

SUPPLYCHAIN

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Navigating Last-Mile Delivery Challenges



Frank Gaura,
VP of Supply Chain
Operations, Ryder

With U.S. e-commerce sales up significantly so far in 2020, the push is on to close any last-mile gaps that may have been prevalent pre-COVID, but have now become substantial liabilities for manufacturers, distributors, and retailers alike. After growing by 30% during the first half of the year (compared to the same period in 2019), e-commerce sales currently make up about 16% of all U.S. retail sales (up from roughly 12% during the first quarter of the year), according to the U.S. Department of Commerce.

While e-commerce was already growing year-over-year pre-COVID, the outbreak pushed these numbers up as more customers began shopping from home. This, in turn, forced companies to improve and enhance their last-mile delivery strategies.

In this Q&A, Frank Gaura discusses how the retail world is evolving as a result of the pandemic, how shippers can improve their operations to meet customer demands, and how they can solve their last-mile challenges.

Q: *How would you describe the current retail environment and how it's evolving?*

A: Due to the pandemic, we're seeing a lot more online activity. Those organizations that had robust online e-commerce sites in place coming into 2020 benefited tremendously from that. Those that didn't—because they didn't invest in one or that didn't have an online presence for some other reason—were hurt financially thanks to the many retail closures that took place.

At Ryder we saw a tremendous pickup in volume, and specifically as it related to those companies that had the robust e-commerce sites. Now, we're seeing a backlog of orders relative to demand in the appliance, furniture, and home improvement product sectors, among others.

We're hearing varying levels of responses from our own clients in terms of when they're expecting some stabilization in this area, but exactly when that takes place will depend upon their individual supply chains. For example, companies with nearshore or onshore manufacturing activities may be able to respond faster.

Q: *Why is "last-mile" delivery such a challenge for retailers?*

A: Today's consumers want tracking, notifications, and self-service scheduling. They also want their shipments on time and undamaged. At the same time, companies want to make sure that their brands are being represented correctly. This is where a third-party logistics (3PL) provider becomes an extension of their brand in the customer's eyes. As consumers have shifted to more of a "stay-at-home" environment, versus going into offices or other places of business, they now have a little bit more flexibility relative to when they can receive their orders.

At Ryder once a delivery is scheduled, customers get emails about arrival times right through to the last 30 minutes prior to delivery. That way, when we show up at their residence, they're prepared for us. Our delivery personnel are well equipped with PPE. We strive to make the customer experience as pleasant as possible while adhering to social distancing requirements.

Q: *How can retailers solve today's last-mile challenge?*

A: By partnering with Ryder Last Mile, companies gain a lot of flexibility and a large, national footprint. We can commingle shipments and provide more frequent deliveries; I think really that's what a lot of the consumers want. They want the product when they want it, and they want the right product, and they want it damage-free. Our network and our solutions are tailored around those customers' needs.

We offer multiple tiers of service ranging from basic front-porch delivery right up through deluxe "room of choice" deliveries. With the latter, we'll take the product (usually furniture) out of the box, assemble it, and place it in the end customer's room of choice. With front-porch delivery there's no need to be home during delivery windows. Consumers like that service for its flexibility and the fact that we leave the boxes on their front porches.

Q: *Do you get involved with returns management?*

A: The returns and the reverse logistics flow are obviously a pain point for most retailers and distributors right now. We offer the capabilities to do the returns pickup, swap-outs, and exchanges. For example, if a consumer isn't satisfied with a mattress and wants a new one, we can go into that home, bring in the new mattress, take the old mattress out, and then either dispose of it or send it back to our customer. We can tailor our solutions relative to our customers' supply chain needs.

Q: *How important is last-mile visibility right now?*

A: It's always been important, but it's becoming table stakes for companies right now. With RyderView™, we provide one-stop-shop order status visibility for both our client and for its end user. Once the package is in our possession, and assuming that the order was consigned to us, we provide key updates, send invitations, and schedule the delivery to the customer (as needed). On the RyderView™ dashboard, the consumer sees that the delivery is scheduled, what the date of the delivery will be, and the specific delivery time.

With RyderView™, consumers can self-schedule those points versus having to work around a date that we choose. We text or email six different windows on the delivery day and they can pick the one that fits their schedule. This is just one more way that we're providing a very flexible, last-mile service during a time when customers are demanding it.

Q: *What else should shippers be thinking about going forward?*

A: There are two rapid changes taking place within our business. The first is the forward deployment of inventory, where customers are asking us to store product for them and ensure that inventory is available in our warehouses or fulfillment centers. The second involves large non-conveyable items and the ability to provide those types of products either at the front door, just inside the front door, or right in the consumer's home. There's a shift in parcel carriers' willingness, desire, and cost structure for these services, and that's making it more competitive for us, the last-mile carriers, to provide those levels of service.

Q: *What other supply chain solutions does Ryder offer?*

A: Our industry leading solutions cover the entire supply chain journey from inbound transportation to warehousing & distribution to outbound transportation to the consumer's door. This safe and secure cross border capabilities, cross-docking, e-commerce fulfillment, and a full suite of transportation services that can manage freight through brokerage, truckload and a dedicated transportation solution to Ryder Last Mile.

And, through our focus on continuous improvement, as well as our proprietary innovative technology, we drive optimization by turning data into actionable business intelligence, providing real-time visibility, and building a long-term relationship with you that fosters growth and delivers value.

COVID hasn't stopped supply chain progress

Supply chains have been in the spotlight like never before over the last eight months. That hasn't always been a good thing. The perception, reinforced by shortages of products essential to our daily lives, is that supply chains were not up to the task and failed. The reality, as argued by MIT's Yossi Sheffi in his new book, "The New (Ab)Normal: Reshaping Business and Supply Chain Strategy Beyond COVID-19," is that supply chains performed as designed—they did what we expected them to do. Going forward, we need to reshape our business strategies, and, as the title of the book suggests, rethink the way we operate supply chains to perform in a new business—and social—climate.

My own take is that rethinking that path forward was already on many companies' roadmaps prior to COVID. What's changed is that the pandemic accelerated the timeline; investments and process changes that were on the calendar three to five years from now got underway in three to five months during the pandemic.

The path forward is a theme echoed in this month's issue. Morgan Swink and Nada Sanders have been researching digital transformation for the past three years. In the lead article, "Want to build a digital supply chain? Focus on capabilities," they note that too many supply chain leaders equate digital with technology rather than focusing on the capabilities technology enables.

When it comes to digitizing the supply chain, they argue, successful leaders strategically target well-defined capabilities, and then identify the technologies that will get them there.

In "End-to-end supply chain synchronization: A strategy for uncertain times," frequent contributors Daniel Pellathy, Michael Burnette and Ted Stank state what we all know: "Despite headwinds, businesses still expect supply chain managers to find a way through this minefield while continuing to deliver value to customers at a profit." Their research indicates that synchronization is a leading-edge strategy that companies can use to manage shocks, recover stability and set the stage for future gains. Synchronization also focuses on building capabilities that are linked to core business drivers.

Last, I'd like to highlight Gary A. Smith's article looking at what supply chain managers need to do to move forward after the dust settles. An experienced supply chain practitioner in his own right, first and foremost, Smith believes it's time to put people at the center of supply chains.

As always, we hope you enjoy this issue as you blaze your own new supply chain path going forward in "The New (Ab)Normal."



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Too many supply chain leaders focus on technological solutions rather than the capabilities they enable.

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Most outsourcing relationships are highly transactional rather than collaborative. The Vested business methodology builds a bridge from the former to the latter. Here's the story of how the business model evolved and why more than 50 organizations are using it today.

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Synchronization can manage shocks, recover stability and set the stage for future gains.

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Annual e-tailing update: COVID-19 virus shakeup



Dr. Lapidé is a lecturer at the University of Massachusetts, Lowell 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.

This represents my fifth e-tailing update about the evolution of consumer e-commerce. The series has chronicled the evolution of e-tailing from the eyes of a supply chain analyst. It has primarily focused on the battles between the heavy-weights, brick-and-mortar Walmart and e-tailer Amazon, as a reflection of what has been happening in the industry.

In my last column, “Supply chain heroes and lessons from COVID-19,” I discussed the breakdown of two basic-need supply chains—food and

medical supplies. I stated that what we have learned during the pandemic is that, despite creating very efficient supply chains, our efforts have sometimes fallen short of meeting some basic needs, even in affluent countries.

The U.S. food chain is really two distinct ones. The grocery industry that serves home consumption—think grocery stores and business-to-consumer (B2C)—and the other is the food service industry that delivers to restaurants and other commercial institutions for food consumed outside of the home (B2B). Prior to COVID-19, that second supply chain accounted for the majority of U.S. food expenditures, as Americans dined away from home more. Thus, this year’s update is all about COVID-19’s impact on e-tailing, because the disruption in the food supply has drastically affected the overall retail picture.

COVID-19 winners and losers

Walmart and Amazon turned out to be the biggest winners in the retail market. The other big retail winners, based on their Q2 2020 financial performance, were Home Depot, Lowe’s and Target. Food shortages buoyed Walmart, Amazon and Target because during the lockdowns more U.S. households needed groceries to cook more of their meals; they also needed more of the cookware and household goods these retailers also sell. More importantly, while the two brick-and-mortar retailers struggled in the early days of e-commerce, they finally harmonized their home-delivery and pickup-at-store services, including curbside pickup, as well

as their enabling technologies. In addition, these big retailers were able to keep their businesses open by making sure they put incentives in place to keep workers working safely.

A *Wall Street Journal* article from August, “Lowe’s Online Sales More Than Double,” noted that: “As the pandemic refashioned the U.S. economy, changing consumer habits have bolstered large retailers.” Furthermore: “Cancellations of vacations and other leisure activities have left people with more to spend on home projects—augmented by federal stimulus checks and enhanced unemployment benefits. Home-improvement needs bolstered both Lowe’s and Home Depot, which have also fine-tuned their pick-up and home delivery services, learning from missteps in the early days of e-tailing.”

Whenever there are winners, there are losers, especially during the lockdown-based downturn in the U.S. economy. For example in “Kroger, For All Its Tech Spending, Had Trouble With Pandemic Rush,” the *WSJ* reported that: “Kroger has spent years—and hundreds of millions of dollars—investing in technology to give it a digital edge in the grocery business. But when the coronavirus changed customers’ buying habits overnight, the grocery chain wasn’t as ready for the online shift as some of its competitors.” Thus the U.S.’s biggest grocer was not able to fully capitalize on the increased demand for groceries due to the performance of its home delivery services. In addition, other retailers, such as T.J. Maxx, HomeGoods and Marshalls were not able to stay fully open during the pandemic and did not fare well.

What about Walmart?

In “Walmart’s Mix of Open Stores, E-Commerce Pays Off in Crisis,” another *Wall Street Journal* article, Walmart is quoted as saying “E-commerce sales jumped 74% as millions of customers switched to ordering online for home delivery or picking up groceries in Walmart parking lots.” Walmart gained as other retailers were forced to close down during the lockdowns. It “doubled-down” on a “stay-open” strategy by hiring more hourly workers, raising warehouse wages and paying bonuses to store staff.

Walmart has shown that even the “big elephant can dance.” In the early days of e-commerce, it faltered a bit because it stuck to a strategy that leveraged its highly-efficient pallet-based big stores and warehouses to handle online orders. When it bought Jet.com and other specialty e-tailers, and eventually merged them into Walmart operations, I thought it might have made a mistake in not keeping them independent and growing a different base than its traditional price-conscious customers—in order to effectively compete against Amazon. As it turns out Walmart used its dominance in grocery to take advantage of an opportunity COVID-19 thrust upon the industry. It consolidated its online operations to allow its customers to buy bigger “shopping carts” of goods from Walmart.com along with groceries purchased on their periodic runs to the grocer.

It also leveraged its less-recognized quick response (QR) supply replenishment processes, put in place for disruptions caused by natural disasters. According to the *WSJ*, a picture in the CEO’s office shows “company trucks rolling into New Orleans after Hurricane Katrina, an indication of the retailer’s pride in quickly restocking stores during the toughest of times.” Since Katrina (and before), Walmart has supported its customers (and workers) during disruptions caused by natural disasters, such as extreme weather-related events, earthquakes and wildfires. It leveraged its QR-based crisis-management skills to quickly respond to the COVID-19 crisis, to its advantage.

Is the Walmart empire going to strike back at Amazon? It appears its recent success has emboldened it to take another run at grabbing business away from Amazon. It is using its large number of stores to fill same-day, home-delivery orders of groceries, as well as other goods it sells. This gives it an advantage over Amazon that can only fill same-day orders of groceries around its much smaller base of Whole Foods stores. In addition, Walmart has launched Walmart+, a yearly membership akin to Amazon’s successful Prime offering.

As I write this, another interesting twist is emerging.

Walmart is interested in being part of a group to purchase China’s Tik-Tok video apps and social media company. Whether or not the acquisition takes place, it seems the retailer is trying to get into digital advertising, an area where Amazon is not strong. It’s a good strategy if it works.

What about Amazon?

That said, Amazon was a big winner during the pandemic. A *Fortune* article, “Amazon Was Built for the Pandemic,” supported the title. It stated; “If you were designing a company from scratch that could capitalize on a global crisis, it would probably look a lot like Amazon.” I concur. My Insights’ position has always been that Amazon’s supply chain was extremely responsive, while Walmart.com was hampered because it relied too much on its finely-tuned, highly-efficient brick-and-mortar supply chain—hence a bit intransigent.

However, despite all going well for Amazon, its overall success has brought other worrisome issues to light. Because it needs to focus on profitability, after a long history of losing money, it is running it into some criticism from the government, as well as suppliers and competitors. It is always being questioned by the feds as potentially using monopolistic practices because its website has become a de facto platform for a big swatch of the e-tailing market. In its quest to reduce distribution costs, it has also started to run afoul of third-party logistics firms (such as USPS)—that now consider it a competitor as well as customer. Its forays into offering private-label goods is concerning to its suppliers and third-party market players that use its platform to merchandize their wares. Two *WSJ* articles were written this year titled, “Amazon Tapped Sellers’ Data to Launch Competing Products” and “Amazon Restricts Ad Buying by Rivals,” discuss practices that some suppliers and competitors find worrisome.

In summary, the COVID-19 virus has greatly disrupted the e-tailing market, making the stronger players stronger and the weaker players weaker. Both Walmart and Amazon have bolstered their leadership positions, in different ways. While the grocery home-delivery supply chain has been historically problematic for the e-tailers (beginning with the Webvan bankruptcy during the Internet dot.com bubble), it now looks like pick-up and delivery of food may become a way of life for more U.S. consumers. I expect there’ll be more interesting changes in my 2021 e-tailing update. ☺☺

Retailers riding the pandemic's wave of change

By Yossi Sheffi



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COVID-19 has swelled the e-commerce tidal wave that was submerging traditional retailing before the virus struck. During the pandemic, stay-at-home consumers switched to online buying in droves, and the 2020 roll call of bricks-and-mortar bankruptcies reads like a “Who’s Who” of retailing.

However, there is another side to this dramatic story. The pandemic has also unleashed a wave of innovation that is giving more impetus to the

changes that are reshaping the retail business and its supporting supply chains.

As I describe in my new book, “The New (Ab)Normal: Reshaping Business and Supply Chain Strategy Beyond COVID-19,” the crisis is compressing innovation adoption cycles as retailers scramble to stay afloat in an ever-changing landscape. These efforts offer vital clues to the shape of retailing in a post-pandemic world.

Navigating new paths

During May and June 2020, the MIT Center for Transportation & Logistics conducted a survey of grocery shopping habits in the United States. The survey, part of a “Covid-19 Generational and Lifestyle Study,” elicited 1,320 responses. The survey focused on buying behavior, distinguishing between store shopping and various online modes such as home delivery, curbside pickup and locker pickup. Home delivery’s share of shopping increased from 13% to 31% of all buying trips. Of those individuals who shifted from in-store shopping to home delivery—the largest group to shift modes—31% stated they were likely to continue with home delivery.

These findings provide a glimpse of the attitudinal changes that COVID-19 has caused; changes that impact every corner of the retail business. Retailers are responding with creative ways to migrate to online channels.

Shanghai, China-based Lin Qingxuan is a retailer with 300 outlets that sell cosmetics from traditional Chinese herbs. COVID-19 struck at the beginning of the Chinese New Year—a big shopping season for the retailer—shuttering 40% of its locations and causing a 90% drop in store sales. In response, the company quickly adapted its business model to digital sales channels. For example, it redeployed 100 of its in-store beauty advisors, who used tools such as WeChat, DingTalk and Taobao Livestreaming for staging online events that engaged at-home customers. The change in direction worked. A Pre-Valentine’s Day online event yielded revenues 45% higher than the same event the previous year.

In the United States, retailers Savas and Sephora implemented similar changes. Nashville-based Savas sells made-to-measure leather jackets, a high-touch retail experience made impossible by the pandemic. The enterprise created a virtual-fitting package with a

self-measuring kit, a packet of fabric swatches and video consultations. Beauty product retailer Sephora created a Virtual Artist app and website that uses images of customers' faces to let cosmetics shoppers try different products.

Another U.S.-based retailer, J. W. Lopes, repurposed its logistics network as part of a move to counter the pandemic's threat. The company is a small New England fresh produce distributor. At the end of January 2020, Lopes had just built a processing center for pre-cut produce. The pandemic forced the company to rethink its future. As people stayed at home in compliance with stay-at-home mandates, 75% of the company's customers closed down, and those that remained ordered less product. Lopes deployed its logistics network—it operates some 20 trucks—to sell directly to consumers. The initial concept was simple: sell \$74.95 boxes of high-quality produce using social media and email promotions as well as word of mouth. The enterprise subsequently added fish to the product mix and sourced from more local suppliers.

To execute the change, Lopes invested in more advanced inventory management, e-commerce capabilities and routing technology. The plan worked; the new venture has enabled the distributor to rehire the staff it laid off when the coronavirus hit. Lopes is maintaining its original distribution business, and when the pandemic finally subsides is "going to build both businesses, work hard and see where it takes us," said CEO Jeff Kotzen in an interview for the book.

Platforms for innovation

In many respects, technology is proving to be a key enabler of pandemic-related directional changes in retailing. These advances were underway before COVID-19 upended the world, but picked up speed as the full implications of the crisis played out. A striking example is the rise of platforms.

Online platforms offer dynamic and flexible selling channels that are suited to volatile, less predictable environments. Consumers can search for

a wide range of products, and that search data (along with data about consumers' click activity) provides powerful, real-time visibility into demand, including demand for new products. This intelligence enables platform-based retailers to react swiftly to market changes.

Consider, for example, the experience of online platform Etsy. When demand for face masks exploded owing to the pandemic, many consumers of a more stylish bent eschewed generic product such as Amazon's "face mask, pack of 50." Instead, they turned to Etsy to find handcrafted masks made by some of the platform's 2.7 million artisans and sellers.

It took Etsy only a few hours to detect the shift in search behavior, and the enterprise adjusted its systems to reflect the change. It recruited face-mask makers, educating them on delivery expectations and allocated demand so that Etsy was not overly committed to a few sellers. In its May 2020 earnings call, Etsy reported that 60,000 shops were selling face masks with sales totaling 12 million units worth \$133 million in April alone—at least 10% of the platform's gross merchandise sales.

The Etsy experience points to another important benefit of the platform model: It enables independent retailers to compete with behemoths such as Amazon. The nimbleness and adaptability of platform sellers enables them to offer creative alternatives to consumers, and quickly capitalize on unexpected shifts in demand. Another commerce platform, Shopify, reported a 71% rise in the number of new stores created on its platform in the second quarter of 2020 compared to the previous quarter, as consumers shifted to e-commerce. Shopify now has more than 1 million retailers on its platform.

Some retailers are proactively developing platform capabilities. For example, C&S Wholesale Grocers teamed up with Instacart to offer e-commerce and same-day delivery solutions to more than 3,000 C&S independent grocery retailers

across the United States. C&S's network of grocers will be brought into the Instacart marketplace where they will establish an e-commerce and delivery offering. Instacart shoppers will then be able to order product from the grocers and pick convenient order delivery times.

Moreover, platform-based selling opportunities are not confined to the products in high demand when a large-scale disruption occurs. It is notable that when Etsy enjoyed a surge in its face mask business, sales in non-mask categories also increased even though there was a slump in wedding- and party-related products that had previously been big sellers.

Mobile as a change agent

Another technology that was a familiar feature of the retail landscape prior to the pandemic, and which is now helping companies to embrace e-commerce, is mobile communications.

A critical element of mobile platforms is synchronization: the ability to prearrange the availability of an item or resource. Customers gain visibility into the transaction as well as confidence in the process. Service providers gain visibility into real-time demand and can smooth their resource consumption. Here are two examples.

Chipotle is bringing BOPIS (buy online, pickup-in-store) to burritos by expanding its Chipotlanes concept. With this system, consumers order their food via a mobile app and select a pickup time. They collect the order at the window, avoiding long lines. The lack of queuing also makes it easier for Chipotle to get permission for drive-through service from retail development owners who do not want the congestion of a traditional drive-through lane.

Mobile technology is being used to improve the management of a scarce resource: urban parking space. Startups such as CurbFlow are working with cities to offer mobile apps that let

delivery drivers and logistics companies schedule curbside loading and unloading activities. Allocating parking slots in this way streamlines urban logistics and the last mile supply chain – an area that is attracting much attention because it is so critical to the efficiency of e-commerce.

Tech-enabled diversity emerging

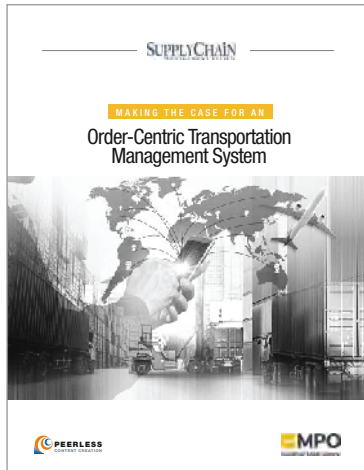
It's impossible to know for sure what retailing will look like when the pandemic is behind us, but the outlines are taking shape.

Market leaders such as Amazon and Walmart will still be dominant. They have the resources and know-how to capture opportunities presented by the pandemic and to weather the storm.

However, COVID-19 also has catalyzed the creative destruction that was transforming retailing, and could promote a more diverse industry. Many smaller enterprises have been goaded into action by the crisis, and are innovating their way into digital channels. Larger competitors are responding too. For example, in May of this year Facebook announced it will allow businesses to build virtual shops on its Facebook and Instagram platforms. To some extent the announcement was timed to take advantage of difficulties Amazon was experiencing in meeting a surge in orders due to the pandemic.

Deborah Weinswig, CEO and Founder of Coresight, has suggested that it should be possible to shop an entire mall from one app. This vision encapsulates the pandemic-inspired changes that are transforming the retail business. ☺☺

"The New (Ab)Normal" is published by MIT CTL Media and is available on Amazon.com



MAKING THE CASE FOR AN Order-Centric Transportation Management System

TO CALL THE NEW DIGITAL BUSINESS ENVIRONMENT “overwhelming” for the typical shipper or logistics provider would be a major understatement. Just as the pressures of e-commerce, omnichannel, and reverse logistics began to heat up, external issues like the international trade wars, labor shortage, and COVID-19 exacted their own burdens on the world’s closely-intertwined supply chains.

As a result of these and other challenges, running a streamlined, profitable business operation became that much more difficult. For example, with e-commerce returns rates averaging about 30% (versus 8.89% for brick and mortar), the reverse logistics process has become almost as important as the forward logistics process.

Add in the need for high levels of supply chain visibility—something both partners and customers are asking for—and it’s easy to see why manual processes and disparate technology just don’t cut it anymore.

“The customer is king,” says Martin Verwijmeren, CEO and co-founder at MPO, a global cloud platform for supply chain orchestration, “and wants to be pleased and delighted with the best possible offerings, the widest product selection, and the fastest delivery at the lowest cost.”

Often referred to as the “Amazon Effect,” these compounding pressures have quickly cascaded into the B2B world, where wholesalers, distributors, branded manufacturers, and retailers alike are being challenged by the customer’s demand for the “perfect order,” or the end delivery of an on-time, in-full, undamaged order at the lowest possible cost.

EXPLOITING THE POWER OF THE CLOUD

With more companies doing business globally, the need for superior, cross-border service has become yet another goalpost for

shippers and logistics providers alike.

The opportunities to sell cross-border abound, but the levels of competition are increasing every year in the international setting. With longer supply chains to manage, companies simply can’t afford to operate in isolation when attempting to fulfill customers’ demands for superior service.

Knowing this, companies are partnering with suppliers, carriers, customs agents, freight forwarders, contract manufacturers, and myriad other companies that can help them “cover the spread” across the entire supply chain.

“Shippers need dynamic networks that can help them differentiate the flows, partners, and services needed to accommodate every single order,” says Verwijmeren, who sees the Cloud as the ultimate enabler of these international, intertwined networks. “The Cloud is ready to be exploited not only as a vehicle for running your supply chain, but also for managing it in a manner that helps firms service customers in the way that they want to be served.”

MEETING THE NEEDS OF THE SHIPPERS AND LOGISTICS PROVIDERS

With logistics providers shouldering many of the pressures that their customers are dealing with, these multifaceted organizations hold a position of responsibility for those customers’ supply chains.

As such, logistics providers need extremely flexible, low-cost supply chains that are both fast and reliable. Similar to their customers, these companies are being asked to stretch outside of their traditional comfort zones (e.g., a particular regional service area) to meet the

COVERED IN THIS REPORT:

- **The Customer is King**
- **A Natively-Unified Cloud Platform for Supply Chain Orchestration**
- **Case Study: Global Contract Manufacturer Uses Digital Platform to Orchestrate its Supply Chain**
- **Making the Case for an Order-Centric Transportation Management System**
- **Do You Want to Lead or Follow?**

changing demands of their customers.

“When their customers want to expand, logistics providers need to be able to grow right along with them,” says Verwijmeren. “This puts new pressures on the provider to come up with an expanded reach and new offerings that allow them to sell more and, in turn, improve their own profitability.”

To make that happen, these logistics providers need Cloud-based supply chain platforms that can serve as firm foundations for the services that they want to provide to shippers.

In this Making the Case we explore the limitations of traditional TMS, show why these systems aren’t meeting the needs of the modern shipper or logistics provider, and illustrate how an Order-Centric TMS helps companies overcome these and other challenges in today’s ultra-competitive business environment. •

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Seize the moment

Forget the new normal. Think instead of a new beginning to transform supply chains.

By Matthew Lekstutis, Mark Newberry and Oren Ben-Zeev

The COVID-19 pandemic has put supply chains simultaneously under more scrutiny and more awareness like no other phenomenon before it. It has highlighted the truly global nature of our supply chains and the interdependencies between them as disruptions in one locality immediately reverberated to others across the world.

In unprecedented fashion these disruptions have rapidly buffeted all aspects of the supply chain leaving few industries unscathed. As many companies shifted workforces to their homes and travel

to densely attended events came to a standstill, communications with clients, customers and colleagues internally and externally went virtual.

Our interactions with clients have likewise gone virtual. Over the past eight months, we have virtually connected, participated in and conducted innovation events and forums across the globe. In this issue's column, we will share a prevailing theme emerging from our discussions; that responding to the disruptions is less about what the "new normal" will look like and more about the opportunity from a "new beginning" to transform our supply chains to become more purpose-driven, resilient, agile and sustainable.

Global commerce disrupted

Among the industries represented in our virtual experience, we saw stark contrasts. For example, essential healthcare predictably spiked as did the need for logistical aid. On the other hand, fashion, aerospace and other elective or discretionary industries fared significantly worse than normal. Across all industries, demand patterns for products and services and typical buying channels have dramatically shifted. Supply, capacity and order fulfillment flows stalled or required rapid re-configuration as normal facility operations ceased and transportation lanes were intentionally closed. We saw constraints based on availability of distribution nodes, transportation logistics and labor. One interesting phenomenon was that as intentional lock downs and closures were enacted, and only "essential" production was open, essential product companies discovered that their products were comprised of "non-essential" components resulting in production and distribution delays.

For many companies, resilience, agility and

adaptability of the supply chain will be a key to their economic survival and future successes. Due to the pressures it has applied, the pandemic in many respects has served as a catalyst for strategic action and for further transformation and innovation. One such transformation is a shift in mentality of the whole concept of supply chains to supply networks operating in "market ecosystems." Largely as a result of the digital age, individual enterprise supply networks have become a market ecosystem of inter-connected enterprise supply networks involving suppliers, manufacturers, logistics providers, distributors, customers and enabling partners.

Ecosystem commerce goes mainstream

The crisis has accelerated the importance of the development of an ecosystem mentality, with all members operating and responding to shifting conditions in concert using federated data and cognitive automation deployed on ecosystem commerce platforms and control towers. Not only will this help alleviate the bullwhip effect and other phenomena caused by basic lack of communication, but in an uncertain future characterized by the events of the past several months, ecosystem-thinking will be the only way for supply networks to weather storms, share value and remain competitive in a Business 4.0-driven environment.

Digital twin advances

One important enabler to creating a networked ecosystem is the concept of a digital twin to digitally represent the ecosystem—or as much of it as possible. Digital twins are digital representations of physical processes, assets or activities. The digital twin models the data flow and interactions between

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these components to emulate the crucial pacing and latency found in the real world. A twin can be built from any part(s) of the end-to-end supply network. Once built and validated, the twin becomes a powerful tool that can be used to simulate alternative source/make/deliver scenarios, to reduce risk, to optimize a constrained problem, to improve performance, and, in short, to create insights that spur faster and more informed decision-making. Digital twins are becoming even more important as ecosystems increase complexity. They are relevant not just for managing the high uncertainty from the COVID-19 crisis but for other supply chain trends such as mass customization and incorporation of advanced cognitive, robotic and autonomous tools.

Many of our discussions revealed how the COVID-19 crisis has thrust new priorities to the forefront of supply chain improvement initiatives; some of these may have already been in progress but received a renewed sense of urgency because of their relevance. One such priority was investing in better data and analytics capability, especially when used in conjunction with a digital twin. Having access to accurate, granular and current data, along with the ability to rationalize and filter it to create insights through advanced dynamic reporting significantly raises business intelligence and provides better visibility along with more informed and timely decision-making.

What's the risk?

Another vital area receiving more attention is supply chain risk management. During our discussions, participants admitted that risk monitoring may not be a priority until it is too late, and is often not inclusive of other ecosystem partners, limiting the aperture through which risks can be accurately identified and assessed early enough to matter. In extended times of high uncertainty, it's easy to understand the renewed importance of this function. Companies also demonstrated a new commitment to philanthropy and social responsibility, especially in industries that are "non-essential." This could range from redirecting manufacturing lines to producing PPE to providing logistical help to simple monetary donations.

The long-lasting nature of the crisis has also led companies to make structural, physical changes to their supply chains. Several virtual forum participants described the shifting calculus in determining sourcing locations, storage locations and transportation modes. Proximity to plants and customers, likelihood of remaining open, availability of transportation lanes, lead time reduction (and corresponding supply-side uncertainty) all became driving factors that are prompting organizations to re-examine earlier decisions and make changes.

Redefining procurement strategies

Consideration of suppliers' physical locations (global vs. regional vs. local) is also driving a re-evaluation of sourcing

strategies, including whether and where to consolidate sourcing, and conversely where to mitigate risk and selectively dual source. Overall quality of supplier relationships has come to the fore as partnerships are strengthened for the sake of increasing upstream risk visibility and developing mutually acceptable contingencies in case operations are disrupted. For example, the question of safety stock setting is being increasingly answered collaboratively with suppliers. Assets are being re-purposed in how they are used; for example, retail space has been cleared of slow-moving items and used as excess storage for faster moving items. Transport vehicles used for shipping bulk product to warehouses may now be used for last mile deliveries based on the rapid increase in e-commerce.

It ain't over 'til it's over

At this juncture the crisis is far from over and uncertainty will continue to dominate the foreseeable future. One of the resounding themes emerging from our discussions was that companies must equip themselves to not only be able to respond to uncertainty but to leverage it as a way of strengthening, innovating and ultimately gaining competitive advantage.

The pressure to excel bi-modally (through efficient, lean core operations *and* through innovation across the ecosystem) is tremendous. [Process] automation was identified to drive improvement in both areas—for example, automating warehouse operations to reduce operating costs in one mode and automatically flowing pricing adjustments through ecosystem partners to shape demand in the other. Investment in digitizing the flow of information through the ecosystem was seen as paramount. A digitized ecosystem can process higher information volume (breadth or granularity) and more rapidly rationalize and consume it which increases visibility, reduces latency and ultimately leads to a more resilient, agile and adaptable network.

People are the most valuable asset

Another emergent priority that emerged from discussion was that the emphasis on social safety will likely endure in the longer-term and the importance of people health and well-being extending to both employees and customers is paramount. This will likely mean greater emphasis on remote work and virtual assistance, curbing large meetings or gatherings, tightening controls on store occupancy and traffic flow even at the expense of lost revenue or efficiency.

Seize the moment

The greatest imperative, however, was the need to "seize the moment" and recognize this crisis for what it is—an opportunity to drive long-intended supply chain improvements that have suddenly been made even more necessary, visible and with a stronger business case than ever before. ☺☺

*Want to build a
digital supply chain?*

FOCUS ON CAPABILITIES

Too many supply chain leaders focus on technological solutions rather than the capabilities they enable. 📶 🏠

BY MORGAN SWINK AND NADA SANDERS

Executives across all industry sectors are rapidly adapting organizational strategies and structures to “digitally transform” their supply chains. Multiple factors are driving supply chain digitalization, including the growth of big data, artificial intelligence (AI), robotics and the Internet of Things (IoT). Some organizations are combining these advances with developments in hardware (e.g., servomechanisms) and software (e.g., analytics) to improve supply chain processes. Yet many supply chain managers are operating in a “wait-and-see” mode when it comes to digitalization.



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Over the past three years we have studied the state-of-the-art of digital supply chain transformation to understand the factors that enable successful transformation as well as the obstacles that impede development. We conducted in-depth interviews with senior leaders of over a dozen large companies, all household names, across a range of industry sectors. We then conducted deep case studies in two companies, one a major airline, the other a leading consumer electronics firm. Through multiple site visits, data gathering efforts and analysis, we observed and participated in the process of digitalization at these firms.¹

Our findings point up three key factors that separate leading firms from laggards. *First*, successful transformation efforts build upon a set of common underlying features that differentiate a digital supply chain from a traditional supply chain. *Second*, more advanced firms pursue visions of digital maturity that follow a natural progression of core attributes. *Third*, and perhaps most important, successful leaders strategically target well-defined capabilities. Many supply chain leaders make the mistake of focusing on technological solutions rather than building capabilities. Our key takeaway is that companies need to focus less on the technologies themselves and more on the capabilities they enable.

What makes a supply chain digital?

We asked dozens of supply chain managers to define “digital supply chain,” and received dozens of different answers, ranging from “one integrated system with one single data base” to “digitizing all transactions” to “making all things digital” to “visibility into demand and supply.” Digitalization certainly involves automation, but when applied to supply chain management, digitalization is also about more tightly integrating processes and generating more real-time insights into events, transactions, cause-and-effect relationships and decision alternatives. Accordingly, we define a digital supply chain as follows:

*A digital supply chain applies technologies to **automate, integrate and illuminate** all processes including data capture, communications, analyses, decision-making, transactions and transformations.*

Making progress toward a mature digital supply chain necessarily follows a path of capability developments that digitize and automate transactions, connect stakeholders to share information, enable decision makers (or automate

them) with analytics applications and automate responsive actions. The journey toward digital supply chain maturity follows developments of these four attributes that increasingly enlarge the scope of transformation to include integrated, systems-oriented, objectives and projects. To guide the supply chain organization’s journey toward a destination that creates the most value for the firm, leaders need to prioritize *capabilities*.

Digital supply chain capabilities

Many executives we talked with said that their organizations lacked a guiding roadmap for change. It is difficult to formulate a guiding vision when so many technology options are available, and when operating conditions are so dynamic. Many managers spoke of their frustration in trying to build a five-year plan when they were unsure of how markets might change, what technologies might emerge or become obsolete, and what new competitors might appear even over the next twelve months! In the midst of all this change, a *capabilities perspective* offers a clearer and more stable approach for planning.

While the value of certain digital technological solutions might change, the importance of selected capabilities is likely to be longer lasting. Supply chain leaders should target specific capabilities that follow the maturity model in a way that addresses immediate problems, but also capitalizes on opportunities to differentiate their supply chains in supporting the firm’s business model(s).

Managers can think about digitally enabled capabilities at three different levels. At the highest level, consider the two fundamental functionalities that emanate from digitalization: *automation* and *insight*.

Devices, computers and robots can be used to automate all kinds of processes performed by humans. These processes might involve sensing, where devices replace human senses, structuring and storing information and making decisions and executing physical tasks. Substituting software and hardware for labor usually reduces costs, but automation also speeds-up processing and transitions, improves consistency and accuracy of task execution, and increases resource availability (automated services are “always on”).

Digital technologies also accelerate and enrich insight into supply chain processes and decisions. Monitoring and reporting technologies increases timely availability

of information. Algorithms and smart analytics cognify processes, that is, they develop and apply knowledge through analysis, optimization and learning. In these ways, smart technologies improve the quality of solutions and decisions. In addition, by enabling more granular insight into demand and supply processes, digital technologies create the potential for more customized responses to market opportunities.

Figure 1 juxtaposes automation and insight as two core dimensions of digital technology enablement, positioning examples of digital supply chain technologies that enable these two broad types of process transformations. The *automation* axis represents increasing automation of processes in overall sense-analyze-respond cycles. Many technologies automate actions and decisions, including data capture, computations, transactions, physical transformations and movements and more. The *insight* axis represents increasing depth of insight developed as data are converted to information to knowledge to plans. Data capture, communication and analytics technologies derive, develop and infuse insights and intelligence into processes by sharing and analyzing information and by prescribing solutions and actions.

Strategic leaders can combine automation and insight generating technologies to create four “Level 2” digital supply chain capabilities; each positioned in a quadrant of the digital capabilities matrix. In its most essential form, digital transformation is about developing automation and insight to radically advance *visibility*, *intelligence*, *efficiency* and *agility*.

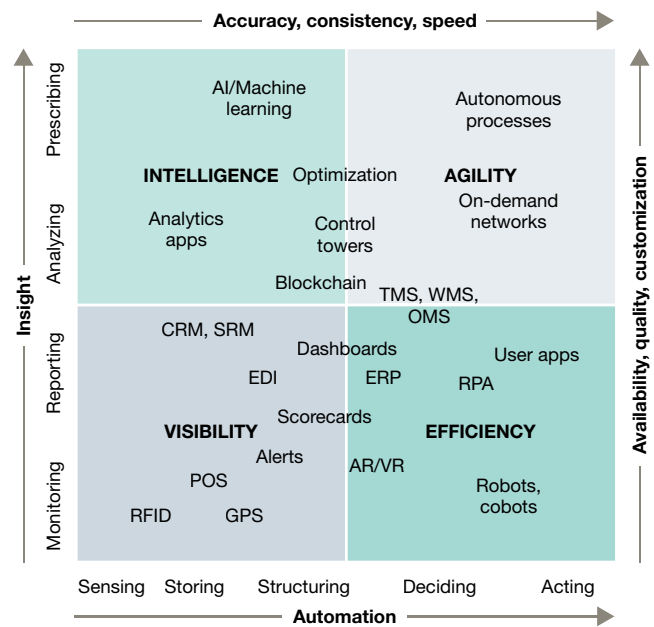
Visibility means having current, accurate and complete information that supports real-time, integrated planning and decision making. Visibility requires automated digital data capture and networked connectivity across processes and stakeholders involved. As an important step toward digital transformation maturity, leaders must identify the types of visibility that are crucial to competition. Typically, this means visibility that reduces or eliminates the most damaging uncertainties in the supply chain, and/

or visibility that offers the greatest potential for improvement and competitive advantage. Leading firms develop visibility using these criteria, rather than simply exploiting types of visibility that are readily available. Developing visibility requires working with upstream and downstream partners to develop data standards, along with technologies for data capture and connectivity.

Efficiency, broadly defined, spans many types of improvements in the use of resources including time. Supply chain managers often think of automation as a means to drive efficiency. Capital-for-labor substitution truly is an important source of efficiency and productivity gains. However, new automation capabilities go far beyond these basic benefits. Automation can improve process speed, quality, service availability and improved user interactions. In manufacturing, emerging examples illustrate the super-productivity of robots and humans working side-by-side; such arrangements are more productive than either robots or humans working alone. In services, automation is improving interactions between service providers and customers, as well as between supply chain partners. Leaders will do well to ask for more

FIGURE 1

Digital capabilities matrix



Source: Authors

than just labor savings from investments in automation. They should also recognize that visibility is a foundation for efficiency. Improved visibility from automated data capture and processing, and from greater transparency and connectivity foster opportunities for automation of both physical and informational transactions, making them more efficient.

Intelligence adds knowledge to visibility in ways that provide insights needed to drive effective actions. Visibility lays the foundation for next-level insights enabled by applying intelligent algorithms to visible data. Algorithm-driven analytics and smart programs using machine learning can diagnose situations and events, predict possible outcomes, assess scenarios and risks and prescribe and execute courses of action. These technologies tend to be the most useful when applied to repeated processes that produce massive amounts of data such as sales, clickstreams, asset monitoring and other transactions. Levels of intelligence include visualization, advanced analytics, prediction and prescription. For example, visibility in a digital supply chain enables a firm to rapidly identify operational bottlenecks and risks. Intelligence enables it to understand root causes and to prescribe effective remedies.

Agility is the ability for supply chains to quickly and efficiently respond to problems and opportunities. One manager we spoke with described agility as “seamless end-to-end demand-supply matching and adjustments.” Agility combines a number of different types of flexibility in processes, resources and capacities. It is the ultimate outcome of combining the other Level 2 capabilities. Visibility immediately points up problems or opportunities. Intelligence prescribes effective responses. Efficient automation executes the response quickly and economically. Monikers frequently used to describe this capability include “on-demand,” “uberized,” “mass-customized” and “responsive.” Essentially, agility means breaking constraints and unfixing capacities in the supply chain, moving to variable cost structures, and building flexibilities that enable rapid scalability, supply-demand matching, seamless

transitions and changeovers, increased operating range, optimal re-routing and dynamic sourcing.

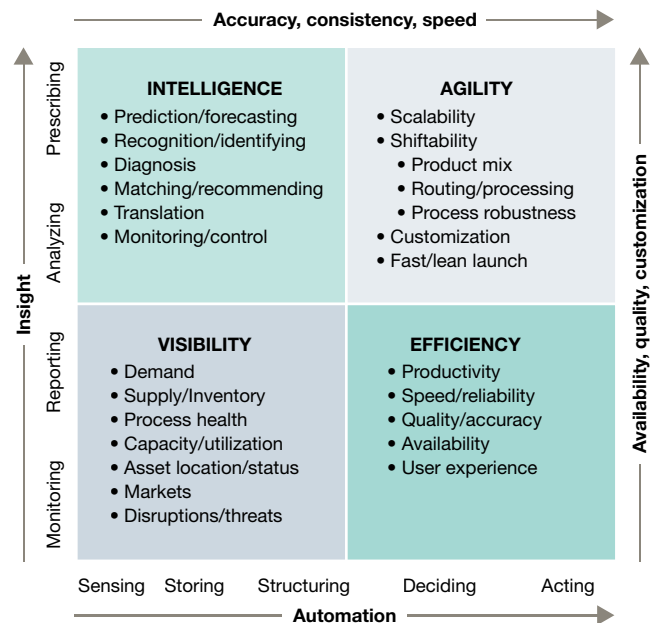
The starting point in developing a digital transformation roadmap involves *defining needed capabilities*, rather than quickly jumping to technological solutions. Ideally SCM managers should prioritize capability development efforts that provide maximal differentiation in the market-places that they serve. Figure 2 provides an inventory of “Level 3” capabilities, ordered within the higher-level capability quadrants established by the capabilities matrix. Leaders should target digitalization initiatives to prioritize and develop specific Level 3 capabilities that best support their business models. The following case studies illustrate how this capability-based approach can work.

Digital transformation: Two case studies

As part of our research, we engaged with two supply chain organizations in the throes of digital transformation. Both organizations were chasing somewhat incremental improvements to supply chain processes, based on priorities established by pain points and cost reduction opportunities. These two case studies illustrate how transformation efforts can be made more strategic when they are guided by a capabilities-oriented approach.

FIGURE 2

Level 3 supply chain capabilities



Source: Authors

Case 1: Technology maintenance organization (TMO) group

The first case involves the technology maintenance organization (TMO) for a major airline. The organization is tasked with maintaining a globally positioned, multi-billion-dollar stock of aircraft. The aircraft are maintained and repaired at numerous airports as well as at major hubs located around the world. Supply chain operations include the management of a complex system of parts, tools, procedures and labor needed to support both scheduled and unscheduled (emergency) maintenance and repair activities. The TMO leadership stated that their overarching goal was to minimize delays by always having the right parts, tools and resources at the right place at the right time. The organization has been pursuing digital transformation over a period of years with that stated goal in mind.

Each of the three major functional groups within the TMO was pursuing multiple technology development projects, with about 15 on-going projects in total. However, the groups' efforts were mostly independent, with little coordination or integration. As we reviewed each of the projects with the leadership team, it became clear that almost all of them were aimed at improving visibility to the TMO's various demands, processes and inventories.

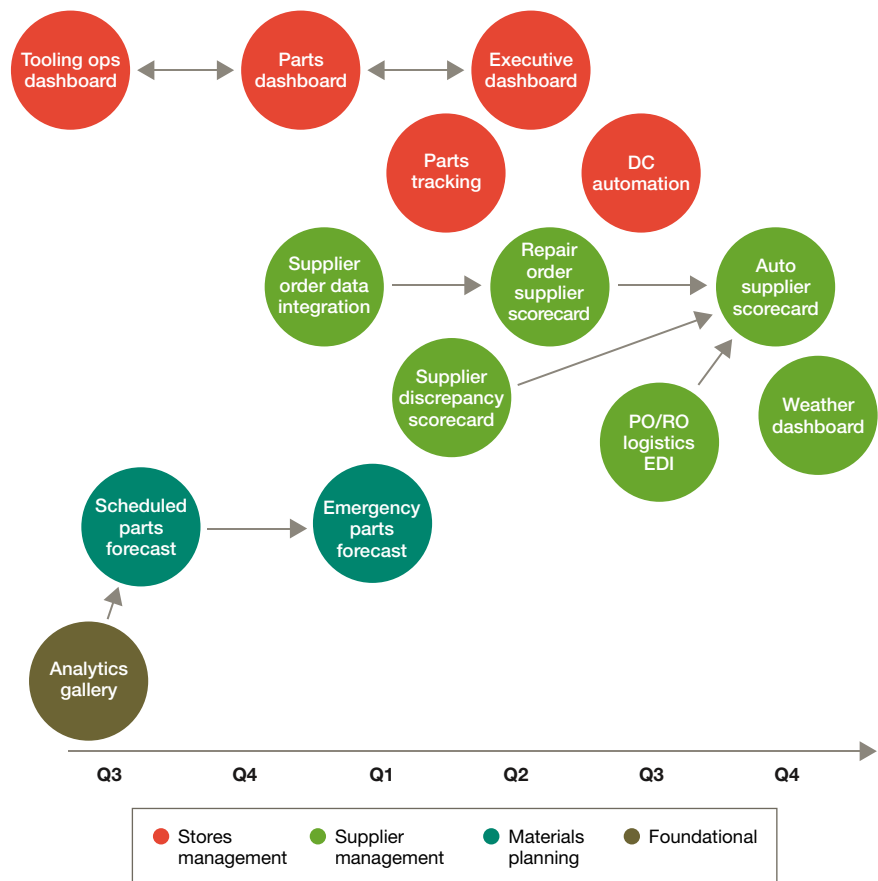
While the team envisioned improvements in resource availability and service lead-times resulting from these technology developments, they struggled to articulate how the improvements would fit into a larger strategy of better supporting the overall mission of the firm. It was clear that a unifying, overarching strategy was missing.

An important first step was to get functional leaders from each area to meet regularly to

identify and explain the goals and planned deliverables of each of the projects in their areas, to think about the capabilities that these projects would provide, if successful, and to consider how the projects could be integrated in ways to build toward a more intelligent, efficient and agile supply chain. Figure 3 shows the timing and precedence relationships among the projects. When presented with this information, the team noted that the projects were very functionally focused, with few integrative connections. The only cross-functional, foundational effort underway was the "analytics gallery" project, which was aimed at giving managers the ability to custom-build scorecards and dashboards to schedule and share their workflows.

We then mapped each of the projects on to our capabilities matrix as shown in Figure 4. Mostly using manual processes, the projects were essentially applying data

FIGURE 3
TMO digital transformation projects



Source: Authors

management and analytics tools to improve visibility and to develop some early levels of intelligence, mostly in areas of parts demand forecasting. The team had not previously recognized that their emergent focus was primarily limited to the development of various types of visibility. This recognition stimulated a discussion of what additional efforts and new projects were needed to advance the organizations' investments and technology initiatives "up and to the right" on the matrix, ultimately building more agile capabilities.

The other key insight that emerged from this mapping process was an identified need to develop more platform-oriented initiatives that could serve as foundations for other capabilities developments. While the "analytics gallery" project provided a self-service tool for

toward developing tighter links to the overarching vision (right part, right place, right time, efficiently), rather than allowing each functional area to independently pursue only its local pain points.

Case 2: Consumer electronics business (CEB)

Our second case study offers a contrast to the technology maintenance organization, both in terms of operating environment and transformation scope. The case involved the supply chain leadership team for a major consumer electronics business (CEB). While the company is well known for its cutting-edge electronics products, over the past ten years the business has outsourced much of its manufacturing needs. As a result, the supply chain team was finding it difficult to plan and control operations needed to meet highly volatile demands for its products.

As with the first case study, we conducted multiple in-person meetings with the team. The company had also been undergoing digital transformation for a few years but was not sure how it compared with other firms and which directions to take. The company's leadership shared that their primary goal for transformation efforts was to be able to answer the question: "If a customer asked for 10,000 additional units, how long would it take us to fill that demand?" We suggested to the leadership team that at the heart of this question is the capability of supply chain agility, and in particular, scalability.

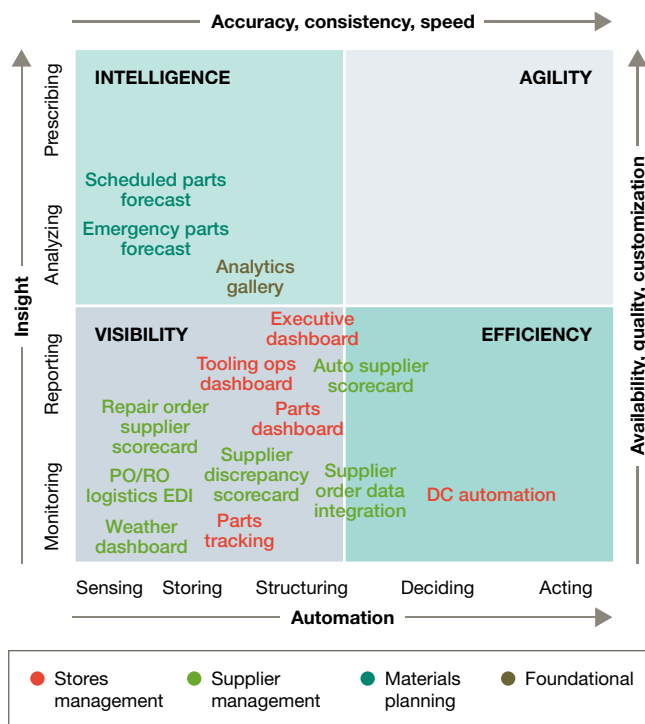
While this suggests that the group was pursuing a capabilities-oriented approach to digital transformation, their actual focus was more on evaluating and adopting specific technological "solutions," with murky linkages to the overall goal. Like the airline TMO, the CEB leadership team was not intentional in their pursuit of a capability. Rather, they were pursuing a number of technological solutions to give the

company increased visibility to improve certain planning processes, without understanding the capabilities each solution offered, and how the solutions linked together.

A first step was to look at the different technological solutions pursued by the company and to identify the capabilities each offered. As the illustration in Figure 5

FIGURE 4

TMO digital transformation projects



Source: Authors

managers to build reports, all the other projects were functionally oriented and quite focused in their scopes of objectives. The TMO team recognized the need to build more cross-functional applications that served to integrate data and planning processes on an enterprise-wide basis. Overall, team leaders dedicated themselves

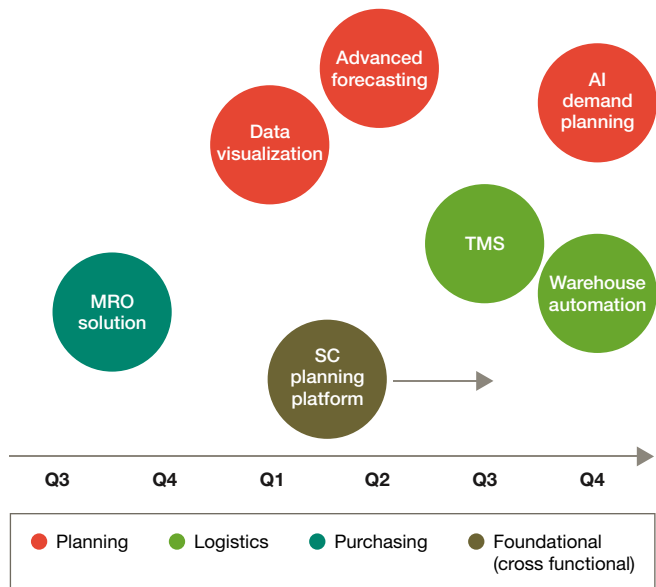
suggests, and similar to the TMO case, the team had selected the different solutions for different functions, essentially following a “projects perspective.” As companies pursue technologies to address different functional needs, it is common to fall into this behavioral pattern. In this case, solutions were acquired over time in the functional areas of Planning, Logistics and Purchasing, without consideration of how they might be combined to create unified capabilities.

When the company’s “solutions” are mapped on to our capabilities matrix as illustrated in Figure 6, the primary capabilities of each become clear. While many of the chosen solutions were best-in-class, each enabled specific capabilities limited to lower and leftward quadrants; none started to address capabilities within the agility quadrant. Ultimately, the solutions the team was pursuing were not sufficient to help the company achieve their primary goals of agility and scalability.

The ultimate lesson for the team was to plan

FIGURE 5

CBE digital transformation projects



Source: Authors

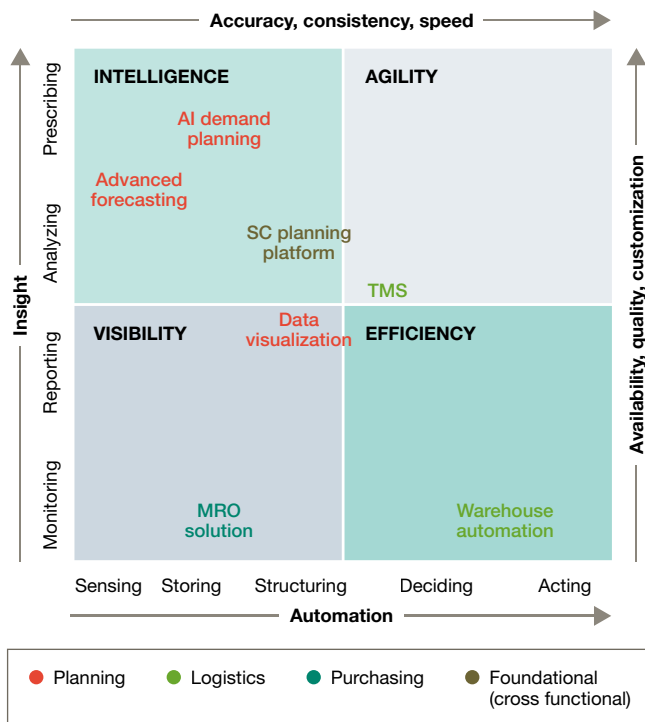
more specifically how its current visibility-oriented investments could be used to advance toward agility. Originally, they thought of visibility as the needed capability to answer the question: How long would it take to fill an unexpected, additional demand? They based this understanding on the assumption that additional demands would be satisfied using existing processes.

We encouraged them to think about how digitalization could help them build more robust and flexible processes, so that the answer to the driving question would be shaped by two capabilities: 1) visibility to gauge inventory and capacity levels in real-time, and 2) agility to change sources and capacities as needed to meet the new demand.

As was the case with the TMO group, the key insight that emerged from the mapping process was the need to develop a more strategic plan and time table. Like the TMO, the company decided to move toward more platform-oriented initiatives that would serve as a coordination for all the other functions. In this case, the company decided to push forward with a supply chain

FIGURE 6

CBE digital transformation projects



Source: Authors

planning platform that would enable the creation of a digital supply chain control tower. They were committed to having end-to-end supply chain visibility. To support this broad reaching effort, the company decided to functionally re-align their organization around process flows and to establish an innovation steering committee to design and communicate a transformation roadmap. Through communications and training, the team increased the breadth of skills, cross-functionality and understanding of all supply chain employees. Lastly, once they understood the idea of capabilities, they considered new initiatives that differentiate their capabilities in ways that provide a competitive advantage.

Moving forward with digitalization

We embarked on this research to gather insights into the unique factors that are giving some companies the lead in supply chain digitalization. The interviews and case studies revealed interesting insights into the process of successful transformation. Across all of the companies we contacted, managers expressed a keen interest in knowing how they were doing; even leaders at well-known, major companies were often unsure as to how their digital transformation progress compared to the competition. They were also uncertain as to the next steps they should follow. Most were acquiring popular technological solutions to address key pain points and sometimes guiding directives, yet they lacked effective ways to gauge progress toward higher order goals.

The capabilities perspective can help. Discussing how an organization's current and planned projects map on to the capabilities matrix can be an eye opening exercise. To guide the discussion, keep in mind the following set of key lessons that emerged from our research.

- First, successful transformation requires the

leadership team to develop a shared understanding of what a digital supply chain looks like. Everyone in the organization needs to understand how digital supply chains are different from traditional supply chains. Digitalization involves transforming processes to build insights, not just automating them for efficiency. A common vision and understanding allows everyone to move in the same direction as they proceed through the digitalization journey.

- Second, the leadership team should develop a maturity model, identifying the critical stages of digitalization for their organization. Organizations cannot jump from stage to stage; they need to build their digitalization competencies as they move through the stages in various functional and regional divisions of the overall supply chain.

- Third, leaders need to understand the difference between acquiring "solutions" and developing "capabilities." This is perhaps most important lesson of all, and one that was underscored in our case studies. Though both of the organizations we studied had clearly stated operational goals, neither had taken the step of thinking through how integrated, digitally-enabled capabilities could help them reach their goals.

- Fourth, it is important to consider foundational initiatives and complementary technologies in ways that lead to a time-phased roadmap for digital transformation. Most organizations are good at creating Gantt charts that show the schedule for projects, but many fall short in fully thinking through the ways that some technology development initiatives are supportive or even necessary prerequisites for the success of others. This is especially true when transformation efforts are spread across functional organizations that operate somewhat independently.

To implement the capabilities-based approach, transformation managers should also consider the

following change management best practices.

Form a guiding coalition with someone in charge. Many supply chain organizations struggle to implement sweeping, integrative digital transformations because authority and responsibility are spread across different functions. Not all firms have CSCOs. Even if supply chain management leadership is centralized, questions such as “is digitalization a SC issue or an IT issue” still arise. Before developing a capabilities oriented roadmap, leaders should come together to create a coalition, such as a steering committee, that includes representative stakeholders from IT, supply management, operations, logistics, engineering, marketing and sales. Funding for integrative projects will almost always budget inputs from all functional areas.

Focus on customers and competitors. When contemplating the capabilities that should be prioritized in the supply chain, it is tempting to think only about the biggest headaches the organization currently faces. For capabilities to truly have market value, however, they need to be developed in ways that clearly differentiate the firm in the minds of customers and from the capabilities of competitors. Select capabilities that create competitive advantage and support the business objectives, rather than ones that only solve current problems.

Plan for organization and talent changes, not just technology. Most veteran managers understand that people, processes and technology have to be developed together. This maxim is particularly important for digital transformation. Often, the limiting factor is not the technological solution

itself; it is instead the inability of the organizational structure to capitalize on new capabilities, or the lack of human resources with the necessary talents to effectively implement and utilize the technology. Digital transformation requires innovations in organizational structures and talent management to support technological innovations.

Frequently update the plan. Rapidly evolving technologies and changing operating environments threaten to make transformation roadmaps obsolete almost as soon as they are constructed. A capabilities-oriented plan is likely to be more stable than a solution-oriented plan. However, it will still be important to frequently (e.g., quarterly) revisit and update plans based on the progress of on-going projects, newly emerging technologies and changes in the marketplace.

Supply chain leaders have little choice but to embrace both the opportunities and risks of digital transformation. Success will depend on their ability to understand in a deep way the capabilities their processes need to provide, given the ways that the firm competes and differentiates itself in the marketplace. This requirement calls on supply chain executives to develop strategic views of their supply chain functions, and to think beyond solving problems and just reducing costs. Successful transformations will develop new value-creating processes. ☺☺

* * *

“Supply Chain Digital Transformation: Visualizing Possibilities,” published in the January/February 2019 issue of SCMR, details early findings from our study. The article is available on scmr.com.

UNMASKING BLOCKCHAIN IN SUPPLY CHAINS



BLOCKCHAIN

There is nothing simple or straightforward about blockchain these days. While it is an advanced technology for tracking and securing transactions across the supply chain, it is still in its early stages.

BY MAXIMILIAN ENTHOVEN, DOMINIK ROECK,
MATHIAS MATHAUER AND ERIK HOFMANN

Today, blockchain is frequently subject to collective eye-rolling. And with good reason. Who doesn't immediately associate blockchain with the cryptocurrency bitcoin, which has its own curious providence.

Bitcoin was created in 2009 by an unknown person or group of persons. And while a paper from Satoshi Nakamoto is attributed with being the first on bitcoin, no one knows who Nakamoto is.

Bitcoin went through some changes in "ownership" early on, which did little to make the cryptocurrency more transparent despite its consistent reliance on blockchain technology to track and secure transactions. Meanwhile, the value of one bitcoin has ranged from 30 cents to nearly \$20,000. As a result, there is wide disagreement from bank CEOs to investors as to the usefulness of bitcoin as a cryptocurrency. Some go so far as to call it a scam.

Most unfortunately, the word clarity is not always associated with bitcoin. And blockchain suffers to an extent from guilt by association. And that is part of blockchain's current image problem. Any marketing person would tell you that blockchain the brand needs a major repositioning.

Some of that process is happening now as a result of successful and practical initiatives in finance, trade and real estate demonstrate the value of blockchain with regards to transaction governance. In addition, supply chain management, especially purchasing and logistics, is beginning to prove the value of the technology to these complex activities.

That said, we wanted to know more precisely what is holding back blockchain in supply chain. So, we surveyed 115 Swiss shippers and logistics service providers of all sizes in late 2019. Forty-eight percent of respondents are at companies with more than 100 employees with nearly half of that at companies with more than 1,000 employees. More than 40% of the companies have revenues of \$51 million plus. The survey is part of an annual survey done by the Institute of Supply Chain Management at the University of St. Gallen on the logistics market in Switzerland.

We discovered that misconceptions about and a lack of education about and standards for blockchain are key inhibitors to its widespread use and advancement. In fact, the biggest misconception is that blockchain is an alternative database. Forty-four percent of respondents say basic education about blockchain is holding back the technology. Two-thirds of respondents worry that they can't convince all necessary partners of the value of blockchain, limiting the potential for success. Three-quarters of respondents acknowledge a strong reluctance by companies to be technology pioneers in the first place.

Clearly, blockchain needs some help. What follows is an attempt to clarify what blockchain is, what it can do and its potential effectiveness in the supply chain.

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Blockchain unmasked

Let's start at the beginning: What exactly is blockchain; especially in light of the fact that so many think it is simply an alternative database?

A blockchain is a decentralized, distributed protocol that defines the storage structure of transaction data in interconnected blocks. These transactions can be financial or informational. Each block is uniquely identified and contains the timestamp of the previous block, creating a chain.

Transactions are transmitted to each node in a decentralized network, and, after verification, recorded in a public ledger or register. Each participant in the blockchain network receives the most current transaction data along with the entire history of all previous transactions stored in the blockchain. Due to the decentralized distribution and constant synchronization of the data, manipulations of data by individual network participants can be immediately identified and eliminated.

Typically, blockchains have been deployed in supply chain management applications to provide a trust layer in complex supplier-buyer networks, placed right above the classical information layer of the Internet. This trust layer intends to facilitate transparency of information flows and builds the foundation for use cases such as proving a product's provenance or temperature compliance during shipment.

In supply chain, blockchain offers four key functions with unique benefits.

Reliability and availability. Because they are distributed, blockchain networks are very reliable. The failure of a particular node or group of nodes does not affect the transaction processing capabilities of the blockchain. In contrast to centralized systems, this allows the elimination of individual points of failure without impacting other nodes. The distribution of risk among nodes reflects the lower susceptibility of the blockchain to malicious attacks or power failures.

Transparency. An identical copy of a blockchain is maintained by each node in the network, enabling real-time verification and inspection of transaction data. Such visibility makes all network activities and operations visible.

Immutability. Data stored on a distributed public

blockchain is virtually immutable because it requires validation by other nodes and changes are traceable, creating a complete and unaltered transaction history. This allows processes and applications enabled by blockchains to operate with the highest level of security.

Process integrity. Distributed open source protocols are always executed in the way they are defined in the code. Users can be assured that the actions described in the protocol are performed correctly and on time without human intervention.

All of that said, blockchain is not a database. Instead, blockchain is a protocol that defines in which format, to what frequency and how much data is stored and transferred in a related database with extremely high levels of security.

So, what's not to like? As we discovered in the survey results, there are several other obstacles to the broad implementation and use of blockchain.

Starting in the right place

There are actually four key areas that any user of blockchain must address upfront for success later.

Education. We recommend companies understand the technology and its value-add benefits before beginning a blockchain project of any size.

Our survey shows that 44% of corporations agreed that misconceived purposes and deficient education on blockchain technology poses a further significant implementation barrier. As has already been said, blockchain is not a database. It is, however, a protocol for storing and tracking data in ledgers. In other words, blockchains use databases; however, using them for solving data management problems makes no sense. Storing data in a blockchain's database is often slower and more expensive than doing it in a standard proprietary database, considering the costly background processes validating transactions.

A blockchain, in contrast to a storage database, records and logs movements with a specific, pre-defined set of rules in a decentralized and distributed network infrastructure. Blockchains should be used for their highly favorable idiosyncrasies—distributed governance, immutability, selective transparency, traceability and the low-friction distribution of data.

Let's imagine we want to track the upstream production and downstream distribution in the supply chain of frozen peas for a grocery store. At every step of the way, relevant data about the product's status should be rigorously documented to guarantee full transparency across the supply chain. Each change of ownership or custody and each transfer during production and distribution from the farmer to the grocery store should be logged in a ledger, instead of overwriting the current status in a central database. The blockchain protocol provides a historical overview of all status changes on this ledger, whose integrity is guaranteed by intrinsic safeguarding mechanisms.

We recommend that each company create its own decision tree for the go/no go decision to explore and invest in a blockchain project in an enterprise context. It's important to note that while many supply chain blockchain projects are very focused on their use test, final success depends on much broader support from enterprise level resources from management support to technology.

Technology. The greatest technological challenge to operationalizing blockchain is management of interfaces between the physical and digital worlds within the three flows of supply chain: goods, data and capital. Despite blockchain's inherent benefits, every implementation can create challenges on the level of contracts, incentivization and data governance. Doing this requires structured and unsiloed intra-firm IT system interfaces that are transparent and interoperable.

A supply chain application requires each partner to digitize the necessary processes and information flows. Digitization asymmetry causes information gaps fatal to cross-company solutions such as blockchain. Decision makers must reinforce communication with their respective IT departments and supply chain partners to get a comprehensive understanding of their current systems' capacities.

Stakeholders. The implementation of blockchain can only work if more than one party invests resources and time to work on a joint solution. In fact, 67% of the survey respondents identified the inability to convince others to participate as a major stumbling block to even getting started with blockchain.

Key benefits to emphasize to those reluctant to participate include: verification of transactions, pseudonymity, immutability of data, single source of truth ensuring no interface problems and risk mitigation through improved data tracing and transparency. There are also several monetary benefits including process automation, improved operational efficiency, insurance and IT savings and reduced cybersecurity issues.

Value creation. Every company holds one of three views on value creation. Those with the technologist/purist view (pioneers) explore technology for its own sake. Those with a marketing view get involved with a technology to show they are innovative. And those with a collaborative view want to strengthen inter-organizational relations through the use of technology.

Your company's view will ultimately determine its readiness to adopt blockchain and make it an integral part of its operations. As a result, each company needs to find out which category it belongs to, and approach projects such as blockchain from that perspective.

Most of the companies surveyed acknowledge the high relevance of the technologist/purist pioneer role (75%) and agree with the necessity of a comprehensive implementation (nearly 70%). At the same time, however, they themselves are hesitant about using new technologies with nearly 30% of them rejecting the approach. This partly contradictory behavior can be attributed, among other reasons, to the general openness toward innovative technologies. In many cases, conventional views still predominate among Swiss companies, although company representatives are aware of the effects of their passive conduct.

Decisions on blockchain projects whose potential extends across several supply chain partners should therefore be made cooperatively at an early stage. On the one hand, this approach mitigates the financial setbacks for pioneers. On the other hand, 74% of respondents don't understand the need for a comprehensive implementation that involves many partners and a full technology set across all partners. As a result, it is essential to align both the different value equations and communicate the impact of pioneer/laggard roles to streamline expectation management.

The link to the physical world

While cryptocurrencies and voting systems exist in a purely virtual environment, supply chain applications always include a material connection to a physical product, vehicle or location. That is why decision makers must think about adequate measurement techniques and linkage identification for end-to-end tracing. Without the diffusion of cyber-physical measurement systems across a network, which continuously maps the physical to the digital world, a blockchain cannot operate at its full potential.

For example, cargo shipping—a bureaucratic process—requires a continuous projection of material flow to information flow. Have the shipping documents been approved? Did the cargo leave the warehouse? Did Customs let the shipment go through the checkpoint?

The documentation of these hundreds of steps generates massive amounts of paperwork in logistics, adding costs and complexity. It is estimated that costs associated with trade documentation processing and administration are around 20% of the actual physical transportation costs.

The fractured nature of the blockchain market accompanied with a horde of available solutions, however, makes the standardization of protocol and identification connecting physical and digital worlds intractable. Eight-four percent of survey respondents say the lack of technology and procedural standards are stunting blockchain's use. Key areas here are data collection, data transmission and data storage formats. Yet, all are so basic to the success of blockchain in any application. Clearly, collaborative initiatives such as inter-organizational consortia must build on existing standards and agree on standards to minimize operability issues.

Incentivize all supply chain actors

The lack of understanding about blockchain's underlying incentivization model is also holding back adoption. Our survey shows that 67% of companies worry

they cannot convince all necessary partners of the financial value of blockchain-based applications. One of the most overlooked groups here are the miners.

Mining is the process by which blocks or transactions are verified and added to a blockchain. To verify a block, a miner, who is a person, must confirm that the block is verified or mined. Miners receive a transaction fee for their effort to ensure the dynamic flow and integrity of transactions.

Their value is in keeping the blockchain intact and running. They decide which transactions to process, giving them the power to modify entries according to the rules. The more distributed that miners are across the supply chain, the more they serve the distributed nature of blockchains.

When speaking to supply chain executives, many are not aware of the role miners play. They do not do this free of charge. So, every blockchain requires a reward model to incentivize miners who create blocks and validate transactions to the network.

In the classic bitcoin blockchain, for example, a miner owns and maintains a node of the network and generally has two streams of income. Apart from the fee that must be paid on top of each transaction, a miner receives a fixed reward for having created a block successfully. In both public and private blockchains, therefore, an underlying incentivization model that fuels a blockchain with its lifeblood must always exist.

Understandably, supply chain actors are often not ready to pay fees for just uploading data. This may be remedied by benefiting from rewards through mining from the participants themselves. For example, the supply chain platform TradeLens, initiated by Danish logistics company Maersk, offers the option for each participant to mine and operate a node. However, it is unrealistic that all suppliers and buyers in a supply chain will. For example, pea farmers will most likely not procure mining hardware in order to maintain a distributed blockchain network; they could just as well upload data for free to a standard central database.

Instead, potent supply chain actors usually take over this role. In other cases, mining service companies perform the service, adding transaction-validating participants to the network, who are not even part of the supply chain.

The importance of trust

Trust plays a decisive role in the context of the acceptance of blockchain technology. There is a lot at stake here because blockchain essentially leads to the disintermediation of industries where personal trust was previously the bedrock of business relationships.

Blockchain creates a move from trust in persons and institutions to a new technology. This is a paradigm shift that is a significant hurdle for some companies to overcome. With blockchain, trust is entirely in the technology and its ability to manage accessibility while ensuring immutability of data.

Corporate decision makers often fear they will lose control of their data if a decentralized and distributed trust layer is launched in a supply chain. On the one hand, this concern is justified, as every node in the distributed network has a personal copy of the blockchain on their hard drive. There is no master blockchain and lesser copies of that. On the other hand, the control of transactional data by one player would defeat the purpose of the blockchain, which is inherently egalitarian.

In any blockchain, especially, it must be decided which rules are hard-coded directly into blockchain protocols (on-chain) and which rules are followed on alternative digital or physical transaction systems (off-chain). Thereby, permissions to view and add information to the blockchain highly depends on the level of trust between actors in the network. Considering that partners and competitors in a supply chain may co-exist in a blockchain network, questions such as the following must be jointly formalized in the off-chain and on-chain governance models.

- Who should exchange data with whom?
- Which data can I trust?
- Who should be intermediary and how

do I avoid lock-in?

During our research interviews, we often heard “blockchains provide trust in the data.” This is only true to a certain extent. Blockchains are not truth machines per se; they are only as truthful as the data one puts into them. In case erroneous shipment information is uploaded, for example, no safeguarding mechanism of a blockchain will audit the content. What blockchains inherently do, however, is ensure the integrity of the individuals uploading the data and make it virtually impossible for a single party to compromise it.

Blockchain solution providers may argue with disintermediation and the establishment of a purely egalitarian peer-to-peer network. Strictly speaking, the role of the intermediary to validate your transaction still remains but is shifted from a trusted third party to the network. However, the network does not look at the actual content of the transaction, but rather at the way the transaction request was submitted. Depending on the players’ intentions and power distribution in a network, the concept of disintermediation must therefore be taken with a grain of salt.

Decide if blockchain makes sense for you

Supply chain managers should not think about blockchains as a panacea to all data management problems in their supply chains. Instead, blockchain is a decentralized application that stacks on top of an existing information exchange layer. Before glibly leaping at potential use cases, jointly determine whether a blockchain application really covers your needs or implies potentials.

If you decide to explore the technology further, make sure to pivot with all required supply chain actors as soon as possible and discuss their needs and barriers. Get them involved early on, decide on standards, and create a win-win for all actors, depending on their individual value equation, before external pressure forces you to inflate another bubble that is destined to burst quickly. ☹☹

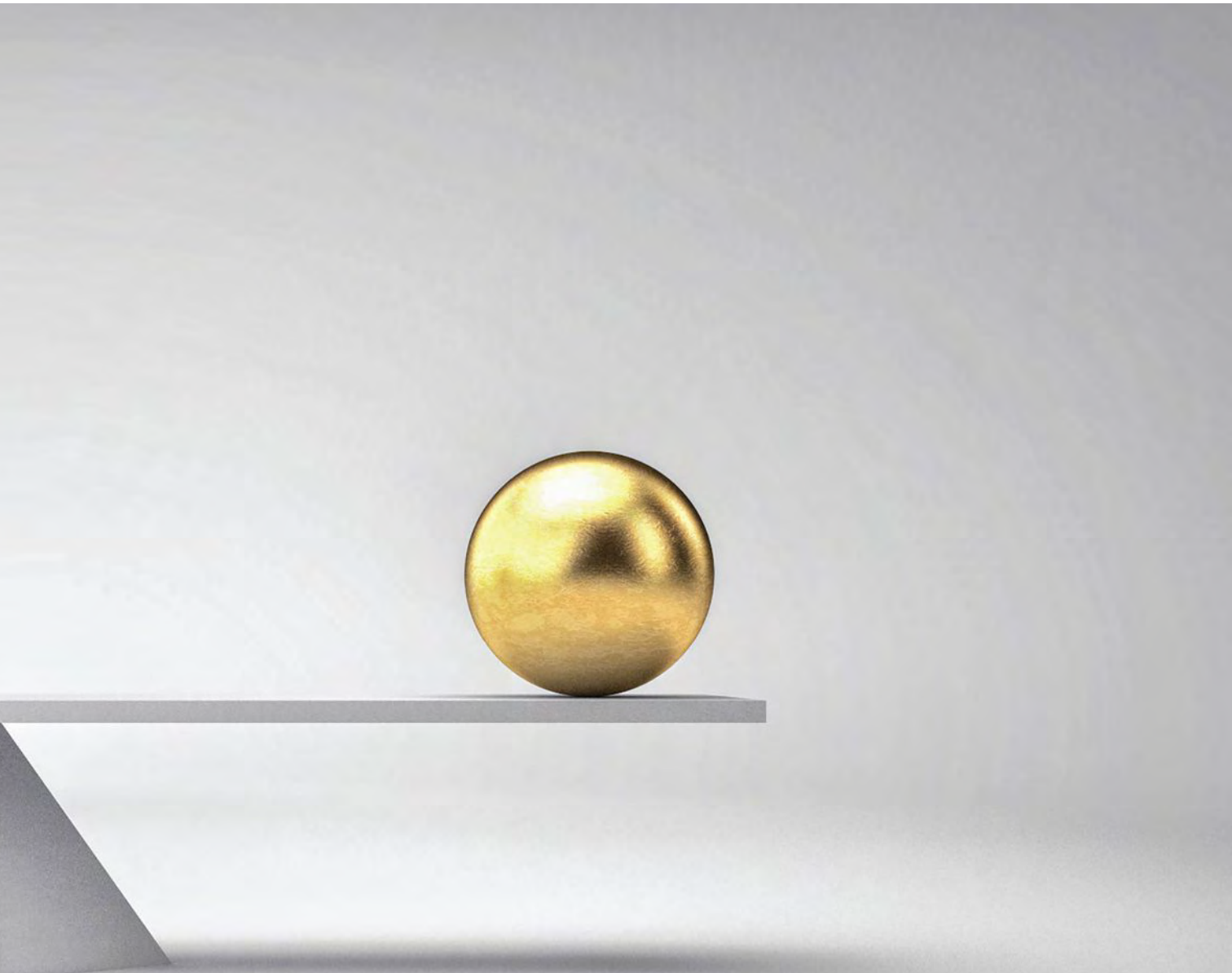
A better way to OUTSOURCE

Most outsourcing relationships are highly transactional rather than highly collaborative and win-win. The Vested business methodology, used by more than 50 organizations, builds a bridge from the former to the latter. Here's how the business model evolved and how it is helping organizations today.

BY KATE VITASEK



How many times have you and others in your supply chain operation asked this simple question: Is there a better way to outsource? Probably more times than you care to say. After all, finding the right balance where everyone wins in any outsourcing arrangement requires more than just a transaction-based contract. But what exactly does “more than” mean here?



Kate Vitasek is a lead researcher and faculty member at the Haslam College of Business Graduate and Executive Education program at the University of Tennessee. Her research focuses on the Vested outsourcing business model for highly collaborative relationships and she has written six books on the subject. She can be reached at kvitasek@utk.edu.

That question was sufficiently compelling in 2003 that the U.S. Air Force funded a University of Tennessee (UT) research project to find out if there really was a better way to outsource. The answer was an overwhelming “yes.” And it led in 2010 to publication of the book “Vested Outsourcing: Five Rules That Will Transform Outsourcing.”

Since then, Vested outsourcing has evolved from an organized and recognized methodology to a movement of loyal followers working to change how organizations outsource. Today more than 350 companies have sent nearly 1,600 people to study Vested, as the movement is known popularly, in one or more UT courses offered in its Certified Deal Architect program. To date, 57 companies have employed the Vested methodology in an effort to improve their outsourcing relationships.

This is the story of how a simple research question had a lasting impact on making outsourcing relationships as successful as everyone hopes them to be.

Research phase: 2003-2009

To get started, UT talked to some of the companies with the world’s most successful supplier relationships. The idea was to learn why some outsourcing deals were highly successful while others either failed to live up to their promise or simply failed outright.

The research included outsourcing leaders ranging from Procter & Gamble to Microsoft and McDonald’s as well as the U.S. Department of Energy. And as you might imagine, researchers saw common threads in the most successful relationships.

For starters, all of the successful outsourcing relationships had an identifiable type of business relationship with their suppliers and service providers that was different from what others were doing. Most outsourcing relationships are highly transactional. However, the more successful ones transcend transactions with a highly collaborative, “win-win” relationship.

In these cases, companies work jointly toward shared goals to drive innovation, create value and reward success. That bears repeating: They work jointly toward shared goals to drive innovation, create value and reward success. Those elements are the foundation of the essential trust between outsourcing parties, and that trust is predicated on deep levels of transparency.

Researchers described what they found as a Vested mindset in these successful relationships. This mindset is based on a true win-win nature of the relationship alongside mutually defined and desired outcomes. Simply put, a win for the buyer is a win for the service provider—the parties are “vested” in each other’s success. The research team coined this new business model Vested Outsourcing or Vested, for short.

While these relationships seemed radical—or at least very different from many typical business relationships—the researchers also found that these companies were leveraging Nobel Prize-winning concepts. Included here were John Nash’s equilibrium theory and Oliver Williamson’s transaction cost economics principles (see sidebar).

In other words, the companies most successful at outsourcing were writing their own textbook on how to make it all work. Identifying the core characteristics of Vested outsourcing was only the first step for UT’s research team.

Codification of the methodology: 2009-2011

The team then set out to codify a broadly repeatable methodology that many organizations could follow to improve their outsourcing relationships. That resulted in five rules featured in the textbook mentioned earlier. As Figure 1 shows, the five rules are:

- focus on outcomes not transactions;
- focus on the “what” not the “how;”
- agree on clearly defined and measurable outcomes;
- develop pricing model incentives that optimize the business; and
- build a governance structure that provides insight not oversight.

Figure 1 illustrates how the rules work together to create win-win business relationships with a “what’s in it for we” (WIIFWe) approach.

Rule 1: Focus on outcomes not transactions.

This requires a shift in mindset. Instead of focusing on buying transactions, companies focus on outcomes. They can include targets for availability, reliability, revenue generation, employee or customer satisfaction and the like.

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Rule 2: Focus on the “what” not the “how.” If a partnership is outcome-based, it should not have multiple service level agreements (SLAs) that the buyer micromanages. The outsource provider/supplier won

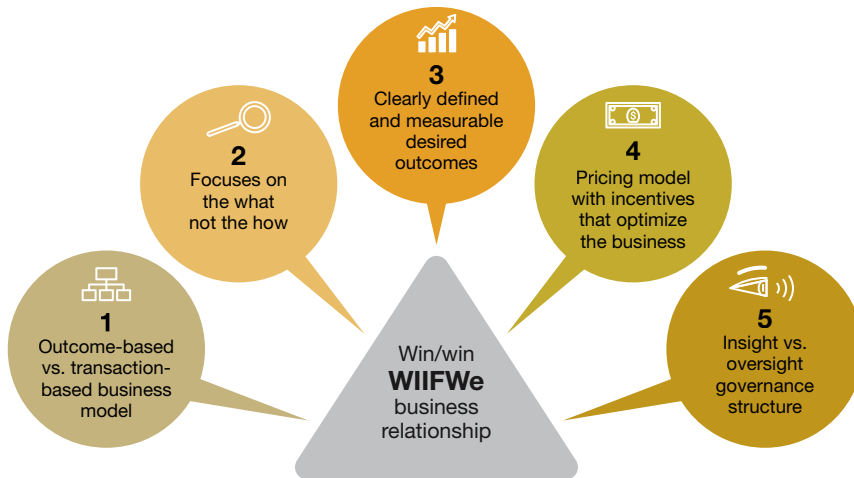
be structured to ensure the service provider assumes risk only for decisions within its control.

For example, a transportation service provider should not be penalized (or rewarded) for the changing costs of fuel. Similarly, a distribution provider should never be penalized for product mix shifts leading to a decrease in throughput.

Finally, the pricing model should link incentives to the desired outcomes, highly motivating a service provider to invest in innovation and transformation initiatives. The more effective the service provider is at achieving desired outcomes, the more incentives (or profits) it will make.

FIGURE 1

Win-win business relationships



Source: Author

the contract because it has the expertise that the buyer lacks. Therefore, the buyer must trust the supplier to solve problems.

Rule 3: Agree on clearly defined and measurable outcomes. Make sure that all of the parties are on the same page about their desired outcomes. Ideally, use no more than five high-level metrics. Both parties need to collaboratively establish explicit definitions for how relationship success is measured.

Rule 4: Develop pricing model incentives that optimize the business. The Vested business model does not guarantee higher profits for service providers. Rather it creates a win-win economic model that highly motivates the supplier to invest in innovation and transformation that will benefit its customer.

A well-structured Vested pricing model is almost always highly transparent with a focus on reducing total cost of ownership and measuring ROI for investments. In addition, the pricing model should

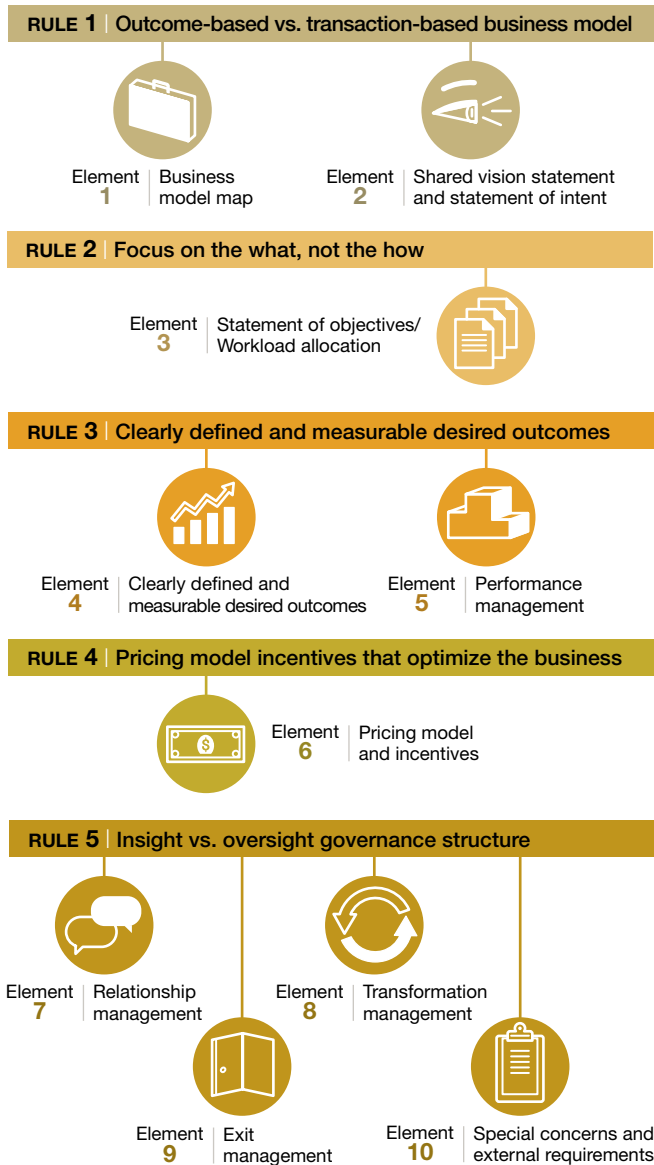
Rule 5: Build a governance structure that provides insight not oversight. A flexible and credible governance framework will enable all the rules to work in sync. The structure governing an outsource agreement or business relationship should instill transparency and trust about how operations develop and improve.

Of course, there were still many skeptics who said: “Nice theory, but you can’t put a theory into a contract.” This sparked the UT researchers to work with the International Association for Commercial and Contract Management and several legal contract professionals. They needed to determine how the Vested rules could be incorporated into a contract. The result was a second book, “The Vested Outsourcing Manual.”

The five rules work in conjunction with 10 contractual Elements. Figure 2 provides a conceptual overview of the Vested methodology. It shows the links and interactions between the five rules and the 10 elements that are essential to creating a Vested agreement.

FIGURE 2

10 elements of a Vested agreement



Source: Author

The five rules, working in conjunction with the 10 elements, address and resolve the structural flaws that can emerge in transaction-based agreements. For example:

- A buyer wants innovation, yet the contract with the supplier has an 800-page statement of work with exacting details on how the supplier should perform each of the activities in scope.
- The buyer wants outcomes, yet the contract spells out hundreds of service level agreement metrics.

- The buyer outsourced to the expert and wants more insight, yet the buyer has an army of people on staff to provide oversight to manage the supplier.
- The buyer wants the supplier to implement efficiencies, yet its transactional pricing scheme inherently incentivizes the supplier to perform more transactions.
- The buyer wants a partner, yet the contract has a 60-day termination for convenience clause.

Proof of concept phase: 2011-2014

Eight years into the project, Vested was ready to be put to work. Dell was one of the first companies to pilot it. Intel was another one. These and other case studies are featured at Vestedway.com.

Dell and its strategic partner, the reverse logistics provider Genco (now a part of FedEx), had a long-standing relationship. It was expanded in 2009 when Genco agreed to acquire Dell's buildings, assets and people under a three-year outsourcing contract.

The problem was that while it was a strategic relationship, the transactional structure of the agreement was far from strategic. Instead, it was a typical transaction-based contract in which Genco assumed the risk of meeting a set "price per activity" while maintaining service levels.

The agreement worked reasonably well for a time, but Dell's leaders continued to face cost pressures. They insisted on an "every dollar, every year" procurement principle—even though under the contract Genco assumed much of the risk under the contract terms.

The seeds were sown for a difficult ending unless the companies could transform their relationship through trust, collaboration and the Vested mindset of "what's in it for we" (WIIFWe). Despite internal skeptics at the computer maker, Dell and Genco structured a new strategic commercial agreement that followed the five Rules.

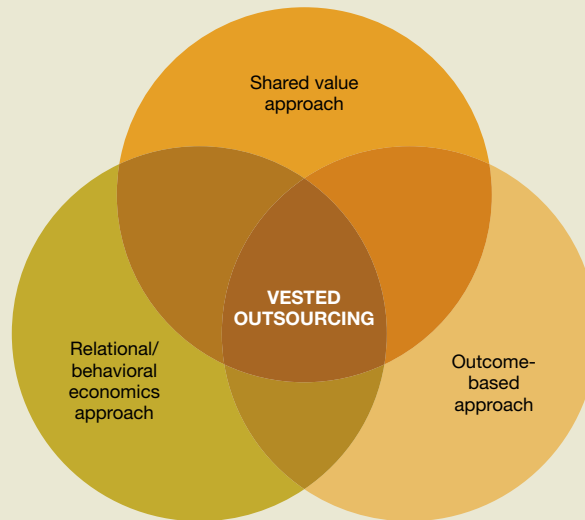
Rule 1: Focus on outcomes not transactions. Instead of buying transactions, Dell and Genco created a joint shared vision and six desired outcomes to set the tone for what they would focus on for the relationship. This helped

Vested builds on Nobel Prize winning concepts

In addition to its five transformative rules, the Vested sourcing business model leverages an outcome-based business model with the Nobel Prize winning concepts of behavioral economics and the principles of shared value.

FIGURE 1

Three modern business philosophies



Source: Author

- Behavioral economics is the study of the quantified impact of individual behavior or of the decision-makers within an organization. Behavioral economics is evolving more broadly into the concept of relational economics, which proposes that economic value can be expanded through positive relationship (I win-you win) thinking rather than adversarial relationships (I-win-you-lose).

- Shared value principles are concepts to generate economic value in a way that builds value for all parties. Entities work together to bring value that benefit all parties—with a conscious effort that the parties gain or share in the rewards. UT

researchers call this a “what’s in it for we” (WIIFWe) mindset.

- Outcome-based approaches, which have roots in the aerospace and defence industries, center around paying a supplier or service provider for achieving a defined set of business outcomes or results rather than paying for a transaction or activity.

These approaches combine to form the Vested sourcing model, which stresses the importance of building highly collaborative, mutually successful relationships with suppliers while emphasizing creating and sharing value for everyone involved.

the parties avoid the activity trap in which suppliers are paid for performing a task or activity—regardless of whether it was needed. Applying this rule enabled the parties to not only call it a strategic partnership, but craft a deal around true business outcomes.

Rule 2: Focus on the “what” not the “how.” A conventional buyer-supplier relationship has a detailed statement of work (SOW) that dictates how the supplier should perform the work. Dell and Genco replaced their detailed SOW with a taxonomy and workload allocation that clearly showed how the parties would work together to achieve their shared vision and desired outcomes.

Rule 3: Agree on clearly defined and measurable outcomes. Traditional outsourcing agreements have detailed SLAs. In a Vested agreement, all metrics are clearly aligned to the desired outcomes. For Dell/Genco this meant reducing the number of metrics from more than 100 to 20 clearly-defined metric aligned to six desired outcomes.

Rule 4: Develop pricing model incentives that optimize the business. The Vested business model does not guarantee higher profits for suppliers. Rather, suppliers take a calculated risk to link their profitability to performance to mutually agreed desired outcomes.

Dell’s agreement incentivized Genco to make strategic investments in processes that would help them achieve the desired outcomes. A pricing model with incentives enabled the parties to “grow the pie and share the pie” when value was created. The more effective Genco was at achieving the desired outcomes, the more incentives (profits) they earned. A true win-win economic model.

Rule 5: Build a governance structure that provides insight not oversight. Dell and Genco established a flexible and credible governance framework that enabled all the rules to work in sync. The focus shifted from managing the supplier to managing the business—with the supplier. Together, the parties built a governance structure based on transparency about how operations are developing and improving.

The results were transformational. In the first two years, Dell and Genco were able to reduce costs by 42%, scrap costs by 67% and drive defective parts per million down to record low levels. Both companies now consider the Vested contracting approach a best practice and have applied it in other relationships. Genco (now FedEx) also benefited with a tripling of its margins.

John Coleman, FedEx’s general manager of operations for Dell’s reverse logistics business, explained the power of a collaborative win-win approach: “It’s like we broke open a new innovation piñata. FedEx employees now know that we will share in the reward for good ideas,” says Coleman.

Building a movement: 2014-2018

Today, Dell is one of more than 50 organizations that have applied the Vested methodology to spend categories as diverse as facilities management, reverse logistics, third party logistics, environmental services, fiber optic network management and labor services.

Meanwhile, the UT research library dedicated to Vested now includes six books, 18 white papers and 18 case studies that document the success stories of organizations such as Intel (third-party logistics), Dell (reverse logistics) Vancouver Coastal Health (environmental services), Discovery Health (insurance claims management), Telia (facilities management) and Island Health (labor services/union contract with doctors).

Change takes time. History tells us new concepts often take a while to cross into the mainstream. Take for example the cell phone, which evolved from large, cumbersome and expensive gadgets to ones that have virtually replaced landlines and become handheld multimedia computers. Or electric, self-driving cars. Once the momentum starts, it’s impossible to go backward.

The bottom line: Change is inevitable—even change in how companies outsource. The tried and true buy-sell, I-win-you-lose, non-transparent, power-based methods that became ingrained in the last century no longer work for today’s complex and global sourcing challenges.

Or as Vested makes clear to all who give it a try: It is easier to maximize your success when you have a win-win deal. ☺☺

END-TO-END SUPPLY CHAIN SYNCHRONIZATION: *A strategy for uncertain times*

Synchronization can manage shocks, recover stability and set the stage for future gains.

BY DANIEL A. PELLATHY, MICHAEL BURNETTE AND THEODORE (TED) STANK



To say that these are uncertain times is an understatement. It can be argued that there haven't been such across the board supply chain disruptions since the end of World War II. For starters, businesses face changes in demand. Unemployment remains elevated while business sentiment on future hires continues to be pessimistic; although recent weeks have seen an abatement in the unemployment rate, future layoffs in industries such as commercial aviation and the oil industry seem inevitable.

These labor market disruptions have taken a significant toll on consumer spending, which declined sharply in the first half of the year and is expected to remain weak for the foreseeable future. Consumers have also changed their spending habits, disrupting traditional revenue streams in a number of industries. And though opportunities exist, many companies aren't well positioned to take advantage of shifting customer requirements.

Demand disruptions have been exacerbated by supply disruptions. Companies entered 2020 with their supply chains already battered by the ongoing U.S.-China trade war. The pandemic worsened these problems by shutting down key partners, scrambling production and delivery schedules.

Global production, particularly in China, dropped sharply earlier this year and will take time to recover. Meanwhile, distribution networks continue to struggle with shifts in demand, further exposing weaknesses in the supply chain. As companies work to adjust, they are re-learning the lesson that dependable supply chain relationships take time and resources to develop.

Finally, businesses may be facing a slow-burning credit shock. Despite unprecedented moves by the federal reserve, debt laden corporations continue to face pressure. Downgrades of corporate bonds to sub-investment status are on track to reach all-time highs. Moreover, the use of leveraged loans and other practices reminiscent of the 2008 financial crisis have reduced transparency and increased the

broader economy's exposure to potentially risky debt. The longer supply and demand problems squeeze profits, the more likely defaults will occur.

And all of these challenges sit on top of a highly charged social and political environment rocked by racial unrest, a resurgence of the COVID-19 virus and an election. It is no wonder that the Atlanta Fed's Survey of Business Uncertainty has been at historically high levels for most of the year.

The three Ps

Despite headwinds, businesses still expect supply chain managers to find a way through this minefield while continuing to deliver value to customers at a profit. New research by the University of Tennessee, Knoxville's Global Supply Chain Institute highlights end-to-end supply chain synchronization as a leading-edge strategy that companies can use to manage shocks, recover stability and set the stage for future gains (See About our research).

Supply chain synchronization focuses on building supply chain capabilities and linking them to a core business driver to create a platform for long-term organizational success. It requires a deep understanding of the core business driver and the creation of a supply chain where physical assets, business processes and people systems (the Three Ps of Supply Chain Synchronization) are intimately linked to its strategic imperatives. Table 1 provides guidance on how companies can manage the Three Ps to develop a synchronized supply chain.

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TABLE 1

The three Ps of supply chain synchronization

	END-TO-END	BUILDING RELIABILITY AND PREDICTABILITY	CULTIVATE A SUPPLY CHAIN CULTURE
PHYSICAL SUPPLY CHAIN 	<p>Are we making the right physical investments to meet the requirements of core business drivers? When do physical investments need to be made? Are upstream and downstream partners making the right physical investments? Are there physical investments already in the supply chain that can be better utilized?</p>	<p>How flexible are physical assets? Can they support multiple business/customer requirements? Are physical investments being maximally utilized? What is our gross profit margin? ROA on fixed assets? EVA? Are there ways to reduce the physical footprint through digitization? Outsourcing?</p>	<p>Are we building technical mastery and strengths into the team, while also building new skills and an appreciation of technological change? Are we ensuring that all employees have visibility into current and future challenges and giving them a chance to grow new hard and soft skills that are key to remaining competitive in a dynamic work environment?</p>
BUSINESS PROCESSES 	<p>What is the appropriate timing for the output of business processes? Are we taking an end-to-end approach in our management of key business processes, including customer relationship management, sales forecasting and demand management, production and operations management, purchasing and supply management, order fulfillment, resource management, new product development, end of product life and commercialization, reverse supply chain management, and data management? Do supply chain stakeholders adopt a process perspective that focuses on optimizing the overall flow of supply chain activities, rather than simply executing activities at the stakeholder's individual node? Do stakeholders work to resolve conflicts in decision making to ensure that the sequencing and timing of activities are matched with maximum efficiency?</p>	<p>How flexible are our business processes? Can they adapt to meet changing business/customer requirements? Are business processes maximally efficient and effective? What is our NOPAT? EVA? Cash-to-Cash? Are there ways to reduce business process complexity? Are there ways to reduce working capital requirements? Are there ways to digitize and/or automate business processes? Outsourcing? Are we eliminating waste, critically evaluating redundancies, avoiding rework and returns, delivering innovation, and carefully managing variation in our business processes?</p>	<p>Are we investing in cultivating the adaptability, emotional intelligence (EQ), and political skills needed by successful end-to-end business processes? Are we emphasizing change management as a critical element of overall supply chain skill set? Are we providing the time and experiential learning needed to build a deep reservoir of talent in our supply chain leaders?</p>
PEOPLE SYSTEMS 	<p>When will key positions come open? What is our development plan for incoming supply chain talent? What is our supply chain succession plan? Do we know the supply chain talent gaps of our key partners?</p>	<p>How do we manage replacement for retirements versus new additions for tomorrow's jobs? How do we manage employee flex time? How many resources are we devoting to hiring, training, and developing supply chain talent? Can those resources be better utilized?</p>	<p>How are we building norms and values that support a holistic, end-to-end systems approach to supply chain management?</p>

Source: Authors

As an example, a global paper manufacturer recently undertook a comprehensive analysis of its manufacturing operations. The analysis revealed that, while some categories rested on operations designed to maximize capacity utilization, other categories rested on operations designed to meet demand at scale. Overall, however, supply chain activities were not clearly or directly tied to meeting specific consumer requirements, which was identified as the company's core business driver. Through a process of supply chain synchronization, the company was able to realign its supply chain across all categories to drive the business to operate from a more consumer-centric point of view. Flexible equipment, changeover time reduction and agile teams are now the foundation of the company's operations. These changes have allowed the company to maintain its performance in the current environment.

This type of total supply chain transformation remains rare. Despite improving performance within different areas that comprise the end-to-end supply chain, many supply chain leaders acknowledge that their efforts are often out of sync with the goals and directions of the overall business. In most organizations, strategy discussions usually make only a superficial impact on supply chain operations. Supply chain leaders, to the extent that they are involved in these discussions, are often relegated to supporting roles. And what comes out of strategy discussions often lacks clear guidelines for how the supply chain needs to be managed. As a result, supply chain managers fall back on implementing "popular" supply chain strategies or "optimizing" supply chain processes without understanding the core business driver toward which the supply chain must ultimately be aligned.

As Steve Bowen, CEO of the global supply chain consulting firm Maine Pointe and participant in the research, put it: “The core business driver sets the parameters for business decision-making and has an impact on how resources are allocated throughout the supply chain and operations. Executives and supply chain leaders need to have a clear understanding of the driver and continuously align operations to meet its requirements. Ultimately, they need to build supply chains that deliver total value optimization—support company goals on cost, cash flows and growth.”

Best practices

A handful of leading organizations are working to synchronize supply chain operations with their core business driver in order to unlock the full potential of the supply chain as a source of competitive advantage. In order to better understand what these companies are doing, researchers acting as part of the UT research team conducted in-depth field interviews with 13 benchmark companies spanning food, equipment, furniture, chemical, packaging, health care and CPG industries. The interviews yielded six best practices that companies can follow to more closely synchronize their supply chains.

1. Alignment with the core business driver

Alignment with the core business driver is what makes the synchronization strategy unique. Historically, supply chains have simply tracked continuous improvement on a range of activities without a clear understanding of how (or whether) these activities related to the core business driver. The companies interviewed for this research, by contrast, found that significant waste can accrue when supply chain operations are managed using a narrowly focused “improvement” lens. These companies found that financial metrics were far better at aligning operations to the business driver. They emphasized that all functions needed to actively participate in providing data, experience and knowledge from an end-to-end perspective. Critical areas of understanding that needed to be communicated included a detailed analysis of cost of goods sold (COGS), customer service requirements and areas of waste generation. Finally, while recognizing that a company might operate multiple supply chains and have multiple business drivers, leading companies emphasized the need for every supply chain to focus on a single business driver. If more than one business driver was identified, supply chain leaders placed the most important driver as the centerpiece of their synchronization strategy.

2. Multifunctional leadership

The synchronization best practice mentioned most frequently in interviews was the need for strong multifunctional leadership. This best practice is not unique to synchronization, but is absolutely critical for the success of a synchronization effort. In the face of extraordinary levels of uncertainty, the greatest opportunities for value creation come from managing the seams and intersections of complex value chains. The days of simply running an efficient supply chain are over. Top supply chain executives must have excellent boundary management skills, and the ability to influence both commercial and financial leaders, to succeed in this environment. At the same time, supply chain leaders need to assemble multifunctional teams and task them with identifying initiatives for simplifying and synchronizing workflows across the organization. Teams should include representatives from sales, finance and product research—as well as traditional supply chain functions—and focus on enhancing business processes with an eye toward improving key financial metrics.

3. Value stream mapping

Leading companies emphasized value stream mapping as perhaps the most important tool for executing a synchronization strategy. Three major points in particular were emphasized. First, companies needed to define the value stream broadly. For leading companies, the value stream included everything required for an enterprise to deliver value creation. This included design, source, make, deliver, sell and service. Second, the purpose of the value stream was to deliver the end business objective. Leading companies used the term value stream to focus the organization on the purpose of the system. The goal was to visualize where every part of the supply chain fit into the value stream, so that the entire organization would be fully involved in managing and improving the value stream. Third, value stream mapping was detailed work and the total effort required to map a value stream for a large, global, multi-category business was significant. Teams could lose sight of the objective and get caught up in the grind of mapping the system. Labeling the work as value stream mapping reinforced the critical point that the purpose is to increase total value.

Mapping exercises generate hundreds of questions regarding supply base management, process redundancy and integration, customer fulfillment and more. Building on the value stream map, leading companies first focused on simplifying their supply chains, then standardizing and integrating processes, and only lastly did they move toward

implementing a synchronization strategy. In this way, teams were able to achieve tangible, incremental benefits while building the necessary skills and relationships needed to tackle the ambitious end goal of synchronization. Table 2 provides a detailed overview of the process.

4. Dependable supply chain operations

To achieve dependable supply chain operations, leading companies focused on two key aspects. First, they advanced common values across the supply chain. Common values help these companies prevent significant conflicts within and between organizations. They allow management to focus on value creation as opposed to dispute settlement. Common values are especially important in the current environment, where uncertainty can break contracts—and relationships—without collective commitment to value creation goals.

Second, leading companies focused on creating reliable, predictable, zero waste supply chains. A typical supply chain incorporates thousands of activities and transformations. This system is only as reliable and predictable as its weakest link. Importantly, leading companies recognized that a high level of reliability does not guarantee a predictable outcome. For instance, a supply chain with 100 dependent steps, where each step delivered its product on time 98% of the time, would achieve less than 20% on-time delivery of product. Supply chains need to be both reliable and predictable. Reliable and predictable operations enable leadership to work on more strategic capabilities. Conversely, non-reliable or unpredictable supply chains require attention on managing day-to-day issues.

Zero waste directly supports the work of creating a reliable and predictable supply chain. The highest levels of waste are typically observed in areas where people and processes intersect, including product design, integration across units, information exchange and coordination with suppliers and customers. Rooting out waste in these areas produced more effective interactions, leading to better reliability and predictability.

5. End-to-end, digitally enabled visibility

Supply chain visibility played a critical role in synchronization strategies at leading companies. These companies operated on the motto “you can’t fix what you can’t see.” Hence these companies invested significantly in technologies that provided visibility into the end-to-end supply chain. Digitalization of the supply chain has advanced dramatically over the last decade, enabling integrated, platform-based supply chains.

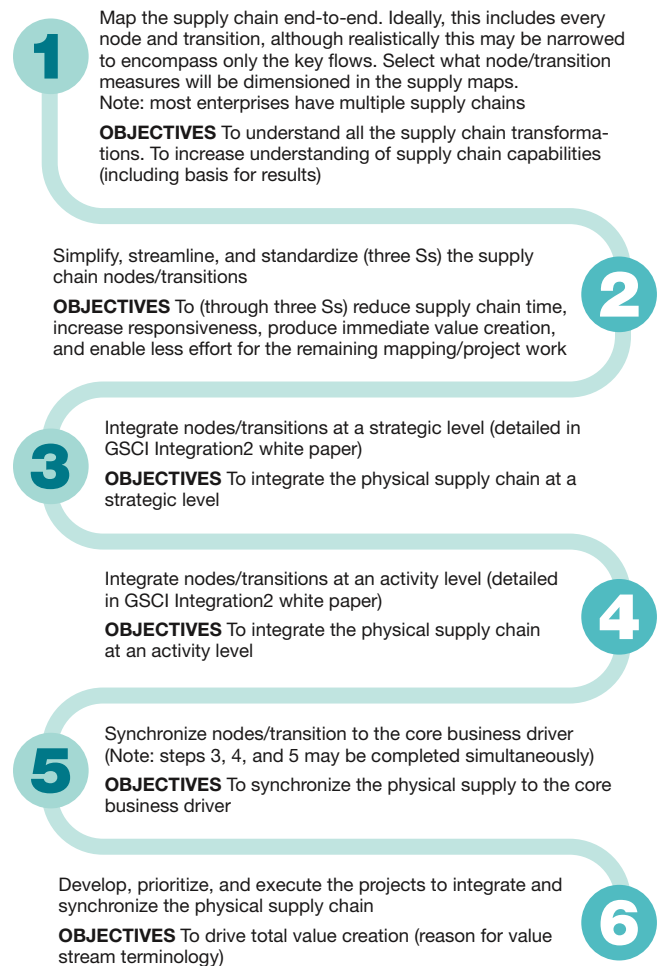
Leading companies have applied these technologies to their synchronization efforts. For instance, companies have

used digital technologies to capture massive amounts of data and apply real-time analysis to track traditional variables—such as cost, quality and delivery—as well as agility-based variables—such as time, cash, service and responsiveness. In one example, a heavy equipment manufacturer implemented digital information systems to view its entire global inventory system. Inventory is now visible in manufacturing warehouses, transit, replenishment centers and franchises. This capability has enabled the company to enact inventory sharing processes to increase service while reducing cash outlays.

In addition, leading companies used analytical tools to model the supply chain, simulate solutions and continuously improve systems to deliver optimized total value (service, time, cost,

TABLE 2

Value stream mapping: steps and objectives



Source: Authors

revenue, quality, cash). This capability has become the basis for improved end-to-end planning and replenishment systems using internal and external data to improve how the supply chain is managed.

6. Develop skills and capabilities to execute synchronization

Finally, synchronization requires supply chain personnel to develop new skills and capabilities. Leading companies highlighted some of the most important skills for executing a synchronization strategy. These include the ability to influence others (particularly in areas outside their expertise), multi-functional business process skills and experiences, boundary management, financial literacy, and business analytics and other digital capabilities.

Companies can take numerous approaches to developing the skills and capabilities needed to execute synchronization. One company interviewed by the research team developed a global community of practice (CoP) approach to document and promote key capabilities. Successful work processes were developed, standardized and validated. These processes were then captured by the CoP for training and reapplication. The organization is focused on keeping the CoP alive and current to address the challenges of efficiently managing complex global operations. Other approaches exist as well.

Regardless of the approach, the key takeaway from interviews was the need to shift away from a limited focus on functional skills to a broader focus on talent development. Companies also emphasized the need to find, hire, develop and retain talent as critical to synchronization.

Emerging synchronization strategies

Leading companies are applying these best practices to ensure that all supply chain assets, processes and people are synchronized to the core business driver. An omni-channel retailer, for instance, was struggling before the current crisis to respond to rapidly changing consumer behavior and the threat of disruptive business models. The company first identified internet consumer orders with low average demand and high variation as its core business driver. In order to synchronize its supply chain to these customers, it implemented market leading data analytics that enabled visibility, improved control and optimized inventory levels. The company also streamlined operations to enhance dependability in its end-to-end supply chain. As a result, it was able to decrease working capital by 25%, reduce logistics spend by up to 12% and save tens

of millions of dollars in procurement costs.

Not all companies that were interviewed achieved such striking success. Because synchronization is still a very new strategy, many leading companies had yet to achieve full implementation. Other companies were building on partial successes to achieve greater gains. But all of the companies were convinced the synchronization was critical to the long-term growth of their companies.

Most importantly, perhaps, synchronization can help companies weather the challenges and opportunities of economic uncertainty. When shocks occur, end-to-end visibility—coupled with strong relationships—provide a critical foundation for maintaining operations. At the same time, having a clear understanding of the core business driver gives companies critical direction in deciding how best to adjust to new circumstances. In many cases, this means precisely defining the customers or segments whose value requirements best align with the company's capabilities and are the most profitable. By targeting core customers, companies are better positioned to create the kind of value that will keep these customers loyal in challenging times. Finally, by reducing costs and enhancing value, synchronization helps protect margins and sets the stage for future growth. While not a silver bullet, end-to-end supply chain synchronization does represent a powerful new strategy for managing risks and deliver value in uncertain times.

About our research

In developing our understanding of end-to-end supply chain synchronization, we conducted in-depth field interviews with 13 benchmark companies. Companies spanned food, equipment, furniture, chemical, packaging, health care, and CPG industries. Most interviews focused on how companies were driving synchronization best practices in North America, but many companies also shared best practices developed from their global operations. Because of the breadth of the topic, the industries sampled, and the different stages of maturity, benchmark company focuses were also broad. Over 100 best practices were discussed. The research team chose the top six best practices to illustrate the synchronization concept. These six best practices were most cited as areas of continued opportunity by many of the benchmark companies. The full GSCI *End-to-End Supply Chain Synchronization Strategy* white paper can be downloaded at haslam.utk.edu/whitepapers/global-supply-chain-institute/end-end-supply-chain-synchronization. ☺☺

After the Dust Settles

Fundamental changes for the supply chain in a post-COVID world.

BY GARY A. SMITH

The world is undergoing a fundamental change that began before the pandemic and will continue in a post COVID-19 world. In my view, it boils down to one thing: People are treating each other as human beings and being more kind to one another. That may seem out of step with the state of our political discourse, especially in an election year, but if you look around, it is happening and it is a growing trend.

To get us through COVID, CEOs and their boards temporarily put their salaries on hold in solidarity with their workers. Companies extended benefits to furloughed employees. And, let's not overlook that the U.S. government passed a \$2 trillion stimulus package that was unprecedented in its reach and scope. While the outcome is uncertain, at the time of this writing, negotiations continued on another stimulus package. In a recent *New York Times* column, Tom Freidman noted this phenomenon, quoting his friend Dov Seidman who said: "In my view, trust is the only legal performance enhancing drug. Whenever there is more trust in a company, country or community, good things happen."

Could we be experiencing a paradigm shift from a "profit first" to a "people first" culture?

That may seem like a loaded question, especially at a time when the word socialism is bandied about as a weapon. However, putting people first does not signal the end of capitalism; rather, it is capitalism for the long term.

When a company puts the needs of its customers and employees first, it is investing in their long-term growth, not limiting it. Employees who realize that their company truly cares about their welfare and trusts them to do the right thing, in turn, trust their companies. Employees become more engaged and loyal.

Customers also react positively when companies develop a people first culture. They realize that the company has their best interest at heart and become loyal customers. Loyal customers and loyal employees are worth their weight in gold. This marks a truly successful company.

What's old is new

It sounds like a radical idea, but people first cultures aren't new. They were quite common from the end of World War II through the 1960s. However, that all changed in 1970, when economist Milton Friedman published an article in the *New York Times* espousing the concept of shareholder primacy. He argued that the purpose of a corporation is *"to conduct the business in accordance with their desires, which generally will be to make as much money as possible while conforming to their basic rules of the society, both those embodied in law and those embodied in ethical custom."* Basically, the corporation's purpose was simply to maximize shareholder value as long as long as it didn't break the law.

Since the 1970s, the concept of shareholder primacy has grown, taking over the majority of executive suites and business schools. But a few organizations did not buy into Friedman's doctrine. Among them are companies such as Apple, Disney and Southwest Airlines that still believe in people first.

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After the dust settles

Another shift began to emerge in the early 21st century with a movement focused on corporate responsibility, especially toward the environment. More recently, the Business Roundtable redefined the purpose of a corporation from one that endorsed the principles of shareholder primacy to one that included all stakeholders including customers, employees, suppliers, communities and shareholders. The order here is important; people first, then profits. This must become the order of importance in a post-COVID world.

Steps toward people first

A people first culture will have a direct impact on how an organization does business and how its supply chains should be managed. Supply chains need to be resilient in order to absorb the shock of disruption and agile to be able to respond quickly, in order to adapt, even to something as serious and devastating as a pandemic. Resiliency plus agility equals adaptability.

Below are eight steps an organization needs to reach and maintain a resilient and agile state:

1. create a vision and culture of true end-to-end visibility;
2. leverage technology that speaks to the vision;
3. implement a company-wide continuous improvement (CI) program;
4. emphasize planning over forecasting;
5. segment your supplier and customer bases;
6. develop a supply chain risk analysis plan;
7. switch from purchasing to procurement and

collaboration; and

8. implement S&OP.

The eight steps, in order from broad to specific, affect the maturity of the supply chain. Gartner's four-step supply chain maturity model is shown in Figure 1.

According to Gartner, currently 80% percent of organizations are at level 1 and level 2. Yet, as an organization implements the eight steps, its supply chain maturity moves from a reactive mode to one that is proactive. At the same time, the supply chain moves from transactional to collaborative. Finally, the supply chain transitions from siloed operations that operate separately and at time against each other, to one that is integrated, where operations automatically flow from one operation to another in a seamless and fluid manner. Let's look at each of the steps in detail.

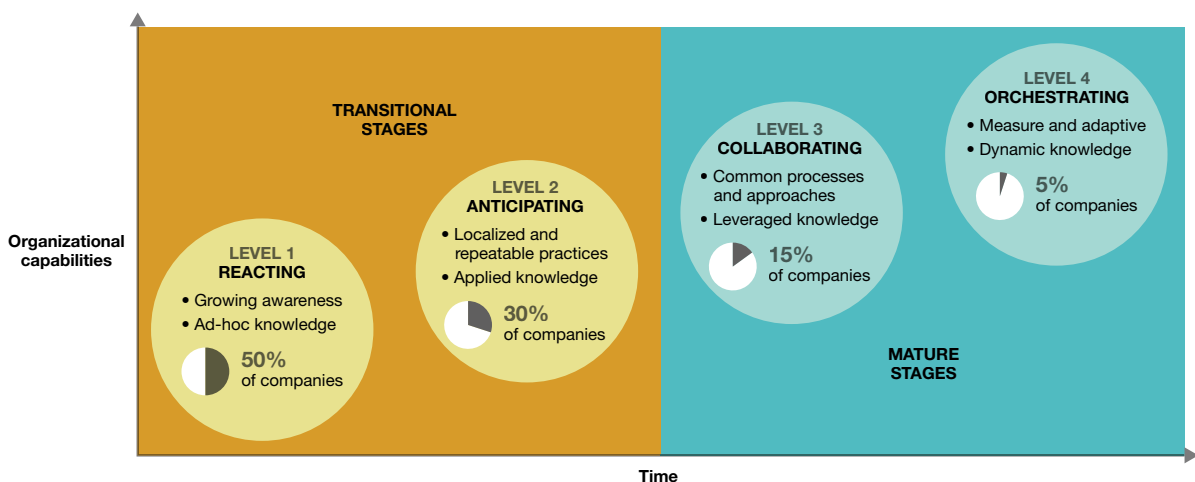
Step 1: Create a vision and culture of true end-to-end visibility.

End-to-end visibility is and should be the goal of any supply chain. It is a requisite in a people first environment. At minimum, it is the ability to be able to track and trace material from the time it is ordered to the time it is consumed, used, sold and delivered to the customer or other end user, from Tier 1 supplier through Tier 1 customer. Visibility should occur at the serial number, lot number, date code and SKU number wherever possible and practical. If an issue occurs with an item, it should be locatable and dealt with appropriately.

Transparency is a vital part of end-to-end visibility. Company operations and processes should be readily communicated and known to all. Material should be

FIGURE 1

Four step supply chain maturity model



Source: Gartner

lookup traceable by most people within the organization. Also, dashboards should be viewable by everyone in the organization along with explanations for each key performance indicator as needed (e.g., what it means and how it is calculated).

Developing end-to-end visibility and a transparent organization will, in many cases, require the organization to undergo a culture change. Culture is the sum of an organization's beliefs and behaviors tempered by customs, morals and the goals of the group. Within an organization it is often expressed by how people act "when the boss is not around." Organizational cultures run the gamut from communal to draconian, however, the requirements for a culture and vision where the organizational goal is to have end-to-end visibility should, at a minimum:

1. be inclusive and participative and respectful of all;
2. embrace change and allow a free exchange of ideas;
3. encourage open communication in all directions, up, down and across the organization;
4. be process and not functionally driven, containing no silos; and
5. allow for experimentation, provide and support formal and informal learning and support failure

Step 2: Leverage technology that speaks to the vision.

As organizations develop their visions and cultures to support true end-to-end visibility, they need to create a technology system that reinforces it (Figure 2). The system must be fully integrated, in such a way, that updates and changes can be reflected in all affected systems.

Central to the system is a supply chain execution system with Artificial Intelligence (AI) capability, allowing the system to make many routine decisions that are normally the job of humans. AI allows the system to operate with fewer FTE's and at a faster rate. Execution systems will vary from organization to organization but at a minimum should include, or have as integrated bolt-on modules.

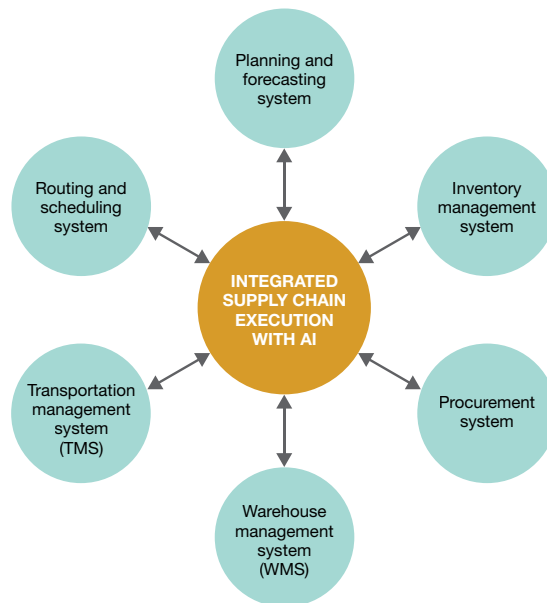
- *Planning and forecasting.* Allows the system to optimize inventory and forecast and simulate consumption alternatives.

- *Inventory management.* Manage inventory levels, orders, sales and deliveries.
- *Procurement.* Manage and optimize organizational spend for goods and services.
- *Warehouse Management (WMS).* Optimizes warehouse and distribution functionality
- *Transportation Management (TMS).* Streamlines the inbound and outbound shipping process.
- *Routing and scheduling.* Optimizes load planning of outbound loads and creates routes and schedules for delivery.

The functionality and level of sophistication of each system will vary by organization. More and more companies will invest in commercial off-the-shelf (COTS) software packages as opposed to developing their capabilities in-house via customization. They will also investigate systems that are Cloud-based or provided as

FIGURE 2

Integrated supply chain execution with AI



Source: Author

a service (SaaS). Such services allow organizations to mitigate risk and provide the most up to date versions of software. They also allow for growth and the addition of new services as required.

Step 3: Implement company-wide continuous improvement (CI).

Continuous improvement (CI) programs are based on the premise that work can always be improved. The

Japanese refer to this as kaizen. Improvements come in two forms, incremental and breakthrough. Incremental improvements occur in small steps that build toward success slowly. They are the foundation of CI. These improvements are usually low-cost and low-risk solutions that are implemented by employees. Incremental improvements are usually localized, meaning that they only affect a small area such as a functional area in a distribution center, the procurement department, etc.

Breakthrough improvements are just that. They are major improvements that affect entire business processes and create order of magnitude savings in cost or time. They are usually riskier and require investment in effort, materials and equipment to implement. Many times, they will require a pilot program to test the improvement on a small scale in order to validate.

It is best to focus CI programs on fundamentals. There are three fundamental, but critical, requirements for the long-term success of any supply chain. These are opportunities that reduce cost, reduce cycle time or improve organizational processes.

- *Cost measures value to the organization.* A low-cost supply chain delivers value to the organization, its suppliers and to its customers.
- *Cycle time is an indicator of the organization's agility.* The faster material is received, picked and shipped, information or orders are processed, products are manufactured, new products are brought to market, decisions are made, bills paid and revenue is collected allows inventory and the cash-to-cash cycle to be minimized.
- *Organizational process improvements measure the precision and accuracy of processes.* Process improvements also impact agility because they indicate an organization's ability to change quickly and effectively. Cost and cycle time reduction leveraged with process improvement ensure an organization's ability to survive in down cycles and thrive in up cycles.

The basis for all CI programs is the PDCA cycle. PDCA stands for plan, do, check, act. During the planning cycle a

problem is identified and stated in a clearly and concisely. Do involves experimentation, data gathering, data analysis, finding a solution and testing it on a small scale. The check step involves verification to see if what has been done meets expectations. This ends with the act step when the improvement is fully implemented.

One of the most popular methodologies used for CI programs is Lean/Six Sigma (LSS). LSS combines Lean, which has its roots in manufacturing (it is the foundation of the Toyota Production System, or TPS) and Six Sigma, that originated in the quality movement. These methodologies are both focused on perfection and therefore complement each other. Lean/TPS is focused on minimizing waste and reducing lot sizes. Six Sigma strives for perfect quality, as its name indicates one error per 3.4 million opportunities. Together in an LSS program, they eliminate waste and improve product, service and process quality.

The concepts of LSS programs are easily understood and employees at every level can be trained to identify opportunities for improvement and continually improve operations. They improve employee engagement because employees solve problems in teams that elicit their input and participation. Implementing a company-wide CI program changes the culture of the organization to one that values improvement and innovation. Everyone develops a mindset where change is good. It spawns a questioning attitude and critical thinking. It is the hallmark of a people-first organization.

Step 4: Emphasize demand planning over forecasting.

A supply chain's purpose is to be the conduit for supply to meet demand. But demand by its very nature is uncertain. It's generated by customers and regardless of whether the customer is a person or another organization (public or private) that customer is ultimately fickle to some extent. Fickleness is the essence of uncertainty. So, to reduce uncertainty, organizations develop forecasts, predicting future demand based on past results, current inputs and trends. Forecasting is the very definition of an educated guess.

Today's forecasts are usually produced using

sophisticated computer software. As a result, too many organizations are too reliant on forecast packages to provide all the answers. They also may not update their forecasts on a timely basis. This leads to forecast errors regardless of the method used. And the more uncertainty, the worse the forecast results can be. To quote Carol Ptak, partner at the Demand Driven Institute: “There are two kinds of forecasts; lucky and lousy.”

The better alternative is demand planning. Planning explains a course of action and identifies the strategic thinking behind the plan, who is responsible for executing the plan’s various parts, the timing and identifies the likely results. The basic difference between the two is accountability. Plans have accountability, forecasts do not. Plans can proactively change as situations and markets change. Forecasts, while changeable, are reactive because they are usually not changed until after the errors occur and the damage has been done. Organizations should invest in and develop AI planning systems that include forecasting modules that can develop simulations of various planning scenarios. This is vital in creating sales & operations plans.

Step 5: Segment supplier and customer bases.

Just as all suppliers should not be treated equal; neither should all customers. There are various segmentation strategies for both, depending on the organization’s requirements and strategy. For example, suppliers can be segmented by performance, sales or risk. Customers can also be segmented into various groups such as volume, sales, geography, profitability or demographics.

Segmentation is used to develop an overall management strategy. Supplier and customer management includes developing appropriate metrics, communicating those metrics, developing relationships, creating positive communication and developing trust. When suppliers and customers are properly managed, both good and bad news can be communicated in a positive and constructive way and programs such as collaborative planning, forecasting and replenishment (CPFR), joint ventures, collaborative new product design and cost savings innovations are possible.

Step 6: Develop a supply chain risk analysis plan.

Many organizations operate multiple supply chains. They do this for a variety of reasons; some operate in diverse industries requiring radically different supply chain strategies and operations, others operate omnichannel environments, still others operate different channel strategies - think consumer and industrial paper products. However, every organization needs a single supply chain risk management methodology so that the interests of the many outweigh the interests of the few (divisions/channels). Without such a plan, business units will always operate from a position of self-interest, optimizing risk within their own span of control over the needs of the entire organization. The supply chain impacts the entire organization, so developing a single supply chain risk management plan that applies to the entire organization will benefit everyone.

The risk analysis plan should consist of the following:

1. develop a team structure;
2. develop a list of risks;
3. calculate risk probability and cost impact;
4. develop a strategy for each risk; and
5. monitor risk.

Each step is important but key to steps two through five is not only to understand the risks themselves but to understand that risks are the result of a cascade of decisions or events that must happen in order for the ultimate risk to occur. For example, the bankruptcy of a key supplier or customer can be extremely hard for a supply chain partner to predict. It is usually the result of many things conspiring together until they reach a tipping point and by then it may be too late. This process is known as the cascade effect. Organizations guard against such risks by taking out insurance or by subscribing to third party services that specialize in understanding such risks as credit.

Step 7: Transition from purchasing to procurement and collaboration.

Just as organizations need to plan more and forecast less, they also need to procure more and purchase less. Purchasing is associated with “one-size-fits-all” transactional operations where suppliers are pitted against one another resulting in a win/lose buying event. Win/lose events always leave one party (usually the supplier) feeling short

changed and can lead to passive/aggressive retaliation in the form of providing poor quality items, late deliveries, inflated prices and poor communication. In short, one-off transactional purchasing is best left to situations where the item is purchased infrequently and the cost is relatively low.

In most other situations, organizations need to transition to procurement events. Organizations utilizing procurement processes experience much better supplier relations than those who rely on transactional purchasing techniques. Procurement professionals develop relationships with suppliers. And while all suppliers are treated with respect, all suppliers are definitely not treated the same.

The differences between procurement and purchasing are subtle, and the subtlest is the difference between value and price. To a supply chain professional, the only thing these two words have in common is that they both contain five letters. Value is about the utility and worth of an item. Price is the amount paid for it. Beware of the transaction that is based on price only. It is rarely, if ever, the best choice. An item's value may include the quality of the item—its useful life. The item may be extremely easy to use, may be used with a wider variety of other items. It may be easily repairable, or easily upgraded to an even more valuable product. Like beauty, value is also in

the eye of the beholder (or customer).

Another subtle difference is that procurement involves sourcing an item or service. Sourcing is the process of qualifying suitable suppliers of an item, qualifying them and working with them to obtain the best value. The purchasing process is about developing a product or service specification, preparing a Request for Proposal (RFP), bidding the RFP and negotiating a price. In short, purchasing is about buying and item or service, procurement is about developing a relationship with a qualified and responsible supplier.

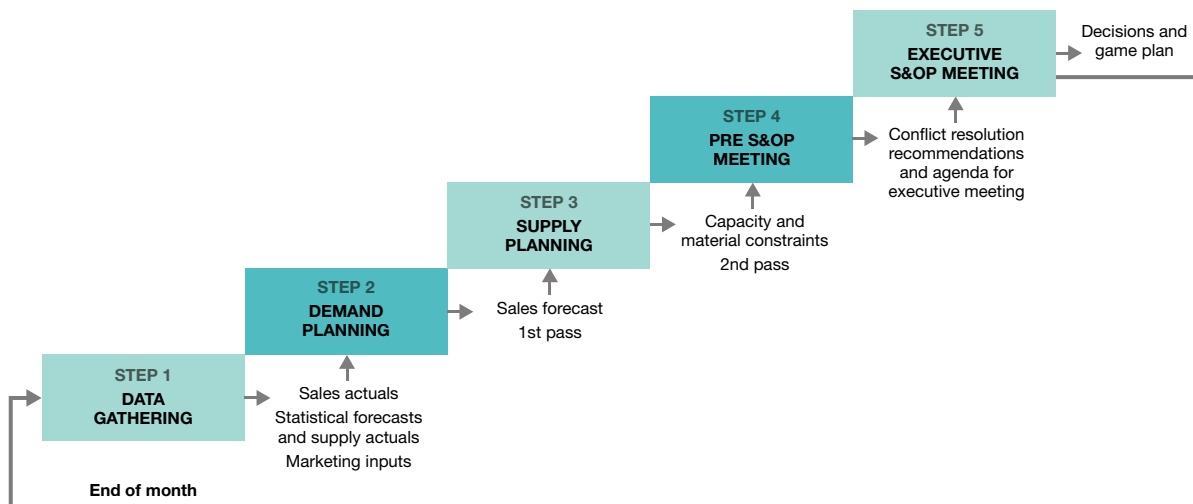
Step 8: Implement S&OP.

Sales and operations planning (S&OP) is the process of balancing demand and supply by providing the organization *one version of the truth* in the form of a single operating plan for a specific time period, usually one month. A longer-term plan of usually 18 months to 24 months is developed simultaneously and set on a rolling schedule. The length of the schedule is ultimately determined by the forecasted item with the longest lead time. This schedule outlines the future needs (demand) along with the S&OP committee's determination of how best to satisfy demand based on capacity and system constraints.

Demand is planned and orders are placed for raw materials, supplies and MRO materials to meet future requirements. This plan is more fluid and the farther

FIGURE 3

Sales and operations planning process



Source: Author

out it extends, the more fluid it is. The one-month plan is known as the Frozen Zone. Here any changes in the schedule are usually forbidden, or require executive approval to change. The cost to change the schedule in the Frozen Zone is usually very high. The next period, usually two months to 12 months in length is called the “slush zone.” During this time, the schedule can be changed at a minimal cost. Outside of this is the “free zone.” Here changes can be made with almost no cost penalties.

S&OP is a five-step process that is repeated monthly (Figure 3). It is run by the S&OP Committee which consists of senior members of the major functional areas including operations, finance, marketing, sales, manufacturing, supply chain, procurement and logistics. The S&OP process is shown below.

The monthly process starts with data gathering (step 1). Here all pertinent data such as actual sales from the previous month, current inventory, expected receipts, marketing data and operating budgets are gathered and analyzed.

This analyzed output is used to develop the demand planning process (step 2). At this point the demand plan is unconstrained, also referred to as infinite capacity scheduling.

Step 3 is referred to as supply planning. In this phase, unconstrained demand meets the constraints of the system in the form of capacity. Capacity constrains the system in two ways, one is labor, the number of people that can effectively do the job, and the second is physical, the amount of work area available to do the work. For example, receiving capacity is constrained by the number of dock doors available and the number of people assigned to the receiving area.

Once the capacity plan is reviewed, the pre-S&OP meeting (step 4) is possible. Here the S&OP Committee finalizes the monthly schedule and the rolling schedule and resolves most, or all, major conflicts.

They then develop the agenda for the executive S&OP meeting (step 5). The Executive S&OP Meeting reviews the results of the previous month, what went right, what went wrong and steps to improve the process. It then identifies any issues and their resolution for the current month’s schedule as well as any outstanding conflicts that were not resolved.

Lastly the S&OP committee presents the final schedule

to the executive committee who either approves it or makes modifications to the schedule and plan. The final schedule is then signed off and all parties commit to a single plan.

Change is in the air

If COVID-19 has taught us anything, it’s that supply chains need to change. Organizations have designed supply chains so that material is sourced from low cost countries, inventory is minimized at every single point and suppliers are squeezed, all in order to beat quarterly projections. That worked fine until along came a virus that spread so fast, with such deadly consequences, that it shut down the whole world. Clearly, the current design was, and is, not up to the task.

But the tools are there. The technology is there. And the processes are there. The issue is that most organizations have it backwards. They put the cart before the horse. They have not intelligently used the tools that they themselves developed. They put profit ahead of people.

As supply chain professionals tasked with putting our supply chains back together, we need to follow the steps in the right order. We need to invest to move them to the third and fourth levels of the Maturity curve, following the eight steps outlined here. We have to invest in the technologies, processes and organizational cultures that put people and the good of our planet ahead of shareholders. We have to play the long game for the future. It is the only way we—customers, employees, communities and shareholders—can all thrive.

By implementing the eight steps detailed here, supply chains will become resilient and able to withstand the shocks of disruption. Supply chains will become agile, allowing us to pivot and change direction quickly, adapting to virtually any situation that comes our way, including a pandemic.

Resiliency plus agility equals adaptability, with people at the center. This is the new paradigm.

**This article was prepared by the author, acting in his personal capacity. The views and opinions expressed do not constitute, nor necessarily reflect, a statement of official policy or the position of the author’s employer. ☺☺*

COVID-19, meet Industry 4.0

Tackle today's challenges with tomorrow's technologies.

By Neal Walters, Nick Anderson and Oleg Kozyrenko

Neal Walters is a partner in Kearney's Energy practice and is based in Toronto. Nick Anderson is a principal in Kearney's Strategic Operations and Supply Chain Management practice and is based in Washington, D.C. Oleg Kozyrenko is a principal at Kearney and is based in Washington, D.C. They can be reached at Neal.Walters@kearney.com, Nick.Anderson@kearney.com and Oleg.Kozyrenko@kearney.com.



Eight months into the COVID-19 pandemic, you've absorbed the initial body blow and are preparing to ramp up operations in a radically changed world. You don't need anyone to tell you yet again how challenging things are. What you do need are *solutions*.

- What practical steps can you take to safeguard the health of your employees?

- How can you continue to effectively serve customers and gain market share as you adapt to new demands and conditions?
- How can you make your business more resilient in the face of a prolonged pandemic or any future crises that could threaten your supply chains?

For manufacturers, some immediate answers to those questions can be found in Industry 4.0 technologies, which are already driving large leaps in productivity, and can now help the sector rebound from COVID-19 (see Figure 1).

Here are some ways manufacturers might practically apply new and established digital tech to operate safely through the pandemic, while moving toward more productive, profitable and resilient operations long term.

PROBLEM: Maintain worker distancing

SOLUTION: Wearable geofencing; cobots

Wrist-worn geofencing technologies (e.g., SafeZone) use proximity sensors to alert employees via haptic feedback whenever they are breaching social distancing guidelines. These devices also capture data to let you know who was in close contact with whom, so you can conduct contact tracing to quickly contain any COVID outbreak.

Collaborative robots (cobots) designed to work with (rather than replace) human workers can take over some tasks that previously required operators to work in close proximity to one another, while also enhancing your production teams' efficiency.

PROBLEM: PPE shortages
SOLUTION: 3DP

Personal protective equipment (PPE) such as face shields and safety glasses has been in short supply since the pandemic struck. You can mitigate the risk of some shortages by purchasing 3-D printing (3DP) assets to produce these items in house, ensuring you have just what you need to sustain your operations, versus being at the mercy of suppliers. A side benefit is that you will also build internal capability around 3DP, if you don't already have that expertise in-house.

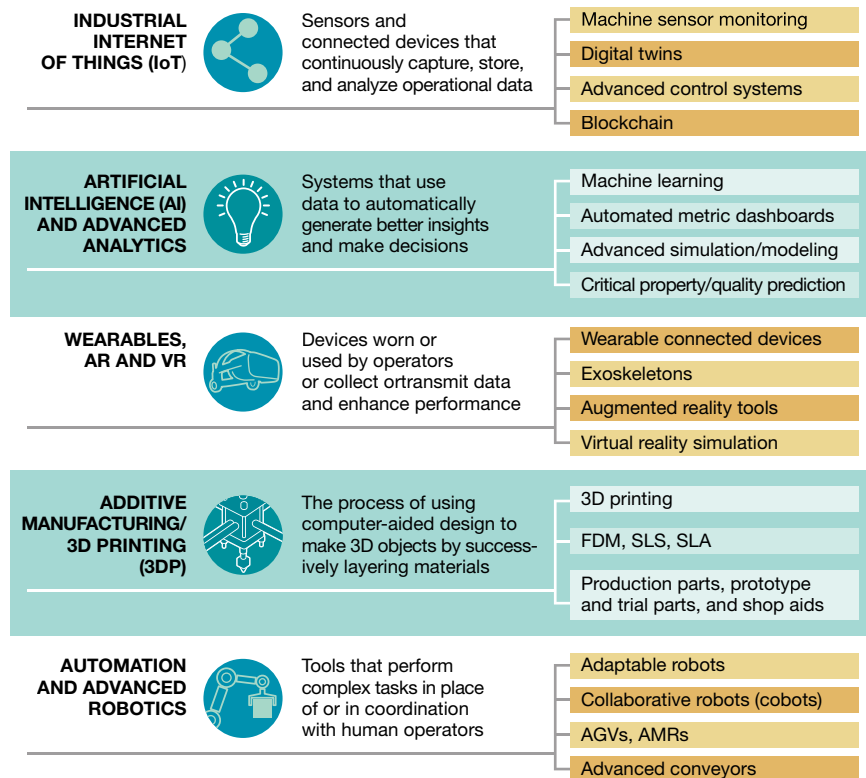
PROBLEM: Less predictable staffing levels
SOLUTION: Automation; ASDL

An outbreak of COVID-19 could suddenly render a sizable portion of your workforce unable to perform. Automation and active steering of direct labor (ASDL) systems can mitigate that risk.

While automated packaging assets such as case-packers and palletizers have been around for decades, some manufacturers still prefer to put workers on these tasks—which are often carried out in close proximity to one another and require extensive handling of product. Shifting some of these tasks to automated assets provides much-needed stability in the face of less-predictable staffing levels.

FIGURE 1

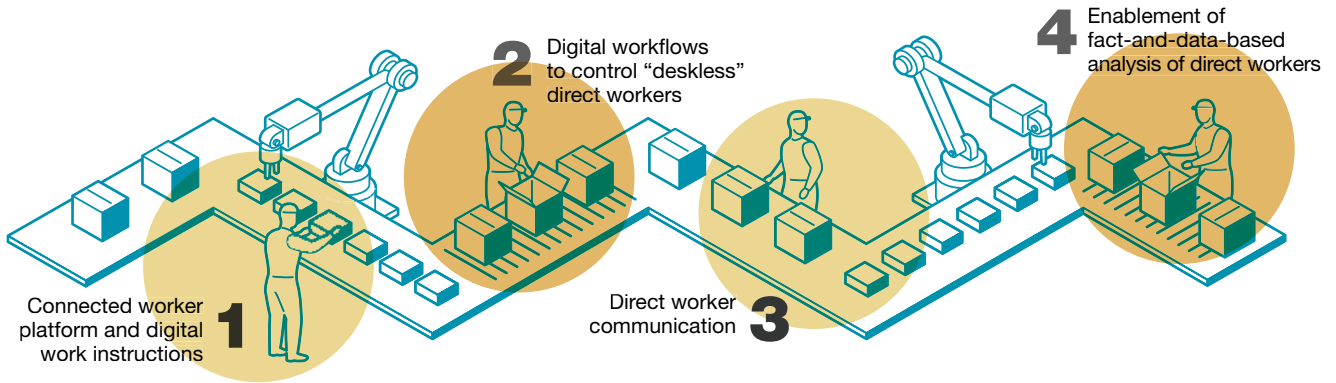
Industry 4.0 technologies



Source: Kearney

FIGURE 2

Active steering of direct labor (ASDL) boosts operator productivity



TYPICAL SITUATION

- Operators responsible for several working stations may lack clear direction, struggle to coordinate efforts
- No real-time transparency on status of tools/operator efficiency

ASDL SOLUTION

- Actively pushes information on upcoming activities (e.g., ending lot) to improve staff-machine ratio
- Provides transparency on performance losses in real time (facilitation of root cause analysis)

SAMPLE BENEFITS

- Improved staff-machine ratio by more than 50%
- 5-15% OEE improvement via root-cause identification leading to permanent elimination of productivity losses

Source: Kearney

On any given day, you can optimize the productivity of the workers available to you by using ASDL technologies to direct and coordinate their activities (see Figure 2). ASDL also helps you foresee and avoid costly bottlenecks.

PROBLEM: *Restricted access to plants and equipment*

SOLUTION: *“See what I see” AR; IoT-enabled devices*

Wearable augmented reality (AR) devices enable remote maintenance of equipment by technicians not on site, transmitting what the on-site operator sees to the off-site technician and relaying voice instructions to the on-site operators in real time. You can also use AR devices and heads-up displays to deliver hands-on training to employees remotely. Subject-matter experts from central locations can use the same technologies to guide the on-site activities of local operators and engineers.

IoT-enabled devices allow for remote monitoring of equipment and inventory even where no physical

operator is present, which could prove vital if the pandemic threatens your workers or renders certain locations off limits. You can also sync sensors with cleaning systems to automatically sanitize higher traffic areas, or with your security system to auto-lock doors once an area has met max capacity.

PROBLEM: *Unpredictable or volatile supply base*

SOLUTION: *End-to-end visibility and advanced planning*

As global supply chain capabilities have become more unpredictable, the ability to predict disruptions before they occur is becoming increasingly more critical. End-to-end integrated planning systems provide manufacturers with the visibility into the status of inventory and equipment from sub-suppliers, all the way to customer points of sale. Capturing this data in real time and applying advanced analytic tools enables planning recommendations for which products should be produced, and when, based on availability of critical

materials as well as impending demand surges. These tools can also recommend when new suppliers or third-party manufacturers may need to be activated to eliminate the risk of shutdown of critical supply chain nodes.

Balancing cost with risk

Each of these solutions requires investment, of course. In the near term, savings from suspended activities such as inter-company travel, office expenses and recruiting could be redeployed for this purpose. But we believe it is time to move beyond transactional thinking and adopt fundamentally new assumptions regarding technology investments.

Chief among the many lessons meted out by COVID-19 is the need to balance cost competitiveness with risk competitiveness. Over time, investing in the kinds of technologies described above serves both ends, as they simultaneously improve your operational efficiency and make you far more resilient to systemic shocks.

Developing your 3DP capability, for example, shields you from unforeseen supply disruptions and lowers your reliance on low-cost overseas suppliers. If a factory needs to shut down in the future, a skeleton crew operating 3D printers can make minimum viable products for strategically essential customers, even in the midst of a crisis. 3DP capability can also be a key to meeting rising demands for customization.

Embrace Industry 4.0

More broadly, the technology investments envisioned above can be a steppingstone into the Industry 4.0 future you know is coming.

- Sentiment analytics can proactively identify high-risk suppliers of strategic importance, then create backup plans to ensure business continuity.
- IoT sensors providing data to AI/ML-enabled analytics can detect the real-time operating conditions and parameters of your production assets, and predict when an asset may be producing out-of-spec product or if a breakdown is imminent, thus reducing reliance on operators to constantly

monitor equipment on the shop floor.

- Digital twins can help you to optimize batch sizes, substantially improve changeover efficiency, and reduce overall cost.

Thinking longer term:

• Cobots are a great bridge to full automation and the future of “touchless” manufacturing. They can present parts to operators, hand off work products between steps and do heavy lifting to reduce workplace injuries. They are also easily reconfigurable to a variety of products. So, as cobots help you space operators out on the factory floor, they also reduce the amount of manual handling, decrease reliance on labor operators and make you more ready to pivot your product mix at any time.

• Connected ERP and MRP systems can track production line data across facilities. This enables you to continually balance production, eliminating surges in one line/site and no work at others.

• AR-based work instructions can significantly reduce training cycles for a potentially transient workforce.

• Remotely controlled robots can enable true “hands-off” manufacturing, impervious to future pandemics.

The investment case

Too often, the case for investing in new technologies has felt abstract—a “digital for digital’s sake” argument that demands sacrifice in the present in homage to an unknowable future. But the ravages of COVID-19 are making the business case for digital investments much more immediate and specific.

Given the largely unprecedented and unpredictable difficulties this global (and still uncontrolled) pandemic presents, your ability to conduct operations may largely depend on effective application of new technologies.

Making Industry 4.0 investments now can solve many of your most immediate problems while significantly advancing your company’s capacity to perform and compete over the decades to come. ∞∞

A SPECIAL SUPPLEMENT TO:

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MANAGEMENT REVIEW

2020 Warehouse/DC Operations Survey:

PANDEMIC HITS, OPERATIONS RESPOND

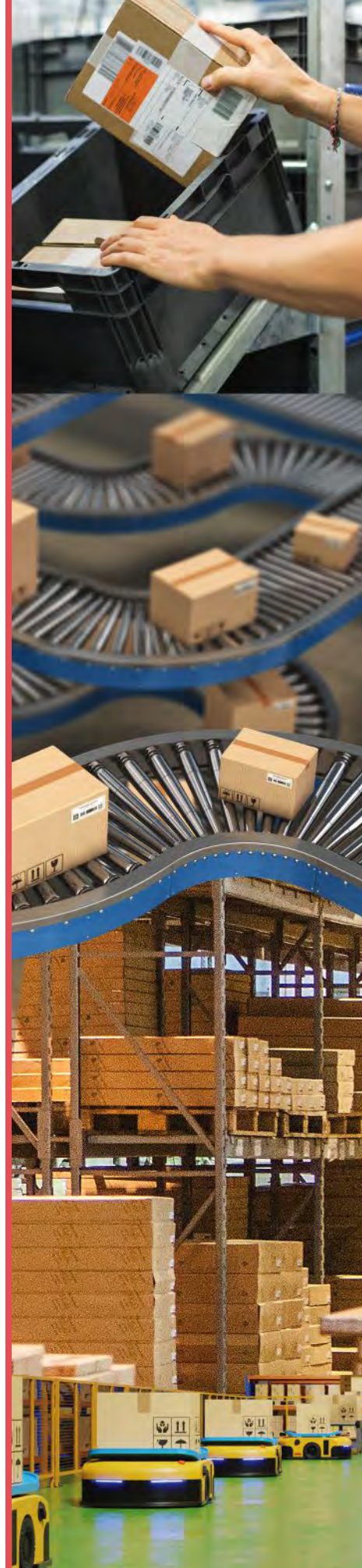
The pace of change wrought by e-commerce on warehousing/DC operations has been increasing for several years, but now the pandemic has kicked it into overdrive.

BY **ROBERTO MICHEL**,
EDITOR AT LARGE

Just when it seemed that the pace of change for warehouses and distribution centers (DCs) couldn't get any faster than it has been over the past few years, COVID-19 came along to show us just how fast that pace of change can be.

Not only does our annual "Warehouse and DC Operations Center Survey" show that the pandemic has made a significant impact on operations when it comes to worker safety and e-commerce responsibilities, but it also indicates that, despite some struggles, most companies are making adjustments.

The annual survey always asks about key operational factors, such as facility size,



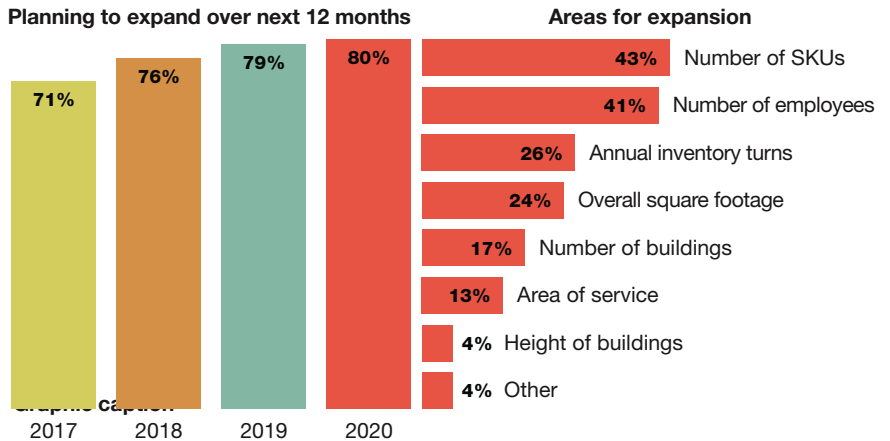
number of employees, and capital expenditure levels; but this year, we added questions geared around the effects of COVID-19, including e-commerce growth since March and practices such as social distancing, mask use, and sanitizing equipment. Overwhelmingly, respondents are taking action via steps like social distancing in areas like break rooms and use of protective masks.

What's more, 87% plan to continue at least some of these health-related practices after the pandemic subsides, and most respondents also report that, since March 2020, they've taken actions to improve warehouse processes and inventory management.

While COVID-19 has caused pain and disruption in many ways, for many DCs, it has meant an increase in e-commerce fulfillment activity. When we asked about e-commerce growth since the pandemic began, 10% of respondents say it has grown their e-commerce channel by 60% or more, and a combined 34% say e-commerce has grown by 30% or greater since the beginning of the pandemic.

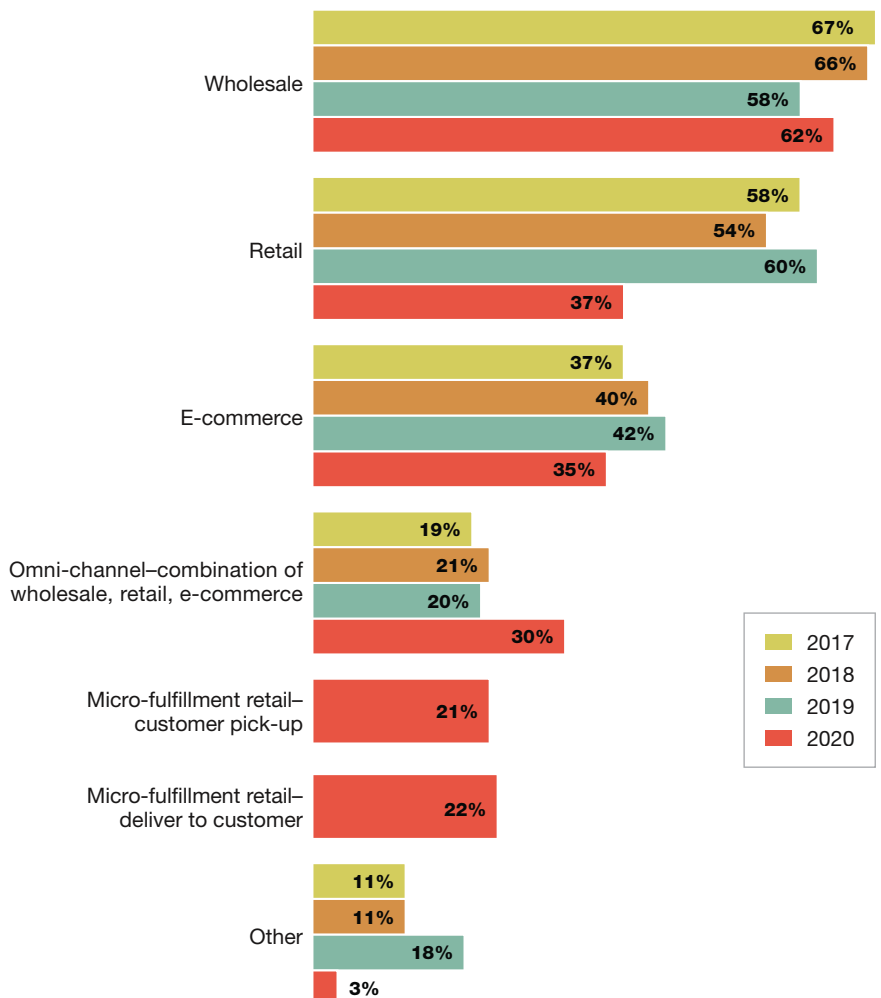
The survey, conducted annually by Peerless Research Group (PRG) on behalf of *Logistics Management* and sister publication *Modern Materials Handling*, drew 122 responses this year from professionals in logistics and warehouse operations across multiple verticals. According to Norm Saenz, Jr., a managing director with St. Onge Company, and Don Derewecki, a senior consultant with St. Onge Company, a supply chain engineering consulting company and our partner for the annual survey, DC operational change driven largely by e-commerce

Distribution center expansion plans



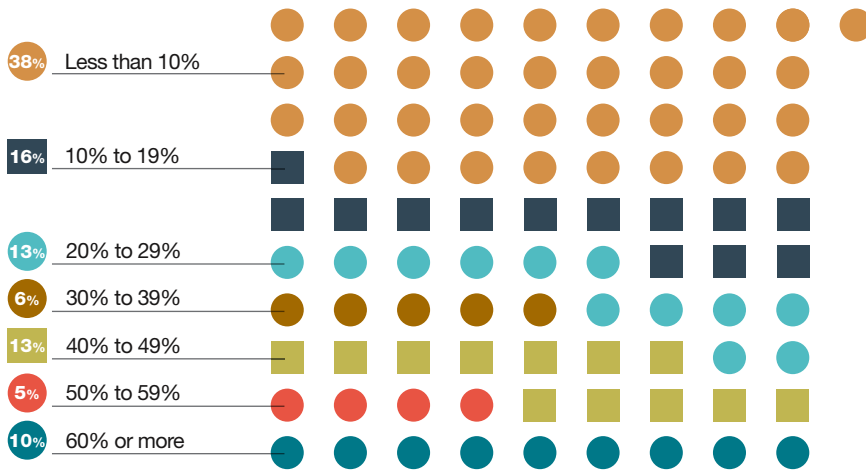
Source: Peerless Research Group (PRG)

Market channels serviced by company



Source: Peerless Research Group (PRG)

E-commerce channel growth since beginning of pandemic



Source: Peerless Research Group (PRG)

has been ongoing for several years, but the pandemic has put that pace of change into overdrive.

“This year’s findings are in many ways a continuation of the trends we’ve been seeing for years, but some of these outliers are what I’d call a ‘pandemic effect’ on DC operations,” says Derewecki. “These not only include steps taken for social distancing, but also changes with the size and number of facilities in the DC network, or in having to lease more space, to better service customers.”

According to Saenz, the impact of e-commerce has grown over the years, but now the pandemic has fast-forwarded the trends expected within the next few years down to a few months. “Findings including growth in SKU counts, greater use of radio-frequency-based picking, more evaluation of automation, as well as the increased emphasis on inventory management, can all be seen as evidence of the rapid growth of e-commerce activity that we’ve seen during the pandemic as well as how that’s driving operational change,” he says.

Operations snapshot

In terms of channels serviced, wholesale remains the most common channel, addressed by 62% (up from 58% last year). However, retail dropped from a 60% response last year to 37% this

87% plan to continue at least some of these health-related practices after the pandemic subsides.

year, while 30% now say that they have an omni-channel operation, up from 20% in 2019.

The percentage saying that they service e-commerce was down slightly compared to last year, but in new questions this year about micro-fulfillment—the trend of small fulfillment sites within stores or other locations very close to customer concentrations—21% are now engaged in micro-fulfillment customer pickup, and 22% are involved with micro-fulfillment-based deliveries.

Given the COVID-19 situation over the course of this year, we asked about

e-commerce channel growth since the pandemic began. While 38% say it caused less than 10% e-commerce growth for them, 10% say it had triggered a surge of greater than 60%, and a combined 28% say it caused e-commerce growth of 40% or more.

The nature of respondents’ inbound and outbound operations is changing in ways consistent with e-commerce growth. In particular, on the outbound side, split-case only reached 8%, up from 3% last year, while a combined 70% have outbound split-case only, case and split-case, or full pallet, case and split-case. On the inbound side, full pallet only dropped by 5% to 14% this year.

When asked how multiple channels are being fulfilled, 36% say they self-distribute from separate DCs for different channels, up from 20% last year. There was an 8% drop in respondents saying that they use a 3PL partner for all channels, while 11% say they only service one channel, down 2% from 2019.

In terms of total square feet in the overall DC network, the average square footage reached 609,325 square feet for 2020, up from 545,860 square feet last year. The most common square footage for each DC also moved up, from 183,750 square feet last year to 191,670 for 2020. For networks with four or more buildings, average square footage reached 452,940—considerably larger than the 285,000 square feet last year.

The number of buildings in the DC network was on the upswing for 2020 as well, with 46% having more than three buildings, compared to 36% in 2019. Additionally, of respondents with three or more buildings, 30% have six-plus buildings, up from 26% last

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year. Buildings also trended upward in common clear height. The average common clear height in 2020 reached 32 feet, one foot higher than last year's 31 feet, and more in line with 2018's 32 feet. For 2020, 14% of respondents indicated the most common DC clear height was 40 feet or higher.

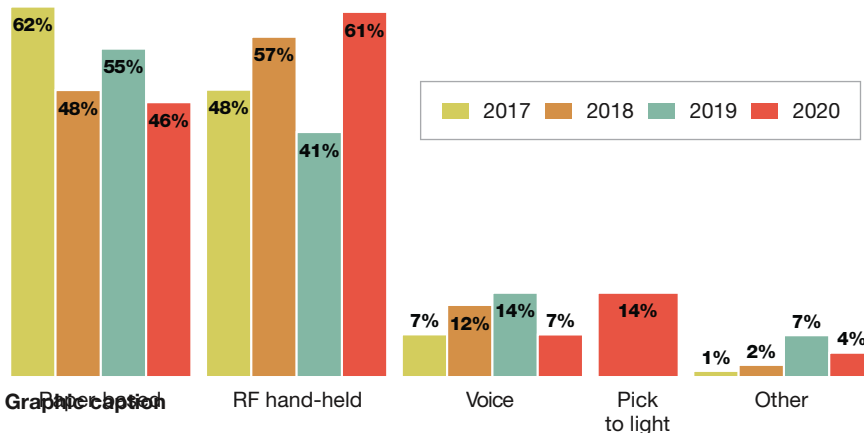
Average annual inventory turns for 2020 respondents came in at 8.2 turns, which is the same as in 2019. SKU counts did rise significantly, up to an average of 12,922 SKUs from 10,615 last year, constituting an increase of 21.7%.

Most of the facility profile findings were consistent with the rapid rise of e-commerce, although, in terms of geographic scope, a smaller percentage of respondents were servicing one metro area. However, 2020 findings such as "more buildings" and "taller/greater clear heights" can be seen as companies trying to better service customers by having more DCs, with some DCs with greater size and clear height suitable for automation and dense storage.

Our finding of more SKU counts in DCs also reflects rising e-commerce activity, notes Saenz. However, one troubling trend is that many respondents still lack a firm grip of item master weights and dimensional (dim) data on their SKUs, he adds. More specifically, while 45% have 100% SKU weight and "dims" in the item master record, 55% lack complete weight and dim data.

Lack of this data makes it difficult to do things like properly size storage and pick locations, determine the amount of inventory that fits in a location, as well as enabling the system to recommend the right size shipping carton. "Lack of accurate item master data is going to negatively impact operations just as they start

Picking technologies in use



Source: Peerless Research Group (PRG)

to become more efficient," says Saenz. "Operations managers need to establish methods to capture item master data and maintain it over time, especially with the rapid rise of e-commerce."

When we asked about e-commerce growth since the pandemic began, 10% of respondents say it has grown their e-commerce channel by 60% or more.

Respondent answers on expansion plans were encouraging, indicating corporate willingness to invest in facilities and resources in the face of accelerated challenges and channel disruption. For 2020, 80% plan some type of expansion, 1% more than last year, and the highest in the last four years for this question. In terms of different areas of expansion, 41% of respondents anticipate the need for more employees, up from 30% last year, while 43% anticipate more SKUs, up from 39% last year.

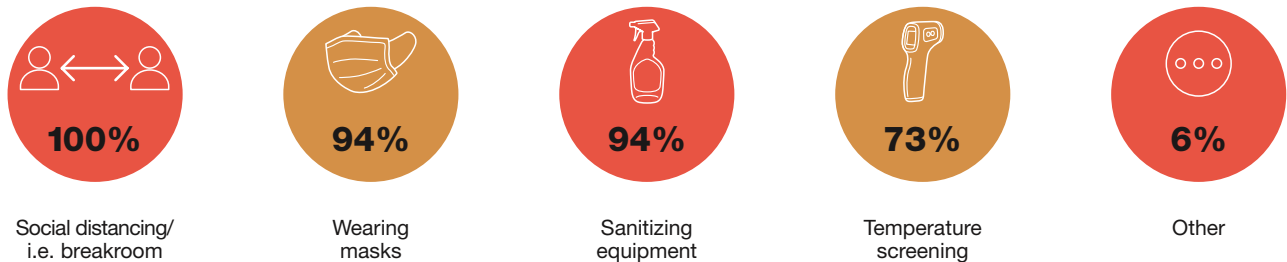
Perhaps due to many respondents being from smaller-sized companies, the

average number of employees in respondents' main DC contracted from 175 people last year to 125 in 2020. This decline in staffing could be an effect of the pandemic. However, a combined 14% of respondents had more than 200 employees in the main DC and another 11% had 100 to 199 people.

The most congested area of DCs continues to be the shipping dock area, cited by 29% of respondents as the most congested area. For the first time this year, we asked about congestion in e-commerce processing areas and value-added services (VAS) areas, with 8% saying VAS are the most congested areas, and 5% naming e-commerce processing as the most congested.

Some findings suggest a space crunch, with a combined 60% of respondents reporting peak warehouse space utilization of greater than 85%, and a rise in the need to lease additional space during peak season. This year, only 36% report "no need to lease more space" during peak, which is down from 52% last year, while conversely, respondents saying "they did lease more space" are up.

New for 2020: Actions taken since March 2020 to adjust operations



Source: Peerless Research Group (PRG)

COVID adjustments

One positive finding is the strong level of action on pandemic related health measures, such as instituting social distancing practices and wearing masks. In fact, 100% of respondents say social distancing practices were in use at DCs in work areas that would normally put people in close proximity, such as break rooms. Additionally, 94% say employees are wearing masks, 94% say they're sanitizing equipment on a regular basis, and 73% are doing temperature screening of employees.

The annual survey has long asked about actions taken to improve operations, but this year, we added a question about operational adjustments since March to cope with new or accelerated challenges. Most (65%) are improving warehouse processes, while 42% have changed layout configurations or rearranged workstations to support to social distancing.

Many respondents (42%) have increased wages since March to retain and attract staff, 35% have increased staff, 27% have developed different or additional delivery capacities, and 23% have trained staff on new e-commerce fulfillment tasks. Such findings show

Graphic caption

that for DCs, the COVID-19 challenge isn't about pondering what the "new normal" may turn out to be, it's about adjusting for the problematic present, which involves keeping workers safe while fulfilling more e-commerce orders.

To some extent, some steps have been absolutely necessary to prevent

Many respondents (42%) have increased wages since March to retain and attract staff, 35% have increased staff, 27% have developed different or additional delivery capacities, and 23% have trained staff on new e-commerce fulfillment tasks.

infections that could close down a facility. What's more progressive, Derewecki and Saenz agree, is that 30% of respondents plan to continue new health and safety practices post-pandemic, and 57% plan to continue at least some of the new practices.

"Close to 90% of respondents are going to maintain at least some level of these new practices to improve the level of cleanliness in facilities and

help keep workers safe and healthy," says Saenz. "It's great to see respondents realizing many of these practices will be helpful long-term in maintaining a stronger, healthier workforce, even post pandemic."

In their consulting work, Derewecki and Saenz are seeing operations add shifts to lessen the number of workers in a facility at one time to improve health and safety. This is perhaps more common that major changes to facility equipment and layouts.

Another way to keep workers distanced is to adjust the dispatching of work, or to adjust the slotting and zoning of an operation, explains Derewecki and Saenz. Such changes using software and systems not only can help keep workers physically distanced, it can improve efficiencies in tasks like picking.

Our annual survey has always asked about actions taken to lower operating costs. For 2020, the survey found that 98% have taken some form of action to lower costs, which is higher than 2019's 95%. Among the more specific actions taken to lower costs, 69% are looking to improve inventory control, up from 50% last year.

It's quite likely that many respondents experienced a big swing in inventory levels related to pandemic consumer buying surges on certain products, and are now looking to rethink what the right stocking levels should be, explains Saenz. "Moving into 2021, being better at inventory control and planning is shaping up as a key concern," he says. "People are realizing they need to be better at analyzing what they keep on hand and how much of it."

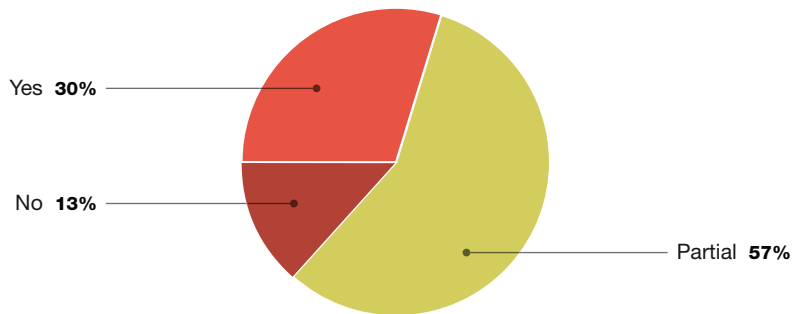
Systems and technology

Given the considerable challenges facing DCs, it's fortunate that budgets remain healthy. The average capital expenditure (capex) budget for equipment and technology reached \$1.45 million in 2020, up from \$1.27 million last year. The median capex figure did decline slightly, but 5% say they have a budget of \$10 million or more.

Another sign of continued investment is that 85% use some type of warehouse management system (WMS) software solution. Furthermore, legacy WMS use declined from 35% last year to 24% this year, while use of WMS modules from enterprise system vendor increased, while use of best of breed WMS solutions stayed fairly level.

This year's survey also found a fairly steep drop in paper-based picking methods, with 46% using paper, down from 55% last year, which is the lowest level in the past four years. Conversely, use of RF-based handhelds to help automate picking reached 61%, up from 41% last year, and constituting the highest percentage for RF-based picking in the last four surveys. Reported use of voice

Plans to continue COVID health and safety practices



Source: Peerless Research Group (PRG)

picking was down for 2020, but in the first year of asking about pick-to-light as a pick technology, 14% were using light-driven picking.

When asked about data collection methods used to gauge productivity, the survey also found that 63% use data gleaned automatically from a WMS, up by 7% from last year, while manual data collection, used by 58% last year, dropped to 43% this year.

Continued technology investment

When it comes to taking actions to lower costs, a net 98% say they have taken some type of action.

should help DCs leverage metrics to help manage operations. Overall, 98% are using metrics, up from 94% last year. Use of all metric types asked about were on the rise for 2020, with use of on-time shipments up by 10%, for example, and use of order- or line-fill rate metrics jumping up by 18% to reach 61%.

"The increased use of all metrics indicates that top management is pressing operational managers for

improved controls and productivity," says Derewecki.

Tough challenges

When it comes to major issues making an impact on DCs, once again in 2020, the inability to attract and retain a qualified hourly workforce was the top issue, cited by 53% of respondents this year. Difficulty in finding qualified supervisors was also cited by 33% of respondents, just below last year's 35% who ranked this as a tough issue.

For the first time this year, we asked if challenges tied to a surge in e-commerce constituted a major operational issue, with 37% affirming that it did. This tied with insufficient space at 37% as the second most frequently cited major issue making an impact on current operations. Lack of SKU weight and dim data also climbed slightly, with 24% calling it a major issue.

The survey annually asks whether respondents' supply chains had experienced a catastrophic event in the last two years—such as hurricanes, other extreme weather events, hackers, strikes, or supplier failures. While

77% say “no,” 23% did say they have experienced such an event.

Again, when it comes to taking actions to lower costs, a net 98% say they have taken some type of action. While improving warehouse information technology and software systems declined, there was a slight (2%) increase in “adding automation equipment to processes.” Given other findings such as greater use of RF-based picking and WMS-generated metrics, it appears respondents see the use of automation

The 2020 survey shows an industry in deep flux driven by the pandemic and the sharp rise of e-commerce fulfillment pressure.

as a necessary means of keeping pace with change while holding down costs.

Still deep in flux

Overall, the 2020 survey shows an industry in deep flux driven by the pandemic and the sharp rise of e-commerce fulfillment pressure. Fortunately, the overwhelming majority of respondents are taking steps to safeguard workers and many plan to maintain some or all of these measures long term while continuing to invest in facilities, automation, and systems to support the operational challenges that stem from the 2020 surge in e-commerce.

“The rapid rate of operational change and requirements brought about by the pandemic is the central focus this year,” concludes Derewecki. “The need to sanitize and keep employees a safe distance apart are priorities most operations weren’t thinking about a year ago, but there are now. Additionally, the

acceleration in e-commerce this year is furthering the trend toward higher levels of automation and information systems support, as a means of being able to fulfill orders efficiently and meet the rapid

order delivery expectations customers are demanding.” •

Roberto Michel is editor at large for Supply Chain Management Review



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Eliminating silos to drive order-to-cash performance

Supply chain collaboration is key to optimizing activities that link the customer to the bottom line.

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

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As in any field, supply chain professionals are susceptible to prioritizing and focusing on their own tasks to the extent that they unfortunately can create silos. Within these organizational silos, work may be optimized, but at the level of the entire enterprise, the result may be sub-optimized processes that are not as productive as possible. Although many organizations recognize the impact that supply chain can

have on the bottom line, it is easy for supply chain staff to lose sight of how their functions interact with others and affect processes across the organization.

This is especially true with end-to-end order-to-cash processes, or the interconnected chain of activities that spans from the time a customer places an order, through the fulfillment of that order, to payment receipt and collections. Although supply chain is only a part of this process, by working closely with other relevant departments it can have a significant impact on an organization's revenue stream.

APQC recently conducted research on how organizations optimize their end-to-end order-to-cash processes. The research looked at how organizations are increasing collaboration within and across supply chain and other relevant departments to standardize

processes. It also examined how leading organizations are transforming their order-to-cash processes to be more efficient and high performing.

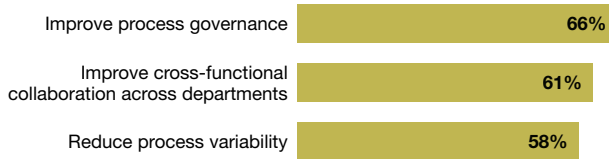
Driving process efficiency

Optimizing order-to-cash is a critical area for process efficiency efforts. In fact, 65% of organizations surveyed by APQC are in the process of an optimization effort for this area. However, this is a recent development. In the same survey, only 16% of organizations indicated that they have completed a transformation of order-to-cash within the last five years.

As shown in Figure 1, process drivers are the key reasons organizations seek to transform order-to-cash. The top driver is improving process governance, closely followed by improving collaboration among departments and reducing process variability.

FIGURE 1

Top three drivers for transforming order-to-cash



Source: APQC

Organizations desire to standardize order-to-cash processes to benefit the business overall. They also recognize the need for departments to tear down silos to improve performance as well as the overall customer experience. To a lesser extent, organizations are interested in performance improvement in the form of shorter cycle times and decreased errors. Although this also benefits the business, it misses the strategic goals of process standardization and increased collaboration.

When it comes to setting key performance indicators for order-to-cash, organizations are focusing on the time needed to complete activities. As shown in Figure 2, a majority of organizations look at the cycle time needed for the entire end-to-end process. Behind that are measures related to specific activities, such as days sales outstanding, focused on the accounts receivable portion of the process, and on-time delivery performance, related to the order processing and supply chain portions of the process.

With their emphasis on process standardization and collaboration, organizations are paying less attention to measures of efficiency (such as the number of FTEs in the process), cost or quality. APQC recommends that organizations not lose sight of quality measures. Focusing exclusively on shorter cycle times and faster delivery may mean that an organization is sacrificing the quality of its customer orders.

The importance of order management

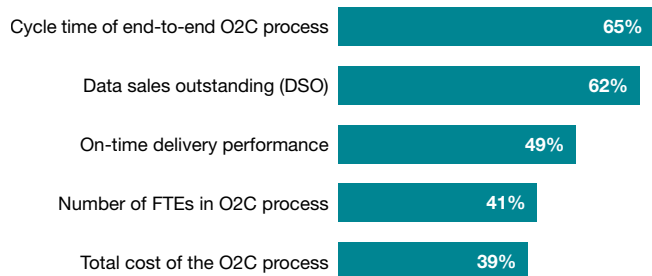
As part of a broader focus on the end-to-end order-

to-cash process, supply chain professionals should recognize the importance of order management on the overall business as well as their own activities. Order management is often the initial touch point in a customer transaction. Without accurate information from the start, valuable time can be spent correcting order errors. Further, errors can affect an organization’s inventory management, which can then affect additional customer orders and quickly lead to customer dissatisfaction.

Order accuracy also affects the accounting activities at the end of the order-to-cash process. When information is incorrect at the front end, it is harder for accounting to reconcile invoices with the actual orders placed by customers. APQC has found that successful organizations increase collaboration between the order and cash sides of the process to reduce errors that can affect an

FIGURE 2

Top five performance indicators for order-to-cash



Source: APQC

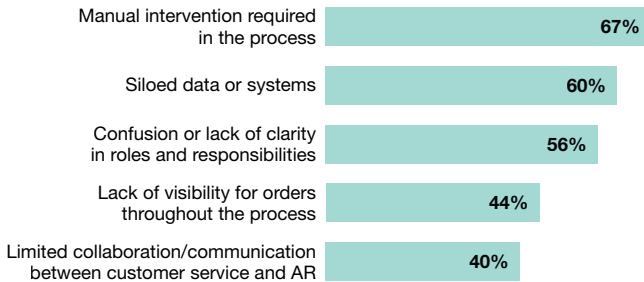
organization’s bottom line.

A lack of collaboration creates challenges for organizations looking to achieve greater efficiency. As shown in Figure 3, a lack of collaboration creates the need for manual intervention during order-to-cash processes—which greatly increases the likelihood of errors—and the challenge of siloed data or systems.

As part of its research, APQC interviewed a global manufacturing organization that improved its order-to-cash process by improving the

FIGURE 3

Challenges resulting from lack of collaboration between order and cash



Source: APQC

collaboration between its accounts receivable staff and other functions, such as warehousing and supply chain. Through the increased collaboration, the organization was able to improve its ability to apply customer payments to invoices and reduce the number of past due accounts.

Effective order-to-cash

APQC has found that successful organizations adopt three practices for effective end-to-end order-to-cash processes: global management of the order-to-cash process, the use of mobile and cloud technology and identification of the right system for the process.

Process ownership. Only about one-quarter of organizations manage order-to-cash as an end-to-end process. About half have made some effort to manage it as an end-to-end process in some departments or regions. This leaves nearly one-third of organizations still managing their order-to-cash activities in silos.

Many best-practice organizations have a global-level process owner responsible for standardizing systems and processes across the many departments involved in order-to-cash. These owners standardize the systems used in the process and the metrics assigned to determine success. As one might guess, these individuals must have a broad

knowledge of the different activities that go into order-to-cash, from order management to supply chain to AR. However, organizations that have implemented such a role have a much higher percentage of customer invoices paid on time than those with process ownership at the business level.

Use of mobile and Cloud technology.

Some organizations are adopting the use of mobile and cloud technology to increase access to information and provide additional opportunities for collaboration. Mobile technology can be quickly adopted, as employees already understand its use from other aspects of their lives. In fact, over 70% of order-to-cash professionals participating in APQC’s research have access to their finance function’s technology through mobile devices.

Cloud technology offers additional benefits for the order-to-cash process. Potential benefits include increased data security, lower costs, greater access to data, and shorter cycle times. However, organizations have adopted this technology to a lesser extent. APQC’s research indicates that only 31% of organizations use it, but an additional 56% plan to increase its use soon.

Both mobile and cloud technology provide organizations with the opportunity to increase efficiency and reduce costs. Those that have adopted mobile access to data need fewer full-time equivalent employees (FTEs) for order-to-cash. Both organizations that have adopted mobile technology and organizations that use cloud technology report a lower cost to perform order-to-cash processes.

Determining the right system fit. With the standardization of processes and the potential for technology to provide greater access to data across departments, organizations

need to consider which systems best support order-to-cash. The systems traditionally used by different departments are often unable to connect with each other, furthering the historically siloed nature of activities within order-to-cash.

Organizations must consider their circumstances (such as unique organizational goals and the types of orders for their particular industry/business model) and determine whether they can adopt a commercial system for use across the order-to-cash process, or whether it makes more sense to create a system in-house. There are both pros and cons to each option, and which to select will depend on the organization's needs, budget and willingness to invest time in the project and ongoing maintenance and management of systems.

Moving toward automation

The taking and processing of customer orders, as well as invoicing and collection based on those orders, are central to an organization's business. The order-to-cash process both establishes a customer's perception of an organization and directly affects the organization's bottom line. Although supply chain is only part of the process, supply chain professionals must recognize that their collaboration efforts are integral to the success of order-to-cash as an end-to-end process.

Creating an efficient and effective order-to-cash process also means standardizing processes and adopting systems that enable increased data access and visibility. A natural next step in this is automation, and best-practice organizations recognize that they benefit from automating as much of the order-to-cash processes as possible. For the global manufacturing organization interviewed by APQC, automating its accounts receivable activities was another element to the improvement of its order-to-cash process.

Automation overall reduces the cost and time needed for order-to-cash and also lowers the cost of managing sales orders. It lowers operational costs and increases working capital. It also frees up employees so that they can engage in more value-added activities.

Optimizing the end-to-end order-to-cash process gives organizations a more strategic approach to their activities. By viewing the process as a valuable chain of interconnected activities, an organization can improve coordination among departments, improve performance, better communicate with customers and increase customer satisfaction. ∞∞

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