. But, on closer examination, two disturbing trends were uncovered. First, many of the innovations were merely minor extensions of existing lines—a kitchen cabinet with a new finish or a different set of handles was classified as an innovation. Second, new products were kept in the mix, even if they were dogs that weren't generating the expected levels of revenue and profit simply because they contributed to the measure that management thought was important. In other words, just because the "numbers" look right doesn't mean that the "right" behavior is taking place.

5. Expect performance measurement to become more complex.

As we noted in Part 1, companies can be expected to compete on more than one dimension of performance (remember—the supplier was competing on security of supply, responsiveness and resilience). In applying the six-outcome framework we previously discussed (efficiency, responsiveness, sustainability, resilience, security and innovation), we have used the 1-2-3 approach. That is, one of the six outcomes is crucial—it is central to how the firm competes and why the key customers buy from this firm.

In the supplier we described in Part 1, the key outcome was security of supply. If this was your primary criterion, you would want to be in the top 5% of performance. The two other key outcomes, responsiveness and resilience, are important, but they should be seen as strategic modifiers to the central outcome of security. These two criteria—responsiveness and resilience—enable firms competing on the same central outcome, (security) to differentiate themselves from each other. For these two additional criteria, you want to be in the top 20%.

The remaining three criteria—whatever they may be—are important but not essential. For these factors, you want to avoid errors. Consequently, you are willing to be in the top 50%. Taking this approach, you now have to measure more than one outcome, and you have to weight the outcomes differently. The result is going to be a more complex, but more usefully prioritized, performance measurement system.

6. Expect predictive measures to become increasingly important in today's business environment.

As previously noted, the business environment is changing. This new environment is characterized by responsiveness, innovation, shorter product life cycles, the emergence of more demanding customers and the emergence of new competitors. As a result, relying primarily on outcome measures may not be good for the health of the firm and its supply chain. The reality of such measures is quite simple—they take too long and your business may not have the opportunity to apply lessons learned to existing products.

Consequently, we expect to see the emergence of more predictive or process-based measures. Such measures make sense because they attempt to prevent problems in performance rather than correcting the problems once they have occurred.

7. *Performance measures will become part of the transparent supply chain.*

The Economist devoted a portion of the July 13th 2019 issue to the changing nature of the supply chain. One of the emerging themes was the increasing importance of transparency in the supply chain. Consumers want to know where the products they are buying were produced and they want to know whether the processes used in producing them were sustainable. An executive marketing VP for Starbucks put it succinctly: "Today's consumers want to know the provenance of the products that they are consuming."

Today, providing evidence of such provenance is being facilitated by developments such as the Internet of Things and blockchain; it is being championed by market leaders such as Amazon, Coca-Cola, Unilever and Walmart. It is being reinforced by having firms institute appropriate performance measures on their supply chain partners and then reporting these measures to interested customers and consumers (either individuals or companies).

One way companies are establishing and demonstrating that they have control over their supply chains is through measurement. To understand this guideline, simply look at the experiences of BMW, VW and Vauxhall previously reported in "The Customer-Centric Supply Chain." These companies have taken strong positions supporting sustainable sourcing. Yet, in 2016, *The Guardian* published an article linking their supply chains to illegal mines in India, where child labor and debt bondage was widespread. In response, they launched investigations into their paint supply chains. In today's environment, ignorance of the supply chain performance at the lower levels is no longer an acceptable excuse.

8. *Performance measures must coexist with social media and Big Data.*

Performance measurement is about feedback. Yet, it is not the only method for generating feedback. Other important feedback can be gained by studying social media or Big Data. Such feedback is now widespread, and it enables firms to identify and correct potential problems before they get to be too widespread. For example, Lenovo is now monitoring social media to detect potential problems in their products while they are at an early stage and to correct these problems before they become too widespread. The same can observed for Big Data, which companies and researchers are now studying to uncover potential hidden problems. For example, Jason Miller of Michigan State University is now analyzing Big Data generated by mandatory ELD (electronic logging devices) in the American trucking industry to assess accidents and shifts in shipment patterns. In a world where responsiveness is king, you have to broaden your views on what constitutes performance measurement.

9. *Don't confuse good performance with a healthy supply chain.*

It is appropriate to end this discussion of supply chain performance measurement guidelines with this final point. Too often, when management measures supply chain performance, it is not really measuring the performance of the supply chain. Rather, management is measuring the performance of the corporate supply chain group. Often, issues are overlooked, including supplier loyalty, the extent to which the supply chain is experiencing healthy turnover or the ability of the firm to effectively manage and grow its supplier base (the upstream portion of the supply chain). It's not looking at whether critical second and third suppliers find it financially and strategically attractive to be part of the supply chain.

We have observed too many instances of firms losing critical lower-level suppliers because they were being squeezed on price and cost by their immediate customers. As one manager put it, "Just because you are reporting good numbers to your top management team, this doesn't mean that your supply chain is healthy. You might be making these numbers by driving your suppliers into bankruptcy." Essentially, by focusing on measuring an extrinsic variable—the overall outcome—you can unknowingly affect an intrinsic variable—the overall health of each company in the supply chain.

Measure to manage

Performance measurement and metrics are key to building the strategic supply chain. However, failure to understand the changing nature of the measurement system and its influence can actually reduce value, damage customer relationships and destroy overall supply chain performance.

The nine guidelines we just highlighted provide supply chain professionals areas of focus to enhance their current measurement systems. They provide insights in how to prioritize or weight measures as well. By following these guidelines, and by being aware of gaps, mismatches and inconsistencies, supply chain professionals can position their performance measurement systems, and thus their supply chains, for success in this new fast-paced, technologically-fueled competitive environment. Failure is not an option (unless we choose not to measure it).

Navigating GLOBAL TRADE

The outlook for global supply chains has never been more volatile. Four experts in trade and compliance look at ways to navigate today's choppy waters.

BY TAN MILLER AND BOB TREBILCOCK

Over the past several decades, supply chains have truly gone global. And with that has come complexity. We're not talking just about the challenges of synchronizing supply chains in which raw materials, parts and components produced in disparate countries need to show up just-in-time on an assembly line, or manufacturing processes that span multiple countries to produce a finished good. Rather, we're talking about the complexity associated with trade compliance, where crossing T's, dotting I's and sweating the details is essential.

While trade compliance may have been a sleepy corner in most organizations in the past—sometimes residing in logistics, sometimes in procurement and sometimes in legal—that has all changed as countries like the United States renegotiate trade agreements and ramp up tariffs. For instance, the headlines on the day the authors were finishing this article announced a new trade war and renewed tariffs on steel and aluminum from Brazil and Argentina. The terms of a new agreement with China were still being negotiated. Continued uncertainty was the theme of the day.

Last April, four experts with years of experience navigating global trade discussed the challenges and opportunities facing trade compliance professionals at a supply chain symposium at Rider University. The symposium was organized by Tan Miller, director of Rider's global supply chain management program. They were: Bob Murray, chairman, REM Associates, and adjunct global supply chain professor at Rider University; Laura Heyburn, director of global trade optimization and trade compliance at Firmenich; Suzanne Richer, founder, Global Trade Academy, an Amber Road firm; and Michael Weick, Customs manager at Subaru of America.

Among the topics discussed were ways to partner with Customs and strategies to raise the profile of trade and compliance within the organization.

Tan Miller is a professor and the director of the global supply chain management program at Rider University. He can be reached at tmiller@rider.edu. Bob Trebilcock is the editorial director of Supply Chain Management Review. *He can be reached at btrebilcock@peerlessmedia.com.*

Bob Murray, chairman, REM Associates; adjunct global supply chain professor at Rider University

I am probably the oldest, tenured supply chain person in this room. And I say that because in my entire career, I have never seen international issues so prevalent, so prominent and so important in all of our supply chains. If you think about it, 50 years ago we bought raw materials and parts, manufactured products and then consumed them in the United States. Today, I don't think there's any product that you wear or that you use that is solely domestic to the United States. So, as businesses, we're going to be influenced by international events. And, we can expect future changes to the rules and regulations that determine how we do business, and how our government controls that business. Just look at shipment security: Never in the last 50 years have we been so sensitive to securing the movement of goods around the world.

There are so many international events affecting global trade. I'm sure you've seen the headlines coming out of England as the Prime Minister tries to convince Parliament to approve the Brexit agreement. I don't think anyone in this room knows what that is going to look like in the next three months to six months. But it will be important and not just for Britain, but also for all of the EU.

Secondly, we just negotiated a new agreement with Canada and Mexico. While that hasn't been ratified, there are political issues at the Mexican border that will affect trade. Whatever happens, how are we going to make the necessary changes in our business?

Then there's China. It's going through explosive growth, but China's whole population is now moving up, and that's driving costs up. So, what will the next China look like? We're going to need to look at that and understand it.

And, there's the various tariff agreements with our trading partners. Because of politics, we don't know how those changes are going to affect international trade with the United States. We don't know what's going to happen in Russia in the next few years, but we do know they are a significant influence throughout the world. And who would've predicted the collapse of Venezuela five years ago or even one year ago? And we have to ask: What's the next Venezuela? We don't know, but we do know that there will probably be one and we will have to deal with it.

Not all events are political. There has been consolidation and the elimination of some major carriers in container shipping. The expansion of the Panama Canal is affecting port operations. In New York, we raised the height of one of the bridges so we can get major ships into the harbor there.

As businesses we can control the height of a bridge or who we work with as transportation partners, but the thing we can't control is political positioning. The question on everyone's mind now is: What will happen in 2020 or 2024? I don't have a crystal ball, but we know that whatever happens, as people in supply chain we have to be responsive to change, correct course and move on within that political position.

Suzanne Richer, founder, Global Trade Academy

At the outset, we need to remember that the profession of trade compliance specialist has really been in existence for about 25 years. My career has mirrored this development as it has enabled me to see the global trade landscape from many perspectives resulting from the variety of jobs I have had involving world trade. I began my career working for Customs brokers and freight forwarders, which led to developing and leading trade compliance and logistics at an import/export firm, and then teaching the full array of export and import topics to current and budding trade compliance specialists. The last 20 years have been focused on providing expertise and advice on global trade compliance and supply chain management through consulting and training.

These different jobs gave me a multifaceted exposure to different aspects of trade compliance. As a result, I bring an alternative and perhaps more varied perspective on global trade supply trade management. Whether you call what we do trade compliance or Customs, it is truly the missing link in global supply chain management and one that cannot be ignored in your import programs.

As a consequence, we now see trade compliance professionals represented in strategic meetings, from sales and operations planning to senior management meetings including purchasing, materials management or supply chain groups.

And you can make and save money through trade compliance. If you conduct business globally, the team managing trade compliance brings strong expertise in global markets and will bring great value to the firm through savings and cost reduction. So, let's dig a little deeper on the changing environment of Customs and how your firm can remain resilient in this new environment.

The first question for your company to consider: How well are you partnering with Customs agencies around the world? New voluntary cargo security and trade compliance programs offer importers and exporters an opportunity to reduce risk and lead time. In the United States, the first step is to join a voluntary cargo security program. That's going to be CTPAT, or the Customs Trade Partnership Against Terrorism that came into play after 9/11.

Now there are similar programs around the world, such as the Authorized Economic Operator program, or AEO, in Europe, the C-AEO in China and the J-AEO in Japan. If you're not participating in CTPAT, you've missed the first step in partnering with the government of the importing country.

The CTPAT partnership opens the door to the Importer Self-Assessment program, which is a voluntary trade compliance program. When a company joins both programs, they earn the coveted title of becoming a Trusted Trader, which earns the firm incredible benefits including removal from Focused Assessment audits as well as having an assigned national account manager at Customs, who acts as a liaison between the firm and CBP.

A great example of how this partnership works is through advance information channels available to you at the time your shipment leaves a foreign port. Working with my assigned Customs manager, if I file my Customs entry early in the supply chain channel, any hold on my shipment will be shared with my team and they can work to correct the issue prior to the shipment arriving in the United States. That's a tremendous benefit. If you're still considering joining CTPAT, or if you're in that program but have not yet moved into the ISA program, it's time to re-elevate how you manage trade compliance. Partnering with Customs globally changes how your supply chain competes internationally.

And this leads into the Brexit discussion and Customs partnership programs globally. If you look at Germany, more than 8,000 companies participate in the European AEO, which is a very large number of companies in this cargo security and/or trade compliance program. Similarly, across Europe, many European companies have partnered with EU Customs through AEO membership to gain access to simplified customs entry processing. The key exception to this trend, historically, has been companies based in the UK.

This is, in part, due to the fact that most UK shipments are Customs cleared in another EU country first and then moved into the UK and this has been the practice for decades. As Brexit comes to fruition, this means many UK companies will not have these same benefits as their European counterparts and must develop expertise on UK Customs clearance without the benefit of experience on how to manage this for shipments in and out of their country.

In preparation of Brexit, how well versed is your firm on shipment movements and routing? Have you mapped your current supply chains in and out of the UK? Many firms are learning that more of their products move through UK ports than they have believed. Post Brexit, will I have to have file Customs clearances for each shipment moving in and through the UK?

In another area of trade, we are optimistically anticipating the passing of the new United States-Mexico-Canada Agreement, known as the USMCA. NAFTA, which has been around since 1994, provided transparency, ensuring transactions and the management of the entire system was done in a systematic and open way. It has certainly had an impact because we are each other's largest trading partners.

The changes anticipated in the current stage of the USMCA should positively affect manufacturing in this country to a very high degree. The local content requirement for automotive parts, for example, goes to from 62.5% to 75%, which means that manufacturing will be drawn back into the United States. Many automotive items qualifying for NAFTA origination will have to be produced in Mexican factories where the average wage is $16 per hour under the new USMCA. As the average hourly wage in the Mexican automotive sector is currently $3, this means more opportunity for investment in the United States, rather than Mexican automotive sector. Ford Motor Company is talking about reinvesting back into Michigan. And, when you look at automotive supply chains, they benefit from being in close proximity to one another to allow for just-in-time manufacturing and parts replenishment. Stronger manufacturing in the North American region will benefit all three countries.

The USMCA includes a 16-year sunset provision, with an opportunity to review the agreement every six years after ratification. I believe that is a much better strategy to ensure the trade agreement will be working to the benefit of each of its members. The United States also updated the U.S.-Korean trade agreement and that has already brought a lot of benefits to the automotive industry. This has been followed by new discussions with Japan as well, so we are starting to see new opportunities come to fruition for the U.S. economy. A lot of good is happening in the United States with regard to world trade.

In closing, I'd like to point out a few challenges we see for exporters. Typically, exporters believe that when a shipment leaves this country, they do not carry any risk beyond that point. However, exporters do have obligations and risk beyond the U.S. border as they are responsible for U.S. products, technology and software anywhere in the world.

When exporting, you need to have strong knowledge of not only your customer, but also the end user—that party in the transaction who is actually receiving the good. Because the government restricts whom we can or cannot sell to and where we can and cannot sell we need to ensure the customer or end user is not designated as what we call a "denied party." If they are, the export must be stopped.

We are seeing stronger enforcement and penalty action from various agencies including the Office of Foreign Assets Control, or OFAC, NAFTA audits and agricultural security. Customs enforcement is on the rise, so now is an excellent time to have an external audit of your import and export transactions and identify gaps in your global supply chain management—and seek to reduce these gaps with a clear compliance improvement plan.

Look to your import-export trade compliance team as a strategic part of your supply chain. They are the ones who have their eyes and ears focused on global trade issues and can provide great insight as to how the changing global Customs arena will affect your firm. They provide not only a protective role, but more importantly, they can help to share a stronger approach to managing this risk through a thoughtful continuous improvement plan

Michael Weick, customs manager, Subaru of America

After 35 years in the industry, I can honestly say that this is probably the most volatile time in global trade since September of 2001 and we know what happened then. We're not facing any domestic military actions today, but it sure is a tough period given the new China tariff provisions. Maintaining control of your shipments is one of the hardest things for a Customs manager to do especially if your organization treats compliance as an afterthought. Getting in front of your executive team and having a supportive director or supervisor is paramount to managing global trade compliance the right way.

Suzanne mentioned partnering with U.S. Customs and Border Protection (CBP). We began doing just that six years ago when I joined Subaru. From the onset, we had one edict: To get into the Importer Self-Assessment Program (ISA). It's one of two highly visible Trusted Trader programs offered by CBP. There are a number of benefits, but it's very hard to be admitted into the program if you don't have the proper internal controls in place, and, we faced an uphill battle at first. However, by working with Suzanne and with a lot of internal support from our tax, legal, HR and IT department heads in order to make sure that we had the necessary controls in place, we were able to get into ISA and effectively be removed from the U.S. Customs audit pool.

Since then, we've been doing well. And then, all of a sudden, there was a change in trade policy when it comes to China and Mexico and Canada as well, including new enforcement policies enacted on President Trump's watch. I do recognize that China has gone virtually unchecked for a number of years and that the trade imbalance is what it is. However, as an importer of parts and accessories from China, you need to think of new ways to begin working smarter about how you're importing these particular parts.

So, what can the global trade compliance team or department do? One of the things that we began asking internally right away at Subaru is how to resource some of the parts that are coming from China. My compliance team has been lucky enough to be invited to the discussion table. There are parts that we import in large quantities and are getting hit as far as the additional duties now in place with the China Section 301-Tariff Actions and

Exclusion Process. Where we used to face tariffs of from 0% to 2.5%, they're now 10% and 25%. So, obviously we wondered how can we act proactively, how can we apply for some the qualifying exemptions that are out there, and how can we resource these parts?

Those are some of the things you have to do as a Customs manager, or as a global trade compliance team. And, that's a good way to get your team in front of leadership to begin building those relationships, because there may be strategies they're not thinking about. It's how you can become a change agent in your organization. And, perhaps the next time an issue like this arises, leadership might ask what about those folks in Customs? How can they help?

These are examples of things you have to deal with, not just internally but externally as well with U.S. Customs, in an ever-evolving, ever-changing environment. It is challenging to mitigate delays, cargo exams, fines and penalties, but it's a worthwhile effort, and these are things we should all be thinking about in order to support our organizations to be successful.

Laura Heyburn, director, global trade optimization and trade compliance, Firmenich

Firmenich is the world's largest privately-owned perfume and taste company, manufacturing flavors and fragrances that are sold primarily on a business-to-business basis to other manufacturers of consumer products such as perfumes, cosmetics, soaps and detergents; flavor products are sold principally to manufacturers of prepared foods, beverages, dairy foods and confectionery products. In addition, the group produces aroma molecules for use in its own perfume and taste compounds as well as for sale directly to other flavor and fragrance and consumer product manufacturers.

I am part of the global trade compliance team at Firmenich. Our group reports to legal and compliance. In our role, it is essential that we communicate with other divisions within our company. We work very closely with legal, finance, supply chain and regulatory teams. Communication and understanding the impact our decisions have on other aspects of the business are very important to our success.

Our team is also responsible for optimization involving cross-border transactions. In order to mitigate your duty liability, it is critical that you have visibility throughout your supply chain. What are the value of your imports, the country of export, the country of origin, duty spend and incoterms? Some savings opportunities include duty drawback, Free Trade Agreements, Miscellaneous Tariff Bills and Inward Processing programs. In the United States, we have implemented a Foreign Trade Zone (FTZ). The FTZ has kept our company competitive by removing costs from our supply chain. The FTZ also helped us reduce our 301 duties, when exporting from our facility.

It is important to remember that these programs require a high level of compliance and interaction with the various stakeholders in your company. It is great to be able to implement these duty savings programs, but you must be able to ensure compliance with the regulations.

Firmenich is also a member of the Customs Trade Partnership Against Terrorism (C-TPAT), the Importer Self-Assessment Program (ISA) and the Customs Center of Excellence for the Chemicals Industry (CEE). These partnerships with Customs have been a great benefit to Firmenich. They allow us to interact directly with Customs and help us to maintain a high level of security and compliance.

As a global trade compliance team it's your responsibility to continually focus on ensuring that your company remains diligent in its pursuit of timely and accurate entry declarations to U.S. Customs. This means partnering with your internal department managers and staff to effectively communicate governmental policy and regulation type changes that occur at any given time.

To this end, it is equally important to be invited to those internal sourcing discussions in order to highlight trade compliance issues so they are understood by non-compliance coworkers and managers. This will ensure that initial sourcing and re-sourcing of active ingredients and finished goods will be conducted diligently and in conjunction with your eventual Customs transactions.

Aligning your global trade compliance goals concerning valuation, classification, origin and free trade initiatives along with your company's strategic goals ensures that they are each in sync. Moving freight expeditiously and legally across international borders is the common denominator we all seek to achieve while working together.

Thriving on the SUPPLY CHAIN HIGH WIRE

The difference between supply chain winners and also rans is choreography, a competence every supply chain manager needs to master

BY STANLEY E. FAWCETT, AMYDEE M. FAWCETT, A. MICHAEL KNEMEYER AND SEBASTIAN BROCKHAUS

Stanley E. Fawcett, Ph.D., is the Goddard Professor of global supply chain management and director of the Moyes Center for Supply Chain Excellence at Weber State University. He can be reached at stan.e.fawcett@gmail.com. Amydee M. Fawcett, Ph.D., is an associate professor of supply chain management and director of the Center for Leadership in Corporate Social Responsibility at Weber State University. She can be reached at amydeefawcett@weber.edu. A. Michael Knemeyer, Ph.D., is a professor of logistics at Fisher College of Business at The Ohio State University. He can be reached at knemeyer.4@osu.edu. Sebastian Brockhaus is an assistant professor of supply chain management at the Boler College of Business at John Carroll University. He can be reached at sbrockhaus@jcu.edu.

On May 21, 2017, the Big Top came down and the Ringling Bros. and Barnum & Bailey Circus performed its final show in, where else, New York's Nassau Coliseum. After a 146-year run, the curtain closed on "The Greatest Show on Earth." That said, it's time for a one-question pop quiz that focuses on a critical supply chain capability that you need if you want to help your company avoid Ringling's fate. Here's the question: Why did "The Greatest Show on Earth" go out of business?

Perhaps you're thinking: "The circus is a relic of the 20th Century. It's amazing that Ringling survived as long as it did." If so, you've overlooked *Cirque du Soleil*, a smashingly successful 21st Century circus. Every year, close to 20 million people pay upwards of $100 per ticket to experience *Cirque* performers in action.

The diverging fates of Ringling and *Cirque* highlight one of the great mysteries in business: "How do one-time showstoppers lose their balance on the competitive high wire?" The mystery is solved in two words:

1. ***Choreography***. Choreography, the art and science of making meaning through space and movement, brought the famed three rings together, creating the circus.
2. ***Competency.*** Although both *Cirque* and Ringling were born of choreography, *Cirque* thrives because it invests in choreography as a valued competence. The Ringling Bros. died because it didn't.

You may also be wondering: "Why should I care about choreography? I'm a supply chain manager; not a dancer." Here's your answer: Choreography is what supply chain strategists do. It's your job, as a supply chain strategist, to bring ideas, people and technology together to create the unrivaled experience needed to turn customers into passionate fans. Besides, Ringling isn't the only ringmaster to stumble and fall. Other industry headliners like Circuit City, Kodak and Xerox fell into economic ruin when they failed to use choreography to reinvent their value propositions.

Ringling's demise; *Cirque*'s rise

To better understand choreography's value to supply chain management, let's diagnose the rise and fall of the Ringling Bros. and Barnum & Bailey Circus by asking another simple question: Why did crowds line up to see "The Greatest Show On Earth?"

- People came for a one-of-a-kind, once-in-a-lifetime experience. They came to be awed by the death-defying acrobatics, wowed by the wild animals and delighted by the clowns.
- No other circus could match Ringling's scale and talent.

In its early days, Ringling used choreography to bring ideas, talent and technology together to put on a never-before-seen spectacle. The result: Laughter and screams of delight filled the Big Top. Ringling really did bring "The Greatest Show On Earth" to town.

So, what caused Ringling to fall off the high wire? The answer is nuanced. By the end of the 20th century, as operating costs skyrocketed, Hollywood and the multiplex deprived the circus of revenues. At the same time PETA protests brought polarizing controversy to the show. Although these external forces hurt, the fatal blow came from within. Beguiled by its own hype, Ringling stopped investing in the competence that made the circus unforgettable—choreography. The story told in the famed three-ring circus failed to evolve, and when it no longer engaged, customers stopped coming back. Simply put, without choreography as its design-and-execution competence, chaotic competition knocked Ringling off the high wire.

Now let's take a look at *Cirque du Soleil*, the circus that got its start as a small band of street performers in early 1980s Quebec City. Fast-forward almost 40 years and you'll find *Cirque du Soleil* has become a global phenomenon—one that has brought "wonder and delight" to over 200 million spectators in 450 cities across 60 countries. From the outset, Guy Laliberté, *Cirque*'s founder, realized the old circus didn't fit the new world. You can see this in *Cirque*'s tagline, "The Circus Reinvented."

Laliberté connected the dots between choreography, renewal and passionate fans. The result: Choreography became the process *Cirque* uses to capture the creative ideas needed to consistently do things audiences have never seen before. Consider how *Cirque* invests in choreography as a design-and-execution competence.

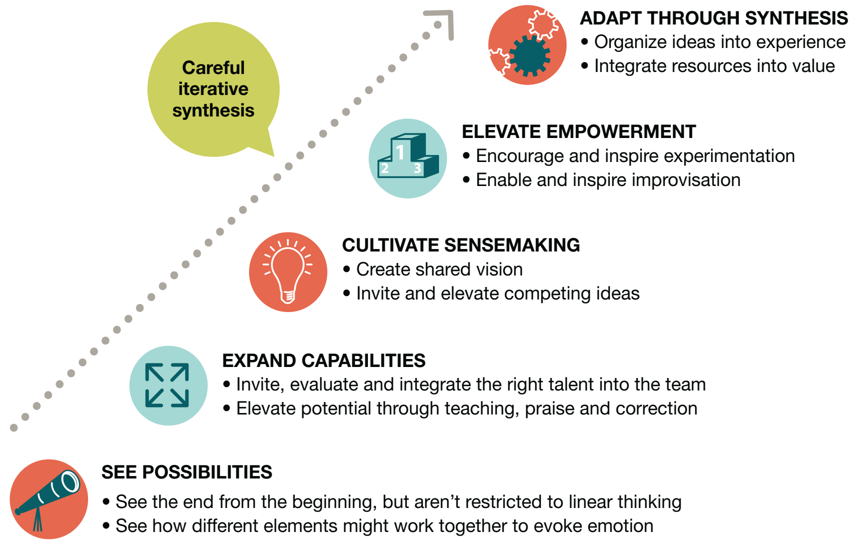
- ***Invest in infrastructure.*** *Cirque* built a 36,600 square-meter headquarters replete with "performance studios." This creative hub is where ideas, talent and technology come together through choreography to become a hit show.
- ***Take the time.*** *Cirque* dedicates tremendous time to choreography. The goal: Bring a new show to market every year. Consider the resource commitment. Each show takes on average two years to develop. *Ká* took four years and cost $165 million.
- ***Empower people.*** *Cirque* sends its own team of scouts out on treasure hunts. The task: Find the best talent worldwide. New performers train at headquarters, honing artistic and acrobatic skills as they learn to not just

trust *Cirque*'s creative process but to become part of it.

The bottom line: Choreography as competence doesn't just happen. *Cirque du Soleil* built it into its DNA; Ringling did not. At *Cirque*, choreography doesn't just unite ideas, talent and technology. It fuses collaboration and creativity to unfailingly deliver shows that evoke awe. Choreography enables *Cirque* to constantly reinvent itself to engage customers. This is the real reason you should care about choreography. It's the missing alpha competence that unlocks your ability as a supply chain strategist to coordinate and integrate talent and technology across the supply chain to build a highly valued, hard-to-copy economic engine.

FIGURE 1

Staging choreographic competence



Source: Authors

Choreographic competencies

To help you make choreography part of your supply chain's DNA, let's take a look into what choreographers do and how they do it (see Figure 1).

Choreographers see possibilities

To get a hit show off the ground, *Cirque* employs scores of researchers, including in-country trend spotters, to scan the world for what's "cool" and to assess relevance and appeal. Talking about R.U.N, *Cirque*'s first show without acrobatics, CEO Daniel Lamarre describes the process—and the choreographer's challenge—of turning a cool concept into a *Cirque* experience.

"People are very intrigued that we are coming out with a show that is totally different from our previous shows, and the fact that it will have no acrobatic acts is creating a lot of questions. When you tell them the acrobatic acts are going to be replaced by stunts, then people get it.

We went through very intensive research. When we started doing the research, one thing became clear: the younger crowd was looking for more action.

When you look at the movie business now and you take the box-office ranking of the first 10 movies, probably nine out of 10 are action movies. The challenge is that in the movies, you shoot it and then you go to the (studio) and then you do some editing, and then you're good. Here we have to do the stunt every day, and therefore you have to make sure that the technology, the performers, that everything is seamless, and you have to make sure the stunt is credible. You should be sitting there being part of the action in this immersive experience, and you should feel that what's happening is real."

What's the choreographer's role? To transform ideas into immersive experience. They do this by staying centered on one question: "How can we keep the eye of the audience?" From the outset choreographers must envision a captivating concept. This becomes the end goal. Yet, as they begin, choreographers seldom have a map for how to get there. Iterative journeys are common and each show evolves as it develops.

Part art, part science, choreography evokes organic evolution. The science is about "how shapes come together to create movement—and a message that evokes emotion."

Great choreographers develop an ability to see how the performers, the stage and technology will all come together. The art is a feel for how to unleash the uniquely human creative and collaborate abilities needed to induce awe.

Although *Cirque* attracts top talent, including Olympic medalists, the *Cirque* difference emerges as technology multiplies the possibilities for artistic expression and choreographers engage performers to bring out collective passion, making the impossible happen night after night.

As a supply chain strategist, you live the choreographer's challenge. You must bring ideas from concept to market, integrate resources and align moving parts to assure seamless performance.

And, you need top talent to do it.

To find out how prepared you are to choreograph your company's success, go to Table 1 and gauge your ability to see the possibilities for distinctive value creation (and the other skills of a choreographer).

Choreographers expand capabilities

With concept in mind, choreographers assemble a team. The audition is key. Choreographers look for artistic flair and physical prowess. But, to deliver a totally new and engaging experience, choreographers must "identify who has the skills to help create new things." They seek performers who can "invent new solutions to help drive the conceptual goal" and "who have the collaborative capacity to energize; that is, to make others better." To reveal these attributes, auditions must be demanding. The goal: Hire people not just for "who they are, but for what they can become." *Cirque* auditions often begin with 100 performers. Thirty survive the first day's cuts. By the end of day two, only four remain.

At *Cirque*, creative transformation is critical. The choreographer must be able to coach people up, helping "the pearl—the hidden talent in each individual—emerge." Choreographers have the opportunity and obligation to enable artists to expand beyond their own capacities to "find more meaningful expression." This is tricky. The best choreographers know how to "marry their vision with where the performers are now, and then engage them and encourage them to reach for more." Yet, they do this without demeaning antics or brutal behavior. Performed well, this balancing act develops artists who "bring a new vibrancy and vitality to the show." Value co-creation—choreography's goal and the key to taking a *Cirque* show to the next level—is the result.

TABLE 1

Choreographic competence: A diagnostic

Are you built for supply chain choreography?
Scale: **1** = not at all; **10** = absolutely

Choreographic competencies		SCORE: 1-10
SEE POSSIBILITIES	• I effectively scan the global marketplace to understand the rules of tomorrow's competitive game. • I grasp the value-added capability of other functions and supply chain members and how they can be combined to co-create distinctive value.	
EXPAND CAPABILITIES	• I can find and onboard the right talent to co-create distinctive value. • I effectively coach others up, helping them build vital new skills.	
CULTIVATE SENSEMAKING	• I can cultivate shared vision among team members with diverse opinions to help organize value creation. • I make it easy for others to get out of the box to share their best ideas.	
ELEVATE EMPOWERMENT	• I encourage others to experiment—i.e., get out of the box—and to learn from every experiment—regardless of outcome. • I enable and exemplify improvisation to get the job done when something doesn't work as planned.	
ADAPT THROUGH SYNTHESIS	• I make sure the best ideas win and are organized into processes that provide awe-inspiring customer experiences. • I help mix and match resources, tweaking processes as necessary to develop and deliver awe-inspiring customer value.	
	TOTAL SCORE (10-100):	

Source: Authors

Choreographers cultivate sensemaking

Turning a cool concept into an innovative, awe-inspiring *Cirque* experience requires great diversity of people, ideas and ambitions. This diversity, however, creates artistic tension. Friction can fracture the production of any show. It is the choreographer's job to direct the diversity to "create a shared vision for what the troupe is going to accomplish together." Let's unpack this thought.

- ***Shared vision requires great communication.*** Choreographers help everyone catch the vision of what a show can be. They also bring great enthusiasm and emotional intensity. As our choreographers noted, "It takes a lot of energy to get everyone to feel they are together."

• ***Accomplishing something together involves helping everyone who touches the production—performers, make-up artists and costume designers—to see how they contribute to the show's success.*** It hangs on a choreographer's capacity to "hear competing ideas and convincingly find the commonality where they can come together."

Vitally, this sensemaking begins as the team is assembled. It occurs concurrently with coaching. As both performers and details come together, magic happens. The *Cirque Way* takes flight. Choreographers and artists learn together. This "living, collective learning" makes it possible to integrate so many moving parts into a show that exudes joy and elicits wonder. Consider the payoff: Itsuko Noto, a fan from Japan, has seen O, Cirque's Las Vegas show, over 100 times. She says: "It touches my deepest emotion." Remember: As a supply chain professional, one of your jobs is to deliver an experience that builds deep customer satisfaction and loyalty.

What is a core competence?

Way back in 1990, C.K. Prahalad and Gary Hamel proclaimed that high-performing companies possessed core competencies; losers didn't. They defined a core competence as, "the collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies." They pitched Honda's engine and powertrain development—a competence that enabled Honda to enter diverse markets from motorcycles and cars to lawnmowers and snow blowers—as the poster child for core competencies. If it was powered by Honda, passionate fans lined up to buy it.

Within a decade, managers everywhere were talking about core competencies. Sounds smart, right? But, there was a problem. Managers were investing in capabilities they thought were core competencies, but weren't. In our work with some of the best companies worldwide, managers almost always talk about their companies' core competencies. However, on closer inspection, we find that fewer than one in 20 actually possess a true core competence.

In his 2001 book, "Good to Great," Jim Collins noticed the gap between the rhetoric and reality. He repackaged the idea that you need to possess distinctive value-creation capabilities as the Hedgehog Concept. Collins defined the Hedgehog Concept as the intersection of best-in-world performance, an economic engine, and passion. Collins' contribution to our discussion comes from his clarifying comment: "The Hedgehog Concept is not a goal, strategy, or intention, it is an understanding."

Our research reveals that few companies possess a true core competence because they don't pay the price to understand what they can do that customers value across multiple markets (possess an economic engine) in a way competitors can't copy (be the world's best).

Choreographers elevate empowerment

Perhaps you're thinking, "Empowerment is old news—and at most companies it's all talk." You'd be mostly right. Choreographers, however, don't just take empowerment seriously, they elevate it. They know that at some point, they will have to say: "The show is in your hands. You own it now." When the curtain goes up, the choreographer will be sitting in the audience. The success of the show belongs to artists on the stage.

There is another reason elevated empowerment is critical. Glitches happen. Think back to Daniel Lamarre's comment: "Here we have to do the stunt every day, and therefore you have to make sure that the technology, the performers, that everything is seamless." That is a great goal and from the audience perspective, a *Cirque* show certainly feels flawless. You can bet, however, that something goes wrong every night. You just don't notice it. But, the real sense of seamless arises from the artists' ability to "make adjustments on the fly." Simply put: They improvise.

Improvisation is easier with great coaching and sensemaking. Skills are enhanced and trust emerges. The artists have each other's back. Elevated empowerment goes further, inviting experimentation. When an artistic element doesn't work, choreographers ask: "Then what will?" They count on the artists to come up with a solution. As everyone "brings their own spontaneity, creativity and imagination" choreographers and artists work together to "design out problems, build in contingencies and build bubbles around pain points." Add in frequent feedback and painstaking practice and voilà, when the curtain goes up the team is locked in, ready to execute and improvise

Choreographers adapt through synthesis

Let's pause to ask: "What makes a *Cirque du Soleil* production so emotionally powerful?" Whether you are evaluating *Crystal*, *Ká*, or *O*, you immediately encounter vast intricacy that transcends experience. Moving parts meld effortlessly. Talent and technology merge. As you survey the artists in action, amazement mingles with a tinge of fear. This is awe: It materializes from careful, iterative synthesis.

Your takeaway: Choreography is an "amalgamation of competencies." Every attribute, behavior and skill we have talked about is necessary. They cultivate great ideas as they build the bonds that make synthesis possible. Synthesis itself is an adaptive mechanism. Synthesis enables choreographers to push boundaries and acknowledge constraints, to "add new elements to achieve nuance and power" and to delete what doesn't work or distracts. Synthesis makes it alright to take two steps forward and one step back if necessary to ensure the best ideas win.

Through synthesis, choreographers learn to fail fast, adapt quickly. They master the art of organizing ideas and the science of integrating resources to pull everything together into the immersive experience that is a *Cirque* show. Importantly, synthesis works best when it begins early, even as a concept is born. Synthesis takes time, but it creates the multiplier effect needed to consistently do things audiences have never seen before.

Choreography as a corporate capability: Why it's so rare

If choreography is so powerful, why doesn't everyone do it? A *Cirque* artist clarifies the challenge, saying: "When you see us on stage you only see the final product, but when you come look at the training you can see how much hard work and time and effort is put into every small detail." Cultivating choreography as a corporate competence requires just as much hard work, time and effort. Entry to the choreography club is expensive.

Developing choreographic competencies isn't, however, just about effort. We've met many hard-working supply chain leaders who put in the hours to make choreography part of their organization's culture. Most fell short. "Why," you ask? They pursue a familiar, but flawed path.

- ***Building momentum***. A supply chain leader embraces choreography, acquiring the choreographer's repertoire of competencies. Such leaders put in place a supportive cast and patiently build a "pocket of excellence." We've found pockets of excellence in areas as diverse as customer service, logistics, new product development and supplier relations.
- ***Crossing the chasm.*** From thinking holistically to synthesizing iteratively, choreography requires that others embrace new ways of working together. The degree of difficulty of adopting choreographic competencies scares people. Feeling vulnerable, they resist. They don't want to step out onto the choreography high wire. It's too risky.
- ***Falling short. Choreography champions are only human.*** They have limited energy and emotional fortitude. Resistance to change, like a fierce wind, ultimately wears them out and blows them off the choreography high wire before they can cross the cultural chasm.

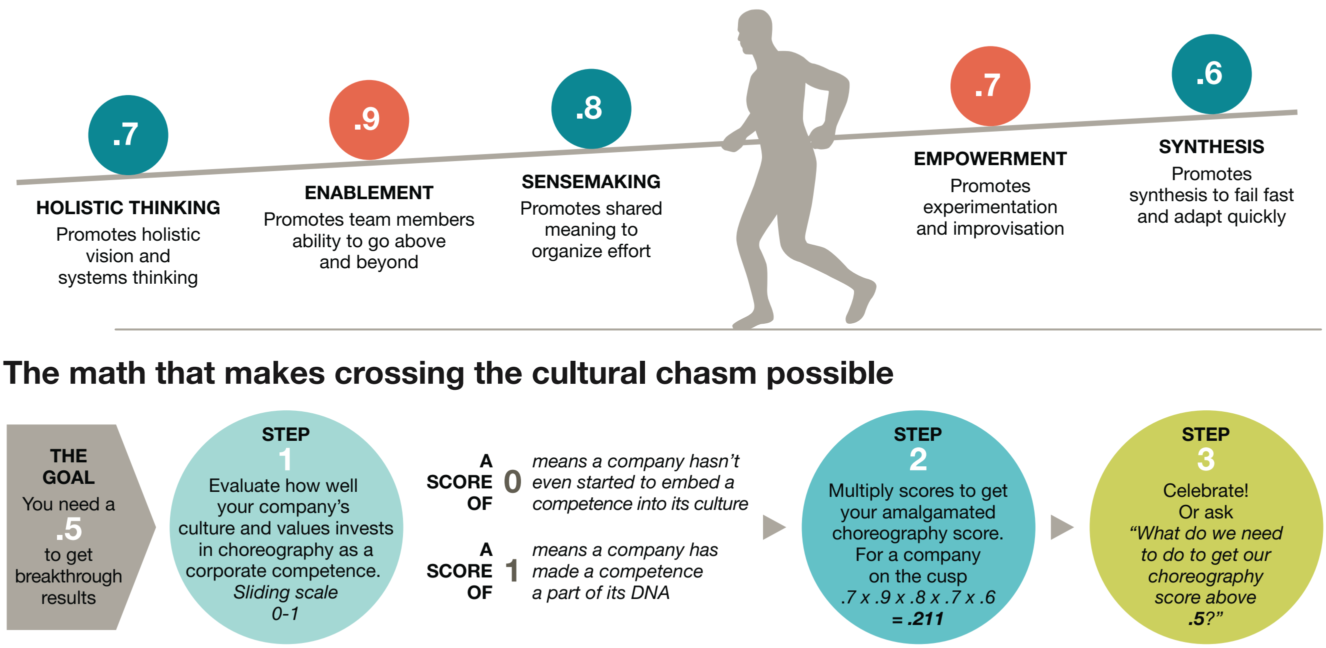
What about the few who managed to stay on the choreography high wire? How did they do it? Make no mistake: They didn't have more resources or a better market position than rivals. They were, however, hungry and looking for an edge. Like their peers, they built momentum and shared success stories, but they added three make-or-break elements to their high-wire act.

- ***Know your limitations.*** Some companies aren't built for choreography. Bold, patient leadership is essential. Soichiro Honda, for instance, invested deeply in principles and processes to nurture a "Honda Way." The Honda Way communicated the norms, guided the investments and attracted the team needed to "co-create something totally new."
- ***Prepare, prepare, prepare.*** Choreography requires that everyone speak the same language. Otherwise co-creating value is too awkward and inefficient. The entire team must also grasp and trust the process—and the choreographer. Otherwise improvisation is too risky. Honda's BP program brings everyone—employees and suppliers—up to speed to cross the high wire.
- ***Pursue a balanced approach.*** Choreography relies on a process of buildup and breakthrough. Take away any of the building blocks and you never break through. Simply put, you need to excel on all five choreographic competencies to build a team you can trust to "adjust on the fly" and "adapt through synthesis." Short cuts, anathema at Honda, are fatal on the high wire.

To summarize, Figure 2 depicts the choreography challenge and invites you to engage in a thought exercise to

FIGURE 2

Is your company ready to cross the choreography high wire?



Source: Authors

benchmark your company's readiness to cross the choreography high wire. The numbers underscore why choreography is so rare and so valuable. We show the analysis for a company on the cusp of choreographic competence. To reach the tipping point, that company needs a .5 aggregate score. The good news: Once you get to this point, you can follow the proven path we outlined above, exploiting the cultural threads that run through the five competencies.

Choreography as a supply chain capability: Why it's so needed

Is it worth the pain to invest in choreography as a design-and-execution competence? Absolutely. Think about today's competitive marketplace. What keeps you up at night? Supply chain managers tell us the following contribute to their insomnia:

- risk is everywhere, threatening to disrupt operations without warning;
- complexity confounds decision-making;
- game-changing technologies are shifting competitive rules in unexpected ways; and
- customers want it all, from low-cost to socially-responsible operations.

You get the point. Global supply chains are complex, chaotic productions.

Now, let's do a little sensemaking. Supply chains consist of a huge number of moving parts and involve diverse daily touch points. Glitches happen. Competitive threats mean you're always striving to take your act to the next level. Renewal is the price of survival. What does this mean? Choreography is the competence you need to remove supply chain pain points, helping you make magic out of today's supply chain circus (see Figure 3). Here's how.

- ***Operational pain points.*** Through choreography you enhance your supply chain's value co-creation capabilities. You are able to more creatively and collaboratively re-design key processes. Further, as key members of your supply chain learn to improvise, customers may not even notice when operating glitches happen.

- ***Disruption pain points.*** Disruptors—risk events, social responsibility and technology adoption—abound in today's marketplace. They create ambiguity and introduce tradeoffs. Choreography's ability to "adapt through synthesis" and "co-create something totally new" enable you to turn chaos into competitive advantage.

Choreography encourages, enables and empowers value co-creation as you design your supply chain and execute value-added processes. Choreography enables you to "design out problems and build bubbles around pain points" as you step onto the supply chain high wire to do things your audience has never seen before. Inspiring awe will keep customers coming back.

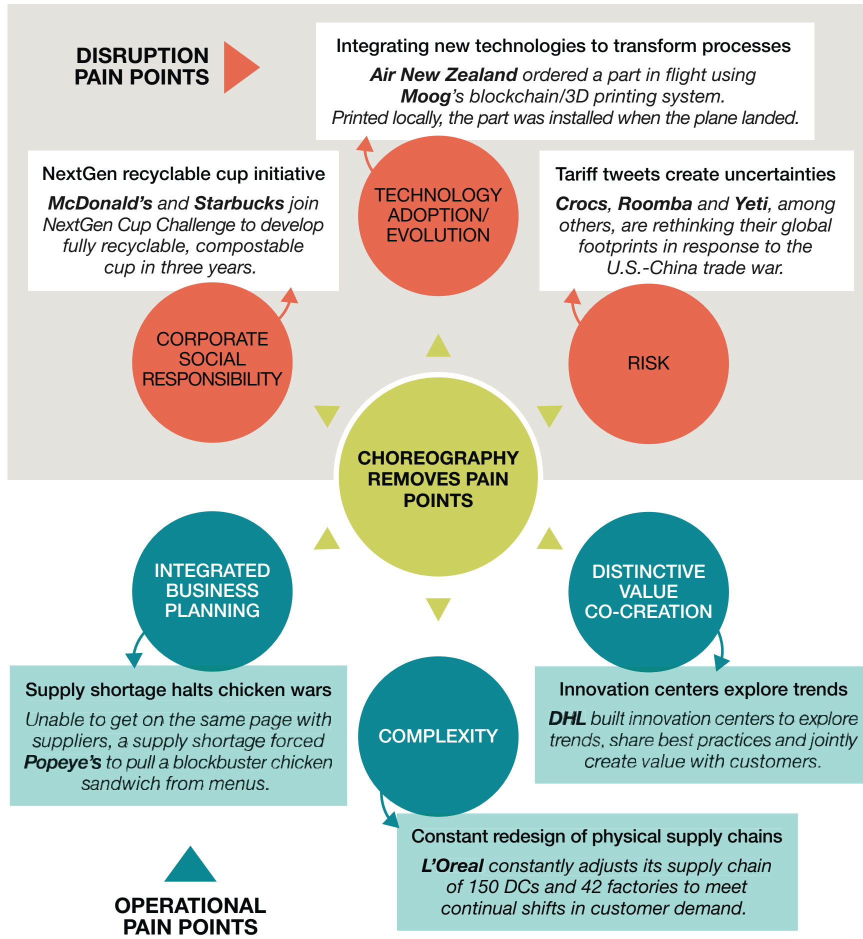
Choreography as a disrupter

Choreography is hard. Yet, in a market in the midst of a murky Industry 4.0 makeover, choreography as a competence isn't just worth it, it's mandatory. Your reality is simple: You can disrupt or be disrupted. *Cirque du Soleil* models a proven path. Never complacent, *Cirque* has used choreography to reinvent the circus over and over again, evolving its supply chain to bring the circus to the digital realm (see Figure 4).

Cirque CEO Daniel Lamarre beckons: "If you want to disrupt the world, you have to be innovative, you have to be gutsy, you have to push the boundaries of your creativity all the time." Choreography is the alpha competence that enables you to push the creative and collaborative boundaries to "do something totally new, different and disruptive." Amazon and Apple, the ecosystem companies, get it. They rely on choreography to co-mingle complementary skills and integrate diverse technologies to dependably bring awe to customers. If you opt for anything less, your company, like the Ringling Bros., may be one disruption away from demise.

FIGURE 3

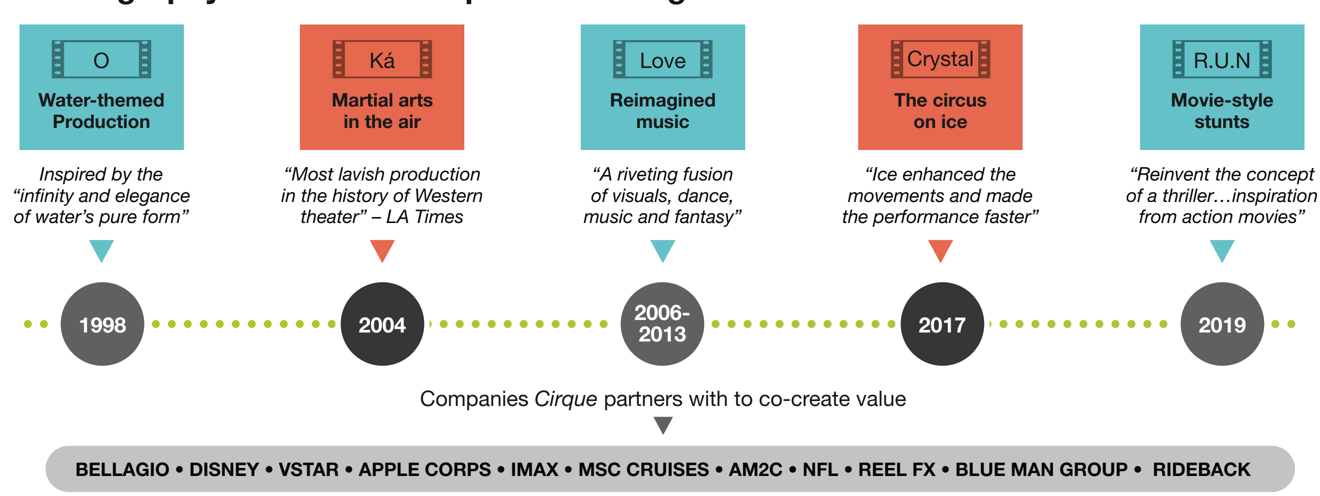
Choreography helps remove supply chain pain points



Source: Authors

FIGURE 4

Choreography reinvents and opens new stages



Coping with the convergence of complexity

The final Global Links column is an opportunity to look at some of the changes that have taken place over the last 10 years.

Patrick Burnson is executive editor at *Supply Chain Management Review*. He can be reached at pburnson@peerlessmedia.com.

When *SCMR* introduced the first Global Links column nearly a decade ago, the mission was to address common supply chain challenges facing shippers around the world and to highlight some possible solutions. One of the first things we discovered was that transparency was becoming key for multinationals seeking new suppliers.

Fast-forward not quite 10 years, and as we prepare to publish the final column, this observation is as relevant today as it was then. Last year, for instance, HSBC surveyed 8,500 companies in 34 markets to produce its Navigator white paper. Titled "Now, Next and How for Business," HSBC's study found that a third of companies are planning to improve the sustainability of their supply chains, and researchers expect that digitization will play an increasingly vital role.

The column also noted in 2019 new evidence that suggests that transparency can also circumvent human rights abuses—even slavery.

According to The Monitor Institute by Deloitte, private sector companies and public sector associations are investing in new tools and solutions to enable them to better oversee their supply chain practices and protect vulnerable workers, while protecting their reputations.

"Responsible Supply Chain Tools: Understanding the Market Opportunity" estimates that the market size could optimistically grow to between $889 million and $2.7 billion over the next five years as companies explore, implement and scale a range of solutions while developers continue to create new tools.

Furthermore, analysts maintain that today's global supply chains are incredibly complex and opaque, but many companies are investing in new tools and solutions that enable them to better oversee their supply chain practices and protect vulnerable workers. These tools are helping companies assess risk, diagnose problems, engage workers and monitor labor practices—effectively reducing that opacity. Think transparency.

Mitigating risk

Creating supply chain transparency is not without its risks, however. A much broader view on shipping and sourcing vulnerability has been outlined in two new studies that also provide transactional tips on mitigation. Resilence360—a supply chain risk management company—issued its first annual report containing a summary of current threats including international trade tensions and the growing impact of climate change.

"The supply chain risk environment is dynamic and continually evolving," says Tobias Larsson, Resilience 360's chief executive officer. According to its 'Top 10 Supply Chain Risks" checklist, the exercise can be daunting.

No. 1 on the list is the threat of trade wars that may require massive restructuring of manufacturing networks. Analysts also note that global trade tensions have already led to the imposition of new import tariffs on a wide range of consumer products and industrial components.

Meanwhile, public discourse following the migration influx to Western Europe and ongoing high-profile migrant caravans traveling to the United States has increased many countries' focus on physical border security. At the same time, some cargo is being caught up in industrial unrest. Strikes, overtime bans or work-to-rule can affect any transport mode almost anywhere in the world.

As we enter 2020, keeping track of ongoing risk and potential new ones will be the focus of Resilinc—a San Francisco Bay Area-based technology company which has for the past 10 years issued its "EventWatch" report.

Throughout last year, "EventWatch" issued a total of 2,629 event alerts—more than seven per day, on average, and an increase of 36% year over year. Of these, the firm classified 907 events as those affecting its customers' mapped supplier sites, and therefore requiring an impact assessment. Across the globe, this event data showed that 21,152 suppliers and 58,191 supplier sites producing 552,950 parts across multiple tiers in the supply chain were potentially affected.

As a final Global Links prediction, we maintain that this convergence of complexity will require new uses for human capital with a greater concentration on humanitarian supply chains.

Humanitarian concerns

While it is almost a given that a company's procurement decisions can contribute to poverty alleviation and inclusive growth around the world, a new group is actually doing something about it.

Launched this time last year, the Global Impact Sourcing Challenge (GISC) aims to create jobs for those most in need through the power of procurement and global supply chains.

GISC is the first business network to specifically focus on escalating impact sourcing as a way to increase employment and career development opportunities for disadvantaged workers. It is seen as the largest official commitment to "sustainable development goals" outlined by the United Nations, as it places its main focus on inclusive job creation.

"[GISC] is a great example of collaboration," says Tim Hopper, Responsible Sourcing Manager at Microsoft. "Through intentionally choosing impact sourcing, and increasing the number of impact worker jobs, companies are able to create social benefits on top of generating business value."

Based on the commitment of companies like Microsoft, GISC believes that businesses will be "stepping up" their efforts in 2020.

According to the UN, roughly half the world's population still lives on the equivalent of about $2 a day with global unemployment rates of 5.7% and having a job doesn't guarantee the ability to escape from poverty in many places. This slow and uneven progress requires multinationals to rethink and retool their economic and social policies aimed at eradicating poverty.

As a final Global Links prediction, we maintain that this convergence of complexity will require new uses for human capital with a greater concentration on humanitarian supply chains.

Kathy Fulton, executive director of American Logistics Aid Network (ALAN), noted last year at USC's 7th Annual Global Supply Chain Excellence Summit that obtaining "actionable information" into the hands of the small- and medium-sized supply chain services providers is key.

"This is especially true for those who don't have time or resources to manage a full disaster or humanitarian response program," she added. "We recently launched our portal with information that can both help those businesses better prepare. It also provides a snapshot for managers to quickly reach organizations empowered with direct disaster action."

Susy Schöneberg, head of Flexport.org, agreed that partnerships will be become increasingly important in this arena. Her company now works with the non-profit charity, MedShare, to recycle medical supplies and equipment.

"We know that we can't solve humanity's biggest challenges by ourselves, which is why we believe in partnerships," she concluded. "At the same time, we also invest in infrastructure and warehousing. But the key emphasis will always be on human interactions and expertise."

A SPECIAL SUPPLEMENT TO:
SUPPLY CHAIN MANAGEMENT REVIEW

RETAIL UNDER PRESSURE

Things aren't getting any easier for the world's retailers, but these six technology solutions are helping them tackle their biggest challenges and prepare for what lies ahead.

BY BRIDGET McCREA, CONTRIBUTING EDITOR

Anyone who has shopped at Target lately has probably heard a car horn (honk honk) or car locking sound (chirp chirp), usually followed by some quick footsteps and verbal coaching among store associates. Emitted by a store associate's walkie talkie and audible from aisles away, these sounds mean employees either have a couple of minutes to finish fulfilling a drive-up customer's order or risk hurting their performance metrics (honk honk), or that the customer is en route to the store (chirp chirp).

This is just one example of retail's struggle to keep up with the new fulfillment requirements of today's customers. In this case, it's about fulfilling orders from brick-and-mortar for customers waiting curbside for their orders to be loaded into their cars. The option didn't even exist just five years ago, and it's one of the things that retailers are struggling to do effectively and efficiently. The same companies are up against stiffer competition both online and offline; evolving customer demands; new imperatives around order accuracy and high return rates for online orders.

For help, more retailers are turning to technology, and right at a time when technology vendors continue to introduce new solutions, applications, software and equipment meant to ease their fulfillment pain points. Automation is of particular interest, encompassing solutions designed for use in the store to mobile and piece-picking robots in the distribution center. "Retailers are servicing customers in all different ways, some of which they never even thought of before," notes Pete Blair, vice president of marketing for Berkshire Grey.

Whether they're shopping in a store or online, customers still expect the goods to be on the shelves, but these days those "shelves" might be on a mobile device, a desktop computer, social media or in a brick-and-mortar store. To capture as many of these sales as possible, retailers have to give consumers a broad range of choices. Then, they have to be able to fulfill those orders as quickly as possible. "Every retailer across all sectors, be it apparel, home goods or electronics, is trying to figure out how to apply automation within their retail networks," says Mike Khodl, vice president of global solution management at Dematic. "There's a lot of experimentation going on."

At this point, Khodl says there's still a divide between those retailers adopting next-generation technologies and the ones that are reluctant to test out concepts like goods-to-person picking or collaborative robots in the backroom. "These are technologies that most retail stores have never experienced before," says Khodl. "So, while there's a clear trend toward using more advanced technology in the retail supply chain, a lot of it is still very experimental."

Help over the hurdles

Experimental or not, the bottom line is that retailers need advanced solutions to not only help them meet their customers' ever-evolving expectations, but also assist with global issues like a persistent national labor shortage, rising real estate costs and a general decline in brick-and-mortar retail sales. According to a CNBC news report in April 2019, the total market share of U.S. online retail sales for "general merchandise," which includes department stores, edged ahead of that of brick-and-mortar stores for the first time. Keyed into their customers' pain points, both software and hardware developers are coming up with new ways to help them get over these hurdles and stay profitable.

Following are seven different ways that technology is helping retailers tackle their biggest challenges while also preparing them for what lies ahead.

1) Micro-fulfillment that helps retailers meet service level agreements. Thinking back to a time when e-commerce was in its infancy and companies were setting up separate warehouses dedicated to this new sales channel, it was clear that harnessing the e-commerce monster wasn't going to be easy. Fast-forward to 2020 and retailers are still trying to figure out how to do it efficiently, effectively and without losing their shirts in the process. One viable option that more of them are leaning toward is micro-fulfillment, or the placement of smaller warehouses closer to the end consumer. "For most retailers, the operational driver right now is: 'how do I respond to the same-day, couple-of-hours service level agreements (SLAs) within a specific metro area?" Khodl explains. "This is driving the micro-fulfillment methodology inside retail stores." To work properly, micro-fulfillment requires back-end automation at the retail level, including automated storage and automated picking. Also critical is the software that drives processes, including order optimization, order prioritization and order consolidation.

2) Robotics: No silver bullet. Since the 2008 recession, retail has since morphed into an omni-channel animal that gives buyers what they want, how they want it and when they want it. Given today's labor-constrained environment, that's where robotics, automation, artificial intelligence (AI) and machine learning (ML) come into the picture. "Omni-channel e-commerce is a super labor-intensive process, and it's getting to be a bigger part of every retailer's business and with very few exceptions," says Blair.

By augmenting human workers, robots help retailers work through labor issues and speed up fulfillment and delivery times. "It's less about removing labor from the picture and more about putting robots in place to make the best use of available labor," says Blair. For example, stores can use robotic order-picking solutions to fulfill in less-than-case and inter-pack quantities. This, in turn, helps retailers ship more frequent, smaller orders while maintaining lower inventory carrying costs.

For anyone considering robots in 2020, Blair says it's important to factor in the dynamic nature of the retail supply chain. For instance, robots have been used for years in automotive plants, but most of those solutions can't just be plopped into a warehouse and expected to work. "In the distribution environment, a robot is more than just a robot," says Blair. "It also requires the vision, software and gripping technology."

3) Goods-to-person order fulfillment solutions. The buzz around omni-channel fulfillment isn't dying down and is, in fact, only getting louder. A fully-integrated commerce approach that gives customers a unified experience across all sales channels or touchpoints, omni-channel has made retailers realize something: servicing end users and fulfilling store orders using the same infrastructure is far more challenging than anyone thought. "This has resulted in us really reshaping the way we go about designing distribution centers (DCs)," says Greg Conner, vice president of global sales for Bastian. A retailer that's fulfilling from a central location, for example, has to be able to group like orders and manage order profiles that look nothing like the ones used for their brick-and-mortar operations. Conner says Bastian is seeing more demand for shuttle technology, goods-to-person options such as the AutoStore picking solution. "Now, these are not the exception; they're the norm," says Conner, who is also seeing more demand for technology that supports ship-from-store, or the delivery of customer orders directly from a retail location. "This adds a whole new wrinkle on things as companies move from using DCs to using their own stores as fulfillment centers."

4) Technology that meets the new expectations of ever-faster delivery cycles. As he surveys the retail landscape right now, Dan Gilmore, chief marketing officer at Softeon, sees companies investing in automation, hoping that the hardware and software that they're implementing will see them through the industry evolution that most have been caught up in for about 10 years. For many retailers, it's come down to being able to hold on long enough for a competitor to go out of business, or for the industry dynamics to change again. "There's a continued belief by most of the marketplace that shipping should and will be

free," says Gilmore, "and new expectations around ever-faster delivery cycles." Behind the scenes, retailers are also dealing with less visible challenges, such as how to fulfill an order for a customer who is located only 10 miles away from a physical store, even if that store doesn't have all of the items in stock. That's where DOM comes into play. By providing a rules-based engine it manages the order stream in real-time, figures out where inventory is located in the network, factors in capacity constraints and automates the decision-making process. And because DOM sits on top of a retailer's existing systems, it enables good omni-channel management without displacing solutions that are already in place. "Retailers are getting to omni-channel enablement much faster with DOM," says Gilmore, "versus just trying to improve their own systems."

5) Solutions that transform manual reverse logistics processes. Thirty-percent of all products ordered online are returned (versus about 9% for offline sales); 92% of consumers would buy again if the product return process was easy; and 79% of consumers want free return shipping. Handled manually in the past, returns processing has become yet another focal point for companies that have to not only receive the returned goods, but also get them back into the supply chain quickly and efficiently. "It can be as simple as workstations, automated conveyors and reverse sorting systems," says Khodl, "or as complex as a highly-automated system that incorporates pouch systems, robotics and other elements." He adds that the sheer volume of returns justifies an investment in automation.

6) Technology that enables cognitive intelligence. With the national unemployment rate hovering at a 50-year low, companies across all industry sectors are hitting walls when it comes to finding, recruiting and retaining employees. Retail is no exception. "Whether they're shipping only to their own stores and/or direct to customers, having the right people in the DC to ultimately execute and fulfill is a big challenge for retailers right now," says Adam Kline, senior director, product management at Manhattan Associates. He says these realities are pushing companies to invest in warehouse management systems (WMS), labor management systems (LMS) and warehouse execution systems (WES) that help them eke the most value out of their available resources. Where WMS handles inventory management, order fulfillment and warehouse resource utilization (associates, robotics and automation), LMS measures how staff is performing against engineered labor standards and provides systematic feedback to employees. Then, WES provides a collaborative layer used to connect various solutions within the warehouse, allowing the "retailer to become much more efficient in terms of fulfillment," says Kline. Those efficiencies include improved pick density, better workflow orchestration (via a goods-to-person or unit sorter) and optimization of the higher-level intelligence that's stored in the WMS. "When you bring these pieces together into a single solution," he adds, "it enables an effective, cognitive type of intelligence for the retail environment."

7) Artificial intelligence that breaks out of the "black box." Able to perform tasks that usually require human intelligence, including visual perception, speech recognition and decision-making, systems infused with artificial intelligence (AI) are gaining in popularity in the supply chain. "We're definitely seeing an uptick in interest in AI," says Sudhir Balebail, program director at IBM. Some of that interest is being driven by the dynamics of the retail supply chain, and the fact that demand can change from day to day, even hour to hour. Knowing this, retailers are moving away from placing big orders with their suppliers and instead using technology (including AI) to collaborate with vendors, send demand signals, change orders on the fly, and route products closer to their end destinations. When supported by AI, these new levels of collaborative decision-making help retailers streamline their supply chains in a way that Excel spreadsheet-based processes simply can't touch. "When everyone is operating from their own source of truth, it's easy for things to fall between the cracks," says Balebail, who tells retailers to avoid implementing AI as some kind of magical "black box" that can't be questioned or interacted with. "Transparency in AI is very important. Look for solutions that are transparent and that can explain and justify their results."


A SPECIAL SUPPLEMENT TO:
SUPPLYCHAIN MANAGEMENT REVIEW
Logistics & Supply Chain
Virtual
Transportation Management
Summit
Attend on-demand today:
supplychain247.com/virtual

Virtual Summit Roundup

This year's summit shows attendees how to kick their company's digital transformation into overdrive in 2020.

The global supply chain is a pretty dynamic place right now. The continual uptick in e-commerce sales; the ever-shrinking delivery windows; the national labor shortage; and geopolitical issues like Brexit and the trade wars are all having an impact on this crucial business network. Add Industry 4.0, the Internet of Things (IoT), automation and artificial intelligence (AI) to the mix and the supply chain environment becomes even more complex and confusing.

Always standing by to help professionals unravel the mysteries of the smooth-running supply chain, Peerless Media once again rolled out an impressive lineup of topics and experts for its annual Supply Chain Management Virtual Summit. This year, the event put the spotlight on the digitalization of logistics and supply chain operations.

With respondents to *Logistics Management*'s recent "Study of Logistics and Transportation Trends" suggesting there's been a general shift toward firms opting to "follow" instead of taking a leadership role with digitalization, the event was both on target and relevant for a wide range of supply chain professionals.

The question is, with the number of available and emerging digital solutions multiplying almost daily, why are many organizations still spinning their wheels instead of driving forward? The Virtual Summit keynote speakers set out to answer this question by sharing the findings of this year's survey. They also offer supply chain professionals some great tips for kicking their digital transformations into overdrive.

Here's a snapshot of each presentation and the key takeaways offered by the experts who participated in the Virtual Summit.

Session 1

Artificial intelligence and machine learning

Technical concepts that promise to propel supply chain organizations into the future by allowing them to synchronize and optimize automated processes; evaluate multiple scenario outcomes; and improve real-time decision-making, artificial intelligence (AI) and machine learning (ML) are having a significant impact on global supply chain management.

Armed with these advanced technology tools, organizations can effectively analyze vast amounts of data, make better decisions, spot trends and even predict events before they actually happen. In this opening session, Sergio Alex Caballero, Ph.D., research scientist at MIT's Center for Transportation & Logistics


Is Your Supply Chain Future-Ready?
Manage your supply chain with the scale, security, and agility that modern markets require. Innovate and outpace change with Oracle SCM Cloud.
ORACLE
www.oracle.com/scm
1.800.633.0738

provides a fundamental overview of AI and ML and how these two powerful concepts can be being applied to logistics and supply chain management operations.

"Artificial intelligence seems to be everywhere," says Caballero. "We experience it at home, at work and on our phones. Before we know it, AI will be in every product and service that we buy and use." He goes on to say that AI is also everywhere in our personal lives—from music predictions, to Google maps knowing the traffic, to chatbots to fraud-prevention tools.

The ability of a machine to perform cognitive functions associated with human minds, AI isn't new. In fact, it traces back to the 1950s and is rooted in the idea that machines can indeed learn how to do human tasks.

Fast-forward to 2020 and AI now has the potential to disrupt many industries because of its predictive ability. "Algorithmic advances, data proliferation, computer power and data storage have all propelled AI from hype to reality," Caballero says.

As part of that forward motion, AI is helping companies predict what's going to happen in their supply chains. "Prediction used to be expensive, but it becomes more disruptive as it becomes cheaper and easier to produce," Caballero says, adding that the supply chain is a hotbed for this technology because it tends to produce a lot of data. He concludes by discussing how, as AI expands, supply chains will shift over to a "proactive and predictive paradigm through better visibility and enhanced prediction."

Session 2

Supply chain digital transformation: Springing forward or spinning in circles?

Early on, companies were concerned about "losing control" over their data once it went into the Cloud, and that such data would be especially prone to breaches and hackers. However, as this software delivery method matured—and as technology vendors shored up their systems and addressed key concerns—those early fears were overshadowed by the sheer benefits of moving from on-premise software to Cloud-based solutions.

In this session, Gartner Research vice president Dwight Klappich dives into the fundamentals of Cloud computing; shares the differences between public, private and hybrid Cloud; and explains the myriad benefits that a Cloud-first approach can bring to the modern supply chain organization.

"The Cloud has had a significant impact on supply chain and logistics, but is not as widespread as predicted a few years ago," says Klappich, who walked attendees through the evolution of Cloud technology and how it has transformed into different areas (both the

private and public Clouds).

According to Klappich, 62% of companies currently have at least one supply chain application in the Cloud. "Companies have shown a lot of resistance before implementing their first Cloud app, but resistance really decreases once they have at least one," he says, noting that there are still some companies that have yet to adopt Cloud-based applications because they don't think it's the right option for their organizations; have data security concerns about it; or have IT teams that don't support that deployment model.

Attend on-demand today:
supplychain247.com/virtual

SESSION 3

E-commerce fulfillment and robotics: From the "point of activity" to "a place of innovation"

As the challenges of e-commerce fulfillment continue to mount, and as labor becomes more difficult to find and retain, a growing number of companies are turning to automation for help. As part of that push, early adopters are helping to propel robots out of the "experimental" stage and into real-life warehouse and DC settings. In fact, mobile, unit-handling, and piece-picking robotics are increasingly making their way inside warehouse/DC operations around the United States—and there's a good chance they're headed your way.

For the five-year period 2018 to 2023, IDC forecasts a 22.4% compound annual growth rate for pick and pack robotics, culminating in more than $9 billion in spending by 2023. In this session, two of the company's analysts provide a snapshot of how logistics robotics are operating in today's facilities. By 2023, 65% of warehousing activities will use robots and situational data analytics to enable storage self-optimization.

They also explore the fundamental value of robotics to supply chain managers; share how early adopters have benefited; and explain how logistics professionals can best determine if a robotics solution is a right fit for their operations. According to Remy Glaisner, research director and Sampath Kumar Venkataswamy, research manager, the top three reasons organizations deploy robotics solutions are to improve productivity and efficiency, increase the speed of operations and improve product/service quality.

Despite these potential "wins," robotics adoption remains low—at least for now. "Across sectors, which is pretty consistent with supply chain-centric organizations, about only 30% of enterprises are actively planning the deployment

of robotics solutions," Glaisner says, "and about 25% are piloting such projects."

Companies may still be using traditional, manual processes at present, but Venkataswamy says that should change with the new emerging technology in the next few years. The session wraps up with a review of the roadblocks to robotic adoption, which include missing skills and expertise and exploiting too-narrow operational use-cases. The analysts also present statistics on how robotics have made an impact on standard operational KPIs and have improved warehouse operations.

SESSION 4

Mobility: Changing the game inside and outside the four walls

An integral part of today's business world, mobility is having an impact on every link in the supply chain—from the warehouse/DC to the yard to the transportation network to the last-mile—and everything in between. Mobile devices and the software they run on work together

to provide high levels of visibility, reliability and accuracy across the end-to-end supply chain.

In return for their increased investment in mobility, logistics and supply chain operations can more readily meet the needs of their increasingly demanding customers, maintain competitive advantage and overcome labor challenges. In this Virtual Summit session, David Krebs, VDC Research's executive vice president of Enterprise Mobility shares some of the trends driving the increased use of mobility devices.

Krebs also explains how devices are being put to work inside and outside the warehouse's four walls, explores the benefits mobility brings to overall supply chain operations, and outlines steps toward making mobility a vital part of a company's digital transformation. "Mobility is not new; it's been around for years in different variations," says Krebs, who points out that mobility helps companies improve productivity, collaboration, supply chain

visibility and real-time decision making.

Krebs discusses the most actively-used technology and services today, including mobile-managed services, cyber security, and IoT, to name a few. He says that mobile technology is fueling supply chain performance, and that more organizations are allocating funds to mobile solutions in order to keep up with the rigors of e-commerce, manage the labor shortage and get a leg up on their competitors.

Session 5

Digital freight matching and digitalization

A concept that's been around for a few years but that really hit its stride in 2019, digital freight matching or "DFM" is the ultimate matchmaking machine for independent trucking companies and the shippers that need them to transport their goods. In this final session of the Virtual Summit, Evan Armstrong, president at Armstrong & Associates gives attendees an in-depth look at how DFM works, who's behind this movement and who is using it.

According to recent reports, the DFM market is expected to surpass $52 billion in annual revenues by 2025—up from $11.2 billion in 2018. After presenting some key survey findings, Armstrong provides an overview of major DFM providers like Convoy, Uber Freight and Transfix. Pointing out that trucking comprises the largest portion of a company's logistics costs, he says there's "a lot of interest in DFM right now."

Going forward, Armstrong says the line

between digital freight brokers and "legacy brokers" will continue to blur. "At the end of the day, DFM companies have been very good, especially over the last three years," says Armstrong. "They have the traditional legacy providers focused on innovating and automating their operations."

MODEX® 2020

GEORGIA WORLD CONGRESS CENTER
ATLANTA | MARCH 9-12
MODEXSHOW.COM

powered by MHI

SHOW HOURS

Monday, March 9 • 10:00 a.m. - 5:00 p.m.
Tuesday, March 10 • 10:00 a.m. - 5:00 p.m.
Wednesday, March 11 • 10:00 a.m. - 5:00 p.m.
Thursday, March 12 • 10:00 a.m. - 3:00 p.m.

A SPECIAL SUPPLEMENT TO:
SUPPLYCHAIN MANAGEMENT REVIEW

SHOW PLANNER

Modex 2020 is ready to welcome more than 35,000 attendees and showcase a record number of exhibitors in an expanded space.

BY BRIDGET **McCREA**, CONTRIBUTING EDITOR

The Georgia World Congress Center is set to welcome more than 35,000 visitors to Modex 2020—the largest manufacturing and supply chain expo of the year. Scheduled to be held March 9 to 12, it's the biggest Modex yet, says George W. Prest, CEO of show sponsor MHI, and one for the record books.

Modex 2020's exhibits represent all segments of the materials handling, logistics and transportation industry, from traditional, manual equipment to computerized, automated systems and smart, connected supply chain technologies.

"At this fifth-annual Modex, attendees can explore the solutions that keep their supply chains moving forward across 370,000 net square feet of exhibition space in one contiguous hall," says Prest. "We're now at more than 35,000 visitors and larger than ProMat 2015, which was a record at the time."

950 exhibitors and counting

With more than 950 exhibitors, Modex now features one large exhibition hall on a single floor—a renovation that added 100,000 square feet of space in the facility's Hall B (which is now connected to Hall C). The conference features more than 150 show floor educational seminars on leading trends, best practices and state-of-the-art equipment and technology solutions that can make manufacturing and the entire supply chain work more efficiently and profitably.

According to Prest, growing interest in transportation and logistics solutions center has been expanding significantly and drove some of the need for the expanded floor space. Now all in one contiguous hall, this year's solutions centers include:

Manufacturing & assembly

This solution center reaches those looking for automated assembly support, intelligent devices, robotics, ergonomic and safety equipment, workstations, overhead lifting equipment, light rail, and other equipment designed for a manufacturing environment.

Information technology

In today's world of constantly changing technologies, it's no surprise that many Modex attendees come looking for IT and visibility solutions, systems integration and consulting services. The IT solution center puts your company in the middle of the buyers who need manufacturing and supply chain systems, software and automatic identification solutions.

Fulfillment & delivery

Eager to show potential buyers your order fulfillment, e-commerce and omni-channel fulfillment, order packing and packaging, third-party logistics, warehousing, distribution, or transportation solutions? The fulfillment & delivery solution center directs them straight to you.

Transportation & logistics

This solution center lets buyers see, touch and operate transportation and logistics solutions, including road, rail, sea and air freight transportation, as well as parcel delivery, security, autonomous vehicles, robotics, sensors, supply chain management software, third party logistics and reverse logistics.

Emerging technologies

As leading-edge technologies continue to disrupt traditional supply chains by creating more-efficient next-generation models that are on-demand and always-on, your customers want next-generation supply chain solutions. Those solutions include sensors, software, Cloud computing, driverless vehicles, robotics and automation, predictive analytics, artificial intelligence, omni-channel fulfillment, augmented reality, and wearable and mobile technologies.

The keynote lineup

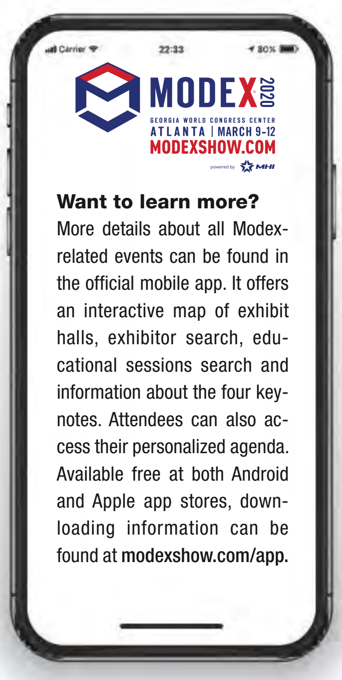
Modex will also showcase four separate keynote presentations, all held in Hall B's Thomas Murphy Ballroom on Level 5.

On Monday, March 9 at 8:45 a.m., U.S. Ambassador to the United Nations (2017-2019), Nikki Haley tells her personal story of leadership with grace and grit and her outlook for the future. The former governor of South Carolina will also emphasize the importance of the role of the supply chain to the economic development of the United States and to global commerce.

On Tuesday, March 10 at 8:45 a.m., EMOTIV's founder and CEO Tan Le will present "The Neurogeneration–The Future is Closer Than You Think." Technology is transforming the ways we work, live and think. The advances that are on the near horizon offer us ways of integrating humans and machines.

On Wednesday, March 11 at 8:45 a.m., MHI will release its 2020 Annual Industry Report. This is your opportunity to be the first to access this new report on the supply chain trends and technologies that are transforming supply chains.

And, on Wednesday, March 11 at 1:00 p.m., Peyton and Archie Manning share their stories about the power of teamwork, collaboration, preparation and giving back both on the field and in business. Peyton Manning is a two-time Super Bowl champion and five-time NFL MVP, and his father Archie Manning is also a former NFL quarterback and patriarch of the famous Manning family.



Special features you won't want to miss

MHI is again presenting the "Women in the Supply Chain Industry Forum" in partnership with the Material Handling Equipment Distributors Association (MHEDA). The forum will be held Monday from 12 p.m. to 5:00 p.m. in Room B402. Paid pre-registration is required via modexshow.com/attendees/networking.aspx or at attendee registration.

For attendees seeking more networking opportunities, MHI's Young Professionals Network (YPN) will host a free meet-and-greet reception in Room B405 on Tuesday evening—no advance registration required. Running from 5:00 p.m. to 6:30 p.m., the event is open to both current and prospective members of the group as a chance to network and connect with other young professionals in the industry.

MHI's Industry Night will be held on Wednesday from 4:30 p.m. to 7:00 p.m. in Hall B's Thomas Murphy Ballroom on Level 5. The event includes networking and a chance to win a "Trip of a Lifetime" luxury package for four valued at $30,000 (see official rules at modexshow.com/attendees/rules.aspx). This event requires registration and pre-purchased tickets.

Other highlights include the presentation of the Innovation Awards and the MHI Young Professionals Awards and comedian Hasan Minhaj will entertain. Tickets can be purchased or picked up by presenting an email confirmation of online purchase on modexshow.com at attendee registration between 8 a.m. and 5 p.m. A portion of the ticket sales will be donated to the Material Handling Education Foundation, Inc. (MHEFI).

Modex is also hosting the 2020 Atlanta Supply Chain Awards, which will take place from 10:30 a.m. to 1:30 p.m. on March 10. The award recognizes dedicated professionals and outstanding organizations leading the way in the Metro Atlanta Supply Chain community. A portion of proceeds will benefit community service programming from APICS, CSCMP Atlanta Roundtable and the Metro Atlanta Chamber. All companies with a presence in the 29 county Metro Atlanta area are eligible to participate in the program. For more information visit atlantasupplychainawards.com (the 2019 Atlanta Supply Chain Awards sold out, so be sure to register early).

Moving beyond the chain in supply chain

Leaders and innovators are now focused on enterprise supply networks and managing an ecosystem. Where are you on the journey?

By Richard J. Sherman

Innovative companies are leading in the transformation of the traditional supply chain to an enterprise supply network (ESN).* The innovators and early adopters of this way of thinking have learned that the supply chain is not a chain at all. Rather it is an ecosystem of suppliers and customers. The change can be seen in how some companies refer to the supply chain function. Take Procter & Gamble for example. They dropped the supply chain management business model more than a decade ago for a product supply model that breaks down much of silo management and focuses the organization on demand driven flowpaths. More recently, the term supply network is used to complement product supply as P&G thinks more about ecosystem management.

Richard J. Sherman is a senior fellow with the supply chain center of excellence at Tata Consultancy Services. He can be reached at rich.sherman@tcs.com.

A connected ecosystem emerges

The ESN model leverages digitalization to connect all of the participants in the Core ESN as well as connecting to enabling and supporting network participants. Operating as a connected community of commerce, companies will operate as a market ecosystem business model. As this concept matures, ecosystem commerce will leverage business 4.0 technologies to enable ecosystem commerce platforms (ECP) that optimize purpose-driven, ethical and responsive market networks to efficiently manage variability in ecosystem material flowpaths from source to consumption to sustainability in a circular economy that creates value for all participants in the ecosystem globally (see Figure 1).

To achieve ecosystem commerce, companies will embark on a journey that actually starts with a digital twin foundation that will progress through five stages of digital business 4.0 maturity (see Figure 2).

Competing against time: An existential value threat

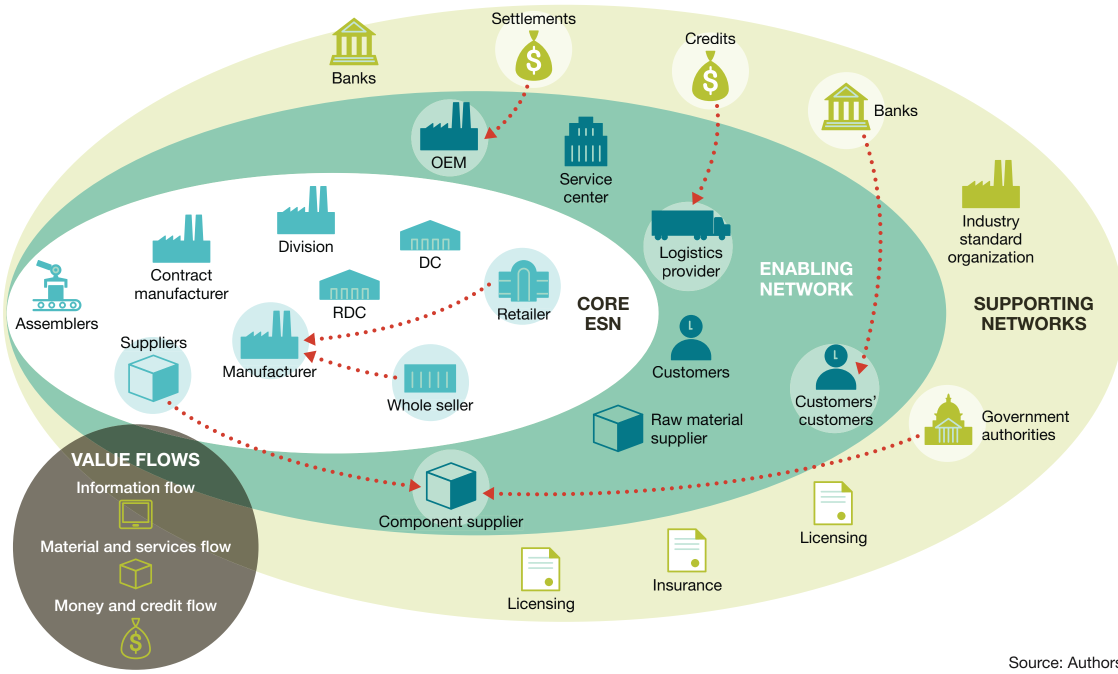
We look to stage 1 digital twin as foundational: Companies need to complete the transformation to a digital twin to advance. Most companies today are struggling with digital transformation and are reluctant to invest in digital technology. It's reminiscent of companies that refused to embrace early automation and EDI transmission of basic commercial transactions. Many of those became extinct, as they were unable to connect customers' electronic orders to "cardex" inventory management and paper order forms. Digitization is a competitive mandate to implement advanced analytics and digitalize manual processes and connect with the market ecosystem. Machine learning and artificial intelligence (ML/AI) for cognitive analytics algorithms rely on historical data sets. It takes time to make history and the laggards may well run out of time to compete.

Connecting the dots

As companies embrace digitization of data and the digitalization of business processes to develop a digital twin, they advance to stage 2 by digitally connecting the nodes internally and externally. Operating in a connected and collaborative supply network, usually starting with strategic suppliers,

FIGURE 1

Market ecosystems are integrated around internal, external and customer facing journeys



Source: Authors

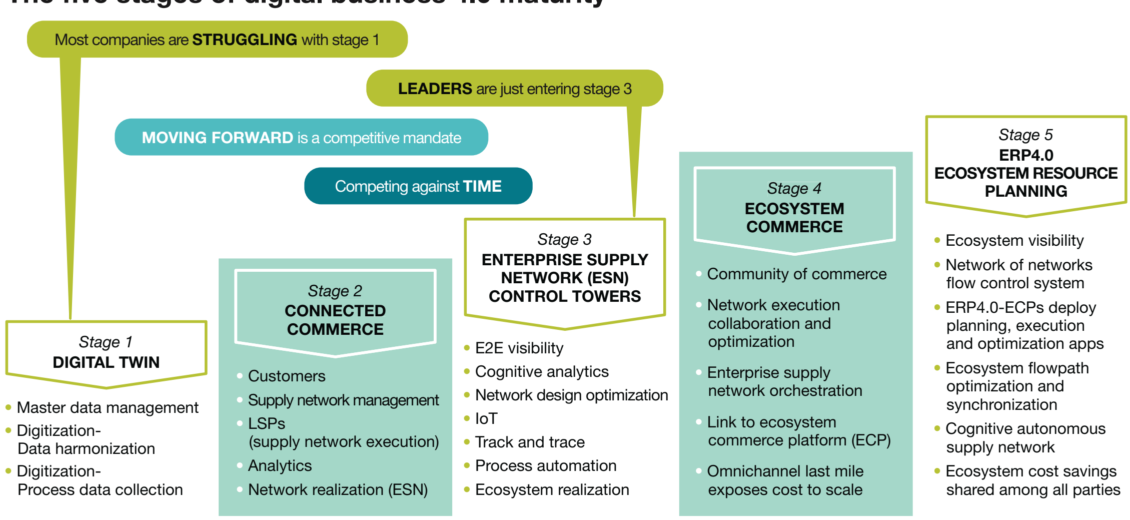
they begin to realize greater value from collaborating with their supply base. The connected experience drives the realization that they are a supply network and not a chain. The enterprise supply network is comprised of connected omni-directional nodes and not linear links. Their thinking becomes more network and system oriented. They further realize that they are a network of flowpaths that require a control tower as they evolve into stage 3.

Visibility is the "tip of the iceberg"

As they gain visibility and implement control tower technology, they become more aware of ecosystem challenges and behaviors. They realize that the ESN provides end-to-end visibility to material flow paths. Companies will extend their digital footprint and their hunger for more data to fuel performance improvement grows. However, just as an airport control tower has

FIGURE 2

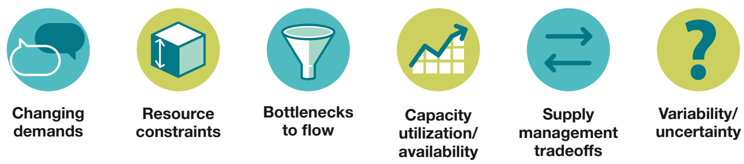
The five stages of digital business 4.0 maturity



Source: Authors

FIGURE 3

Total supply network problems that ecosystem commerce analytics aim to solve



Source: Authors

control only over flights in its airspace, the ESN control tower only has flow path visibility to material within its enterprise network boundaries. It doesn't have visibility to the flow paths outside its boundaries. Yet, it is total ecosystem material flow conflicts that are often most disruptive to material flow in the ecosystem as a whole. The realization that they don't have visibility to competitive demand responses to the same problems raises awareness to ecosystem commerce flowpath problems and constraints (see Figure 3).

We find that the early adopters are in the midst of achieving stage 2 maturity. Please note that many leading companies find themselves operating at multiple stages of maturity simultaneously. It's not a linear journey; but, if there is no stage achievement plan to realization, companies will find themselves stuck.

Innovators in the midst of stage 3 maturity through stage 3 ESN implementation are realizing that their enterprise supply network is a network within a market ecosystem network and they are embracing ecosystem thinking to embark on the journey to achieve stage 4—ecosystem commerce behavior. Along the way, they also see the journey and the means to achieve "purpose-driven ethical supply network" management and embrace the notion of a circular economy. But, that's a topic for another time.

The whole is greater than the sum of its parts

As they experience the challenges of ecosystem commerce and the cost to scale in an omni-channel (across industries not just consumer) ecosystem requiring last-mile and customized delivery, their hunger for data to fuel even more advanced cognitive analytics grows. Experiencing the benefits of Internet of Things (IoT) based ML/AI enabled analytics and the value of digital connected collaboration, they are also experiencing an exponential increase in ship-to locations including individual household, consumers and business locations. They are experiencing increased frequency of orders from the same customer as well as decreased order quantities. As e-commerce grows, they realize the need for a community of commerce and a multi-enterprise ecosystem commerce platform (ECP) to act as a neutral ecosystem network flow path data collector, consolidator, aggregator and federator that can provide an ecosystem network flowpath control system leading their journey to advance to stage 5 deployment of ERP 4.0 applications (ecosystem resource planning) and advancing to cognitive autonomous supply network management.

Paving today's path to the 2025 vision of ERP 4.0

At stage 5, the ECP, solution providers like E2open, One Network Enterprise, Infor Nexus, SupplyOn, Vecco International, OpenText, TrueCommerce, Ariba, Coupa, SPS Commerce, Bamboo Rose, BlueJay and InterSystems are realizing that they are at the center of the market ecosystem and operate within and above a network of networks capable of not just managing data interchange supporting ecosystem commerce transactions; but, they are also capable of planning and optimizing ecosystem resources in and out of the individual ESNs.

The ECPs are acquiring, developing and deploying applications to more accurately forecast, plan and optimize the resources within the total ecosystem to reduce the total cost of the market ecosystem by reducing the cost of competitive inefficiencies by sharing the cost and capacity utilization gains among all of the ecosystem subscribers. For example, transportation costs are rising rapidly as companies are required to ship more LTL and Parcel. What if the ECP were to consolidate and route ecosystem TL shipments to increase capacity utilization and decrease empty miles? Who will control autonomous commercial vehicle traffic?

By offering ERP 4.0 (ecosystem resource planning) capabilities, the ECP is, in a sense, creating the democratization of ecosystem supply management and the potential of cognitive autonomous supply management (CASM).

Where are you on the journey to crossing over to ecosystem commerce and resource management?

***

To learn more about the emergence of supply network and ecosystem thinking, read "I can see clearly now…the constraints are gone," by Richard Sherman on scmr.com.