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Lessons from leaders



Bob Trebilcock,
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If it's September, it must be time for Gartner's take on the Top 25 supply chains. This marks the 16th year that Gartner has put together its list of the leading supply chains across the globe, a list that now also includes an additional five Masters. Those are companies that so consistently made the list year in and year out that they warranted a category all their own. You can read the article, and the web only material we publish on scmr.com, to find out what it takes to become a supply chain leader. The lesson I took away from this year's list is that the companies on it aren't only implementing new technologies or offering new services; they're also leading the way in areas of sustainability, corporate responsibility and supply chain ethics. Read the article, and let us know what lessons you take away.

Speaking of leaders, this issue features an extended interview with Shekar Natarajan, the supply chain leader at American Eagle Outfitters. Shekar has had a fascinating career working in supply chain at some of the country's best-known brands—Coke and Pepsi, Walmart and Target, with Disney and AB InBev thrown in for good measure. He's also thinking about the future of supply chain, with a new perspective he calls Supply Chain 4.0.

We round out the issue with articles examining what supply chain managers can learn from decathlon athletes that will help them clear the bar on supply chain performance; demand planning in a post-COVID world; and a look at how supply

ecosystems are changing the way procurement professionals bring their suppliers together to innovate, develop new products and improve performance.

Finally, I hope you'll have room on your calendar to attend our NextGen Supply Chain conference, November 10–12. As with most events this year, COVID-19 forced us to cancel our in-person event in Chicago in April. So, we're going virtual. We have an impressive lineup of supply chain leaders, including keynotes from Mark Shirkness from GE Appliances, Lenovo's Bobby Bernard and Ninian Wilson from Vodafone.

And, we'll have presentations from this year's Supply Chain Award winners. The event is designed to bring thought leadership on those technologies defining tomorrow's supply chain to senior leaders—like you. You can learn more about registering at nextgensupplychainconference.com.

I look forward to you joining us, and as always, to hearing from you.

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Supply chain heroes and lessons from COVID-19

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I was originally going to title this column, “Say it ain’t so, SCM,” a paraphrase of “Say it ain’t so, Joe.” That saying originated after the 1919 World Series scandal, when Chicago White Sox players were accused of taking bribes to throw the series, and star outfielder “Shoeless” Joe Jackson allegedly admitted to helping fix the outcome. The expression is now commonly used to express disbelief or disappointment after learning some unfortunate truth about someone or something—such as the shortcomings of supply chain management.

And, make no mistake: COVID-19 exposed some serious shortcomings in U.S. supply chains. This was disturbing news for all SCM professionals, who wish it weren’t so. At the same time, I think the shortcomings also expose a future role for supply chain heroes if we can learn the lessons from the pandemic.

SCM has been a global force for good

I joined the supply chain community in 1990, following a career in marketing. From the start, I felt fortunate to be at the right place at the right time. The rise of globalization and consumerism led to the evolution of global supply chains that strived to source, transport, make and deliver goods from any country in the world, and to sell them in any other.

Using practices such as just-in-time, integrated operations and cross-functional business processes, we developed highly efficient and effective supply chain operations to meet the global demand for goods and services. What’s more, like many of my colleagues, I felt like those of us managing global supply chains were raising the economic conditions

of people around the world. In a respect, we were supply chain heroes. There are statistics to back up that view: According to the World Bank, by 2018 poverty around the world had plummeted, half the population had reached the middle class, and literacy, disease and deadly violence were receding. I believe that much of that can be attributed to the manufacturing, logistics and distribution capacities that brought economic development to developing countries.

Yet, shortfalls in two basic human needs

Still, as we have learned during the pandemic, despite creating very efficient supply chains, our efforts have sometimes fallen short of meeting some basic needs, even in affluent countries.

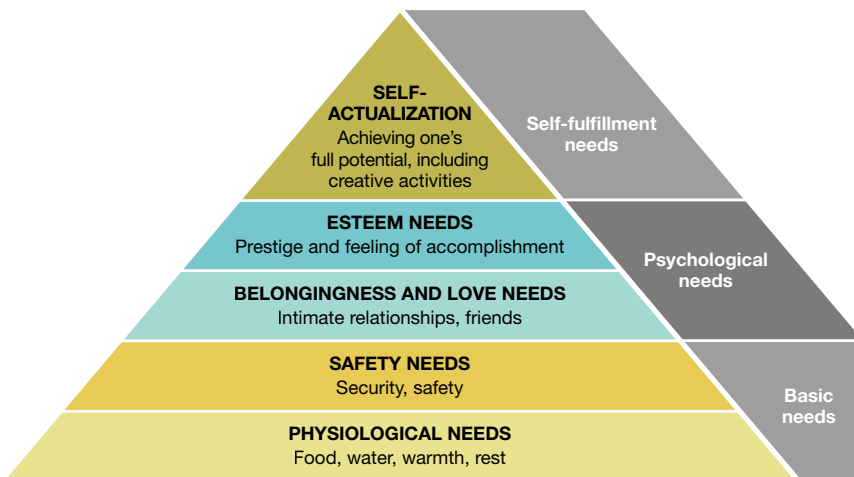
As a marketing professional I learned about Maslow’s Hierarchy of Needs, a framework for looking at how products and services meet the needs of consumers. It is represented as a five-tier pyramid model of human needs (think consumers) and is often used as a gauge for determining the level of fulfillment societies have achieved in satisfying citizen needs (see Figure 1).

For example, less-affluent developing countries focus on meeting the lower two tiers that involve basic needs: 1) physiological and 2) safety and security needs. Industrialized affluent countries, having previously fulfilled basic needs, largely focus on supporting citizens in filling needs among the three higher tiers of psychological and self-fulfillment needs: 3) love and belonging; 4) self-esteem and 5) self-actualization.

As an affluent country, I assumed the United States had already fulfilled our basic needs, such as food, clothing, shelter and medical supplies. Now, we should be on a path toward an enlightened society—meeting our psychological and self-fulfillment needs. So, it was stunning to me when we began to see major shortages of two of the most important basic needs: food and medical supplies. These are so essential that the United States and other industrialized nations should be self-sufficient rather than count on other countries to do for them.

FIGURE 1

Maslow's Hierarchy of Needs



Source: simplypsychology.org

Learnings from the food shortages

I live in one of the most affluent towns in the United States. Yet, during the shutdowns, it was difficult just to get groceries. While grocers struggled to fill their shelves, we learned from news reports that produce and dairy farmers were dumping their products and livestock growers were euthanizing their animals because there was no one to sell them to. While that seemed crazy to my family and friends, it made sense to me as a supply chain professional. I understood that the food supply chain is really two distinct chains: One is the grocery industry

that serves home consumption—think grocery stores—and the other is the food service industry that delivers to restaurants and other commercial institutions—think companies like Sysco—for food consumed outside of the home. Today, that second supply chain accounts for more U.S. food expenditures than ever—as much as 54% of total food expenditures in 2018, according to the USDA—as Americans dine away from home more.

The two have very different needs, from the sizes of packaging to how products are delivered. What they have in common is that both are fine-tuned to be extremely efficient rather than responsive. What's the difference? In terms coined in a ground-breaking publication by Wharton professor Marshall Fischer,* efficient supply chains are used for high-volume, low-margin products and focus on minimizing costs and assets, such as inventories. Efficiency keeps food prices low. Responsive supply chains are typically utilized for trendy, high-margin products; they are designed to maximize product availability. Minimizing costs is a secondary consideration.

During the pandemic, the restaurant, travel and hospitality industries shut down their operations and furloughed their supply chain workers. With the food service supply chain on hiatus, farmers had no place to sell at least half their wares. Meanwhile, furloughs also slowed down the ability of the grocery supply chain to move goods from suppliers to the stores. Remember: Those supply chains were not designed to turn on a dime.

Significant short-term change to both supply chains would have been necessary to correct this at the national level. However, there is currently no strategic food reserve to mitigate food supply disruptions similar to the Strategic Petroleum Reserve that was put in place after the Arab oil embargo. Like that program, it usually takes a real crisis for the federal government to create a strategic reserve.

That said, there were some Quick Response (QR)** initiatives that enhanced the flow of food. For example, restaurants across the country offered home delivery and take out; in Boston, the mayor also allowed restaurants to sell groceries. I believe, however, that more could have

been done if the food service and grocery industries collaborated to improve the flow of food using short-term QR programs, with or without government help. That could be a project for future supply chain heroes.

Learnings from the medical supply shortages

In my column, “Advocate for responsible outsourcing,”*** I argued that too much outsourcing from the United States led to income inequality and a shrunken middle class. I discussed several factors that might have caused over-outsourcing including unsound analyses and plans, globalization, shareholder-focused executives and “justice” (in terms of the “national debt” companies owe). A factor I missed was national health.

Although the United States is guilty as charged of spending more money on health than any other nation, the pandemic exposed the fact that the United States is also overly-reliant on cheap Asian labor for inexpensive but essential personal protection equipment (PPE), such as masks and gowns for our hero medical workers. I suspect the causes for those shortages involved inappropriate outsourcing and inventory management practices. When the global pandemic hit, we paid a price when sourcing countries kept supplies for their own citizens. I’m sure we would have done the same if the shoe was on the other foot.

I also suspect that the use of standard Pareto-based A/B/C inventory management practices might have been complicit in the PPE shortages. These practices put the most focus and resources into managing A items, less so in B items and the least in C items. The ranking criteria is often predicated on revenue, usage or inventory value.

During my work in service parts logistics, I learned about another important ranking criteria: criticality. It is based on the cost-of-shortage to the user, and not the supplier. It incorporates the customer’s costs when operations are shut down for the lack of a part. For example, Caterpillar offered next-day delivery on critical parts because part failures could shut down construction and mining operations around the world, negatively affecting a customer’s revenues. Similarly, in computer services there were parts whose failure would shut down computerized transactional systems such as airline and hospital-ity reservations or banking and financial operations. Critical parts by their very nature are A parts regardless of revenues, usage or their inventory value.

During the pandemic, the shortage of PPE equipment, especially for workers in Intensive Care Units, meant that COVID-19 patients received degraded health care. This may have contributed to some deaths. Those are stark reminders that PPE supplies, albeit inexpensive, should be treated as A items that require focus and attention. They should definitely not be outsourced to other countries.

Similar to food, there is no federal strategic reserve to minimize PPE supply shortages during a pandemic. Perhaps it will be available for the next one. Meanwhile, I would urge private sector companies to develop QR programs as well. That could be another project for future supply chain heroes.

You can be a SCM hero, too

Like most people, I experienced some of these shortages first-hand. Since the beginning of the pandemic, for instance, I have been unable to replenish our home stock of Clorox wipes. That’s not likely to change any time soon, as Linda Rendle, Clorox’s incoming CEO, warned in the Wall Street Journal that wipes “will likely remain in short supply until summer 2021.” I suspect that Clorox had no effective short-term QR programs in place to garner the huge revenue opportunities from customers like me, who are willing to pay double or triple to get more. That could be one of the reasons the current CEO is being replaced by Rendle, who has supply chain experience and had oversight of Clorox’s cleaning products—one of the new generation of supply chain heroes I mentioned earlier.

To sum it up, the major learning from the COVID-19 pandemic is that we need to support federal and local government efforts during emergencies like pandemics. However, if you want to be a supply chain hero, think also about supplementing this support with QR programs to boost your company’s revenue, even during pandemics and possibly the ensuing economic downturns. ☺☺

* Marshall Fisher, “What Is the Right Supply Chain for Your Product?” Harvard Business Review, Mar/Apr 1997

** L. Lapede, “Are you capturing enough ‘quick-response’ revenue?” Supply Chain Management Review, Mar/Apr 2018

*** L. Lapede, “Advocate for responsible outsourcing,” Supply Chain Management Review, Nov 2017

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Steering innovations through regulatory headwinds

By Matthias Winkenbach and Farri Gaba



One of the many variables that influence the success of an emerging innovation is the regulatory framework that it must navigate to become a real-world application. These frameworks might exist but be open to change, or rudimentary because the codes are in an early stage of development.

Either way, innovators need to be aware of how current and future regulations might influence the commercial prospects of their creations.

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Truck-and-drone (T&D) cooperative last-mile delivery systems represent a promising solution at a time when new ways to deliver products to end customers are in high demand. However, the concept faces an uncertain future, partly because the regulations that pertain to it are still evolving.

Research carried out by the MIT Megacity Logistics Lab explores the future of the T&D concept from a regulatory perspective. The research provides important insights into the commercial potential of T&D systems, as well as the role of regulations in bringing supply chain innovations to market.

A promising innovation

Drones have emerged as a highly promising last-mile delivery mode that avoid ground-based traffic and can provide nearly on-demand service. However, these aircraft are severely constrained by flight range and cargo capacity limitations.

The T&D delivery system could overcome these constraints. In this system, drones are fixed to the top of a truck when not deployed, dispatched from the truck when required and retrieved at other predefined locations along the truck's route. After returning to their truck base, the drones switch batteries with spare units that have been charged by the vehicle, or recharge while being fixed to the truck. The concept is reminiscent of an aircraft carrier operation.

Logistics route optimization models show that a T&D vehicle system can achieve substantial cost savings when benchmarked against either truck-only or drone-only delivery models. The

cooperative concept is particularly promising in affluent, rural areas where distances are long by road but not by air, and consumers are willing to pay a premium for speed. Integrating drones into the delivery process in this way is particularly effective in areas where a relatively small number of customers are ill-served by current truck-only delivery services.

Sources of uncertainty

However, the benefits of the truck and drone combination at the heart of this system are less clear cut from a regulatory perspective.

The Federal Aviation Administration is responsible for the control and use of navigable airspace in the United States. There is a vast range of FAA regulations pertaining to the operation of drones, but following are the rules that pertain to commercial T&D operations.

- Drones must be flown within visual line of sight of the pilot in command.
- Drones cannot be flown autonomously—there must be an operator—and a one-to-one relationship between operator and drone is required.
- Drones cannot be operated from a moving vehicle to transport another person's property for compensation hire. Some compromises are possible; drones could be launched when the vehicle is stationary, for example.
- Drones cannot be operated over a non-participating person, property populated by people, or a moving vehicle—a non-starter for urban delivery systems.
- Drones cannot be operated in certain classes of air space as defined by the FAA without

authorization or waivers.

- Drones must weigh under 55 pounds and remain under a 400 feet altitude ceiling unless they operate under certain waivers.

These regulations are extremely restrictive for commercial drone delivery services—let alone T&D vehicle systems.

Moreover, operators must also comply with state and local codes, which are by no means straightforward. For example, states are not allowed to restrict drones from operating in a specific airspace directly. However, because the FAA does not oversee trespassing or privacy regulations in this domain, local agencies have asserted their authority through these channels.

Last-mile regulations that address relevant vehicle manufacturing, design and maintenance requirements as well as operational constraints is another class of code that could impinge on T&D vehicle systems. However, this type of regulation does not currently apply because the T&D concept is too novel to be regulated in this way.

Another source of ambiguity is the prospect of further regulation. An example is an attempt in 2017 to introduce federal legislation to regulate drones. The legislation would have introduced restrictions such as requiring any person or firm seeking to use a drone for commercial purposes to obtain pre-authorization by providing detailed information on the venture. Although this legislation was never enacted, it is indicative of how the legislative landscape can change.

Adding to the uncertainty is the lack of appropriate representation at the regulatory level. At the time of writing, no member of the FAA's Drone Advisory Committee has expressed interest in T&D vehicle systems, hence the concept is under-represented.

Rolling the regulatory dice

Notwithstanding these uncertainties, what type of regulation might facilitate the development of T&D last-mile solutions?

There are two fundamental possibilities: adaptive and static. As these categorizations imply, adaptive regulations advance in stages with the promise to revisit and revise policies in the future, whereas static codes are less flexible and allow less room for revision.

The overarching aim is to reduce policy errors and countervailing risks, improve net benefits to society, minimize industry or public frustration and, in the best case, incentivize future technological innovation in the industry being regulated or other associated industries.

Static policies appear to be less aligned with these objectives in the context of T&D vehicle systems that are still in the formative stage of development. It is not uncommon for this type of regulation to yield ill-suited and over- or under-regulated frameworks over time that impart their own set of negative externalities and consequences.

Adaptive regulations can flex with the T&D concept as it evolves. Adopting an adaptive regulatory mindset can help

overcome political impasses because the regulations develop in stages. This approach has received much attention, in part, because it helps regulatory bodies keep pace with technological advances.

However, the adaptive method does have its drawbacks—namely cost to the regulatory body. Also, it can be more challenging for industry to keep pace with regulations that are in a state of flux. Moreover, frequently visited regulation opens the door for commercial interest groups to lobby their cause at each policy revision.

Planned Adaptive Regulation (PAR) is a variant on the adaptive approach. PAR is inherently adaptable since formal learning is built into the process. This approach requires periodic evaluations that involve data gathering, input aggregation and policy redrafting.

Soft law mechanisms represent another tool that could be employed in the pursuit of adaptive regulations. These are typically defined as regulatory arrangements that create substantive expectations but are not directly enforceable. Examples include informal guidance, industry self-regulation, best-practice guidance, codes of conduct and third-party accreditation and certification.

The FAA's current regulatory approach teems with examples of soft law policies given the case-based approach that the agency currently follows, particularly in the drone delivery space.

Another tradeoff to consider is the relative merits of local versus national regulatory oversight. As always, each approach has its pros and cons. For example, local regulations are typically more adaptable and better at keeping up with rapid technological evolution. On the other hand, there is always a risk that local municipalities enact "revenue generating" regulations that are not aligned with national priorities.

Scope for success

While the future of T&D vehicle systems as a last-mile solution is uncertain, we can be sure that the industry's key players will continue to conjure iterations of the technology or new concepts as they pursue innovations that give them a competitive edge.

The technology policy question will remain central to this activity. The good news is that where there is a problem there is an opportunity, and those that learn to navigate the regulatory skies could reap substantial benefits. ☺☺

"A Systems-Level Technology Policy Analysis of the Truck-and-Drone Cooperative Delivery Vehicle System," the working paper from which this article is derived, can be downloaded at ctl.mit.edu. Just scroll down to "publications" and click on the paper.

The cognitive ecosystem: A new beginning

The pandemic provides an opportunity for new strategies to navigate through uncertainty to a new beginning.

By Hiranmay Sarkar

Hiranmay Sarkar is a managing partner with Tata Consultancy Services. He can be reached at h.sarkar@tcs.com.

The impact of COVID-19 is being felt in every business today. The time to recover to a pre-COVID state will vary from company to company based on their business models, industries and geographies. However, it provides an opportunity for an enterprise to determine new strategies and navigate through the uncertain times to a new beginning. Companies are at the crossroads as demand volatility increases and supply disruptions continue to shake the customer experience. Companies must respond to the market uncertainties faster than ever before.

An ecosystem centric cognitive supply chain can play a pivotal role in addressing the challenges. It can enable an engaging customer experience throughout the product journey—from product development and launch to booking an order to delivering the products and to providing after sales service. This requires the enterprise to detect the changes as soon as they occur, respond swiftly and ensure prevention of future recurrences.

Most organizations today face a disconnected ecosystem of multiple silos, enterprises and physical supply chains, as well as they are constantly challenged by unpredicted external forces. All of these cause disruptions and affect the customer experience. Efforts toward establishing a cognitive ecosystem promise a new beginning enabling organizations to seize the opportunity change offers.

Ecosystem value chain

The modern supply chain operates in an ecosystem value chain that deals with both the demand and supply side processes of an enterprise, and these business processes span across

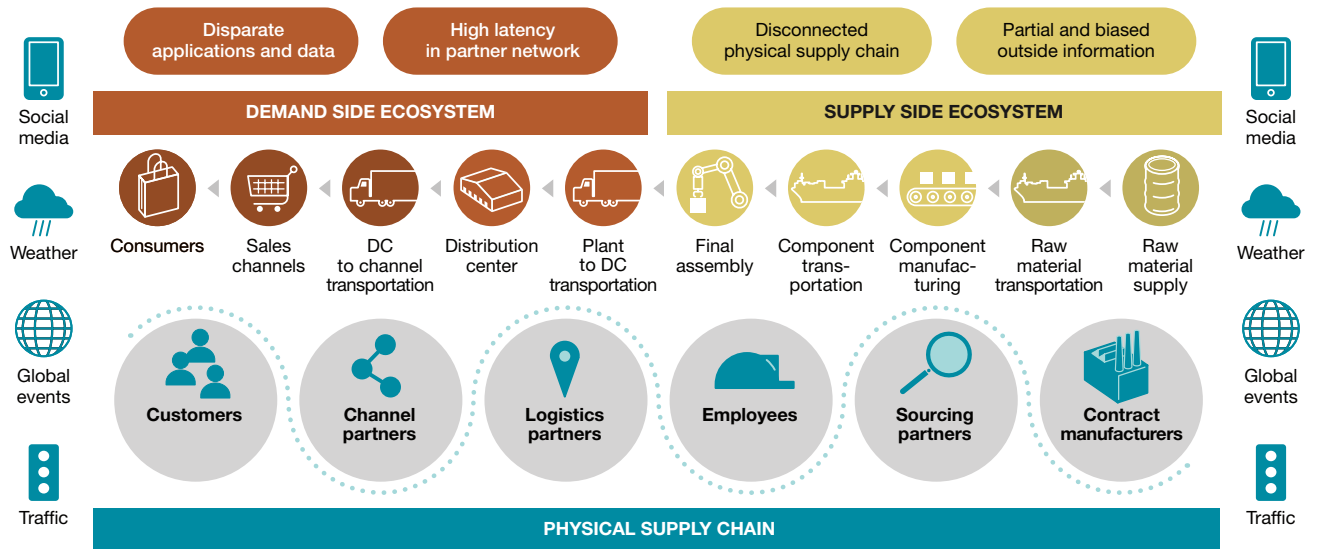
multiple enterprises. Business operations, such as raw material supply, manufacturing, storage and distributions are performed by multiple companies before products reach the customers/consumers. Within the ecosystem value chain, an enterprise collaborates with multiple other companies that provide specific services or products (see Figure 1.).

By virtue of this working model, an enterprise needs to operate with four key entities as follows.

1. Partners. Depending on a company's business model, there could be several options from 100% vertically integrated to 100% virtually integrated supply network value chains. A 100% vertically integrated company performs all of its supply chain operations in-house, whereas a 100% virtually integrated company outsources its entire supply chain operations to partnering companies, such as sourcing partners, contract manufacturers and channel partners. By outsourcing the operations, these companies can focus on their core strengths, including customer centric activities, branding and financial performance.

FIGURE 1

Ecosystem value chain



Source: Author

2. Physical supply network. These refer to assets such as equipment for loading-unloading in a warehouse, CNC machines on the shop floor or trucks for land transportation. A large volume of data such as geospatial location or machine output can be captured from the physical supply network by leveraging the Internet of Things (IoT) to facilitate real time monitoring and control.

3. External forces. Supply networks are exposed to various external forces, everything from pandemics, traffic, weather or social sentiments. These external forces have significant influence on a company's business performance, and, as such, they are also vulnerable to disruptions similar to those experienced this past spring and summer including shutdowns and protests, or the more common disruptions caused by traffic congestion delaying shipments or winter storms forcing store closures.

4. Systems of record. Companies are implementing and leveraging software platforms and IT infrastructure to manage business operations like supply planning, distribution and warehousing and logistics. As companies have grown and

technology has evolved, their IT infrastructure has become a complex landscape of fragmented functionality, technology and data.

A cognitive ecosystem drives agility

Supply networks are always vulnerable to disruptions. A small disruption at one point can cascade to other points of the ecosystem that potentially creates a large impact, like a delay in vessels arriving from overseas suppliers that can halt production and delay shipments of finished goods to the customer.

Enterprises need to adopt conscious efforts to minimize disruptions by gradually improving cognitive capabilities across the market ecosystem. Cognitive ecosystems require five key characteristics to drive agility and resilience: (1) they must establish common business processes; (2) they must break the information silos by connecting the dots to improve inter-enterprise visibility and traceability; (3) they must orchestrate data across ecosystem participants with a common set of

standards for data harmonization across the ecosystem; (4) they must leverage the data to create ecosystem-wide self-awareness; and (5) each entity must work toward meeting a common purpose with agreed to SLAs and continuously focus on process automation to eliminate latency. An agile ecosystem faces disruption and improves the customer experience by managing the order experience, product experience, delivery experience and service experience (see Figure 2).

By virtue of improved agility, an enterprise acquires the following resilient capabilities: (1) flexibility—the ability of a company to adapt techniques to develop and implement modified processes; (2) accessibility—allowing companies to harvest relevant information rapidly from

its data abundant systems; (3) alertness—the capability that enables supply networks to sense changes and predict disruptions due to the changes; (4) decisiveness—companies are able to make resilient decisions confidently; and (5) swiftness—allowing companies to rapidly implement the decisions taken.

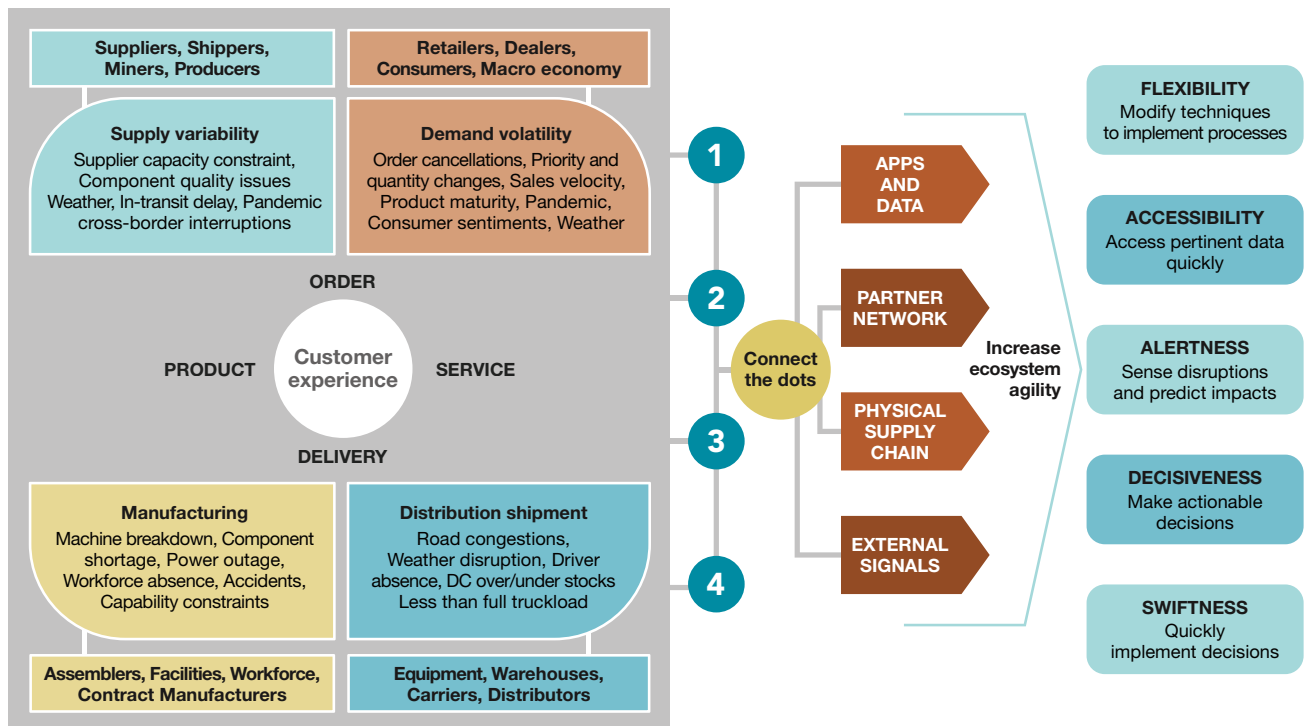
Cognitive ecosystem maturity journey

Companies need to take a practical approach to improve and develop a set of capabilities to improve their ecosystem maturity. Figure 3 shows representative capabilities at different maturity levels and depicts the incremental journey from the connected to the cognitive state.

Companies must consider developing specific capabilities based on their current maturity levels, such as the following.

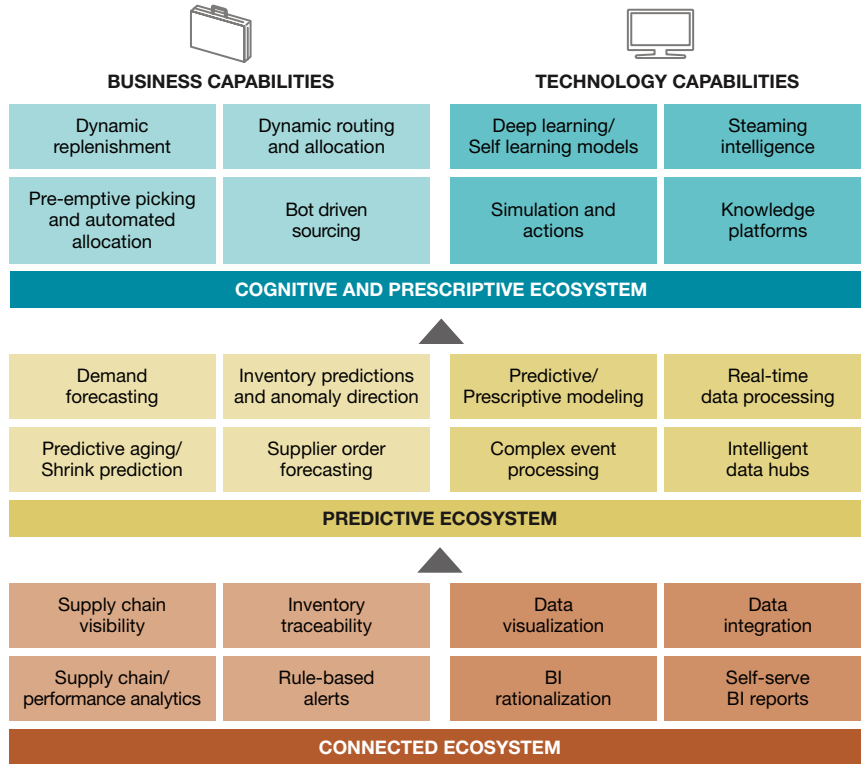
FIGURE 2

An agile ecosystem



Source: Author

FIGURE 3
Ecosystem maturity



Source: Author

Connected ecosystem. At this stage, an enterprise focuses on establishing visibility and traceability across the supply network. They focus on data integration and data virtualization across the ecosystem.

Predictive ecosystem. This state helps estimate the quantity of work items that would be needed to run the supply network optimally, e.g. it allows companies to determine optimal inventory levels across the ecosystem to satisfy demand while minimizing stock.

Cognitive and prescriptive ecosystem. A company reaches this state when it can take system assisted decision making and automated executions. Companies leverage combinations of digital technologies, such as AI/ML, IoT and blockchain, to sense changes in real time, analyze impacts and enable expediting business decision making. The cognitive ecosystem state will enable true insights across the ecosystem and help tackle disruptions and mitigate risks resolutely and resiliently.

Keys to the new beginning

Business environments are becoming more volatile every day and companies require the agility to minimize the impact of unpredicted disruptions. Rapid decision making and speed of execution are the keys to a new beginning.

This can only be achieved by adapting to a cognitive ecosystem. However, the reality of a cognitive ecosystem will not happen overnight: It is a journey that will gradually improve an organization’s business maturity from connected to predictive to prescriptive and to cognitive states.

Companies that begin this journey today will be in a more resilient position every day to gain competitive advantage in responding positively to market changes. As digital technologies mature and processing power becomes more affordable, companies can achieve data-driven insights and emerge as the future leaders in a cognitive ecosystem. ∞



The 2020 Supply Chain Top 25: LESSONS *from* LEADERS

Gartner's 16th annual global Supply Chain Top 25 exhibited adaptability and resiliency, especially during times of disruption such as these.

BY GARTNER'S MIKE GRISWOLD, DANA STIFFLER, STEPHEN MEYER,
THOMAS O'CONNOR, KC QUAH, MICHEAL YOUSSEF, KIMBERLY
BECKER, KIMBERLY ENNIS, JIM ROMANO AND STAN ARONOW

In our 16th edition of the Supply Chain Top 25, we have an impressive group of leaders with new lessons to share, including a diverse set of six new entrants.

In 2020, we have experienced one of the most significant disruptions in a lifetime. Many organizations felt the financial impact of the disruption beginning in early 2020, after we pulled all the financial information used as part of the business measurement component of the methodology. The peer and analyst voting components occurred in March and April of 2020 and reflect voters' perspectives on how companies dealt with the pandemic. It is instructive to see how many of the Top 25 companies have reacted and positioned themselves for success during and post disruption (see Table 1).

While some countries around the world are reopening their economies, massive uncertainty remains about how much activity will ramp up. Leading companies are defining scenarios to predict how markets will recover post-lockdown with a focus on accelerating competitiveness in the recovery curve, while also building in risk-mitigation strategies in case of a second wave. Leaders need an agile, or adaptive, strategy that allows the supply chain

organization to sense and respond to changes in the business context as they happen. They also need to think long term and forecast for the upturn.

You can read more about our methodology and notable trends on scmr.com.

Inside the numbers: The Top 5

High-tech leader **Cisco Systems** comes in at No. 1 on

TABLE 1

The Gartner Supply Chain Top 25 for 2020

RANK	COMPANY	PEER OPINION ¹	GARTNER OPINION ¹	THREE-YEAR WEIGHTED ROPA ²	INVENTORY TURNS ³	THREE-YEAR WEIGHTED REVENUE GROWTH ⁴	ESG COMPONENT SCORE ⁵	COMPOSITE SCORE ⁶
1	Cisco Systems	470	574	300.7%	12.5	2.9%	10.00	6.25
2	Colgate-Palmolive	1113	532	68.8%	4.7	1.0%	10.00	5.37
3	Johnson & Johnson	885	454	77.6%	3.0	3.6%	8.00	4.65
4	Schneider Electric	567	453	63.0%	5.4	4.2%	10.00	4.48
5	Nestlé	1084	350	40.0%	4.8	1.2%	10.00	4.44
6	PepsiCo	857	385	47.9%	8.2	2.7%	10.00	4.42
7	Alibaba	991	316	106.7%	23.9	54.0%	0.00	4.39
8	Intel	583	488	37.4%	3.5	5.8%	8.00	4.12
9	Inditex	737	351	34.7%	4.6	6.8%	10.00	4.11
10	L'Oréal	677	252	71.1%	2.8	7.4%	10.00	4.01
11	Walmart	1333	324	13.2%	8.5	2.4%	7.00	4.00
12	HP Inc.	296	389	51.1%	8.5	5.5%	10.00	3.87
13	Coca-Cola	1195	207	75.4%	4.4	0.0%	6.00	3.74
14	Diageo	403	280	41.4%	0.9	6.2%	10.00	3.49
15	Lenovo	397	307	16.9%	11.2	7.0%	10.00	3.44
16	Nike	768	265	47.2%	4.0	6.7%	6.00	3.35
17	AbbVie	128	30	262.4%	4.1	7.6%	5.00	3.20
18	BMW	575	182	24.8%	3.9	4.2%	10.00	3.17
19	Starbucks	799	202	52.6%	13.0	7.7%	4.00	2.99
20	H&M	412	161	22.4%	2.8	7.7%	10.00	2.95
21	British American Tobacco	154	56	85.6%	0.7	18.1%	9.00	2.90
22	3M	624	207	54.1%	3.9	1.1%	6.00	2.90
23	Reckitt Benckiser	265	14	99.0%	3.8	8.2%	9.00	2.79
24	Biogen	79	27	152.2%	2.5	7.8%	7.00	2.78
25	Kimberly-Clark	534	80	34.6%	6.6	0.2%	10.00	2.76

¹ **GARTNER OPINION AND PEER OPINION** based on each panel's forced-rank ordering against the definition of "DDVN Orchestrator."

² **ROPA:** ((2019 operating income / (2019 Net property, plant, equipment + year-end inventory)) x 50%) + ((2018 operating income) / (2018 Net property, plant, equipment + year-end inventory)) x 30%) + ((2017 operating income / (2017 Net property, plant, equipment + year-end inventory)) x 20%).

³ **INVENTORY TURNS:** 2019 cost of goods sold / 2019 quarterly average inventory.

⁴ **REVENUE GROWTH:** ((change in revenue 2019-2018) x 50%) + ((change in revenue 2018-2017) x 30%) + ((change in revenue 2017-2016) x 20%).

⁵ **ESG COMPONENT SCORE:** Index of third-party environmental, social and governance measures of commitment, transparency and performance.

⁶ **COMPOSITE SCORE:** (Peer Opinion x 25%) + (Gartner Research Opinion x 25%) + (ROPA x 20%) + (Inventory Turns x 5%) + (Revenue Growth x 10%) + (ESG Component Score x 15%).

- 2019 data used where available. Where unavailable, latest available full-year data used.
- All raw data normalized to a 10-point scale, prior to composite calculation.
- "Ranks" for tied composite scores are determined using next decimal point comparison.

Source: Gartner (May 2020)

strong revenue growth, strength in Environmental, Social and Governance (ESG) and recognition of leadership in the community opinion polls. Cisco's digital businesses are supported by a digital supply chain that can take advantage of data and is predicated on security as a foundation. Supply chain security needs to evolve, and Cisco has been on its own improvement journey, operationalizing the ability to monitor and mitigate partner IT security capabilities. In addition, Cisco has driven significant value in predictability in lead-time, cost savings and inventory reduction, while launching many new products, offers and services. Its ESG efforts include a goal to have all new Cisco products incorporate circular design principles by fiscal year 2025.

At No. 2, **Colgate-Palmolive's** commitment to reduce its impact on the environment is evident by its certification as "TRUE Zero Waste" through an external certification program owned by the U.S. Green Building Council (USGBC). Since 2017, 15 of its manufacturing sites have achieved TRUE Zero Waste certification, with 10 achieving platinum status, the highest level of recognition. Colgate-Palmolive received the 2019 Leadership Award from the USGBC "as an organization at the forefront of the green building movement," based on its TRUE Zero Waste certification accomplishments.

In response to COVID-19, Colgate-Palmolive mobilized five manufacturing plants on three continents to produce 25 million bars of soaps for global agencies that will be specially packaged with instructions on proper handwashing to amplify the World Health Organization (WHO) #SafeHands message.

Prominent healthcare conglomerate **Johnson & Johnson** climbs five spots to No. 3. J&J's embrace of supply chain innovation is unparalleled in the life science industry, where innovation is usually reserved for product development. Its Supply Chain Innovation Engine, located in New Brunswick, NJ, allows collaboration between J&J's supply chain team, key partners and external experts. People who work there prioritize disruptive ideas that will improve healthcare. To support the effort to treat COVID-19 patients, J&J leveraged its 3D printing expertise to print manifolds for ventilators. Designed by Prisma Health, the manifolds allowed two patients to share the same ventilator.

Climbing seven spots to No. 4 is **Schneider**

Electric, the French energy management and automation specialist. This move into the Top 5 is a remarkable achievement, considering that it only made its debut on the Gartner Top 25 four years ago.

After building foundational end-to-end supply chain processes, Schneider Electric is now building advanced digital systems on that base. For instance, the Schneider Electric EcoStruxure is a suite of tools and services to help in IoT development. One of the core capabilities it provides is connectivity across the business, providing support for better and faster decision making throughout operations. Moreover, Schneider Electric openly shares what it is doing with peers, embodying the concept of Gartner Supply Chain Top 25—to promote and make visible the supply chain profession.

With a top-five peer score (of non-Masters) and perfect ESG score, **Nestlé** lands at No. 5. Nestlé has a strong focus on customer centricity, with an emphasis on improving product availability on-shelf and online. To improve product availability, Nestlé is investing in additional capacity and performance in select manufacturing facilities to increase agility, transforming its planning capabilities with demand-sensing technologies and integrating strategic collaboration with key customers.

Movers and shakers: No. 6 through No. 15

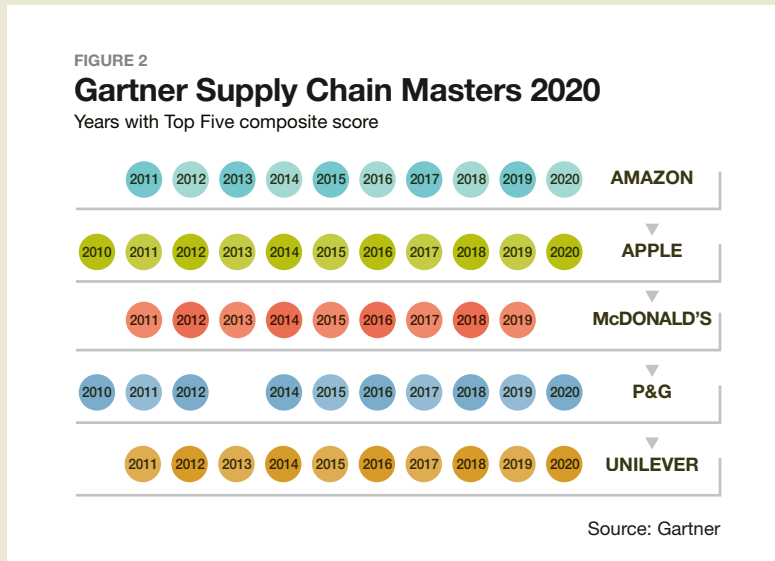
At No. 6., **PepsiCo** is leading the way in SmartLabel, the common industry platform that provides visibility to key information to consumers, including nutritional facts and certifications that support the highest levels of safety, purity and sustainability.

On the sustainability front, PepsiCo North America is leading with 100% sustainably sourced potatoes and corn. PepsiCo's U.S. operations will be powered by 100% renewable electricity this year as part of its global goal to cut emissions by 20% by 2030. This is accomplished with solar panels, battery-powered fork trucks and a move to more electric vehicles, including delivery trucks. And, during COVID-19, PepsiCo spent \$45 million to provide food and other essential relief to help those affected by the pandemic in more than 40 countries.

Chinese retail giant **Alibaba** rose six spots to No. 7. What differentiates the Chinese digital giant's supply chain from other e-commerce leaders is the sheer scale at which it operates. Consider that for its Singles' Day

Supply Chain Masters: Five companies leading the way

In 2015, we introduced the Supply Chain Masters category to highlight long-term leaders that have attained top-five composite scores for at least seven out of the last 10 years. To be clear, this category is separate from the overall Supply Chain Top 25 list, but if a Masters company were to lose this designation, it would be considered as part of the Supply Chain Top 25 ranking, like any other company in our study. All of last year’s Masters qualified again this year (see Figure 2).



Amazon

Customer centricity, supply chain capability and an innovation culture are at the core of Amazon’s business and have led to a range of attention-grabbing capabilities. These include:

- ever-faster, last-mile delivery capabilities, including reports that Amazon now delivers nearly half of its own packages;
- the hiring of 175,000 additional workers during the initial peak of the COVID-19 crisis to ensure customers continued to receive every day necessity items and medical supplies; and
- scaling of the grocery-focused retail concepts and micro-fulfillment capabilities.

In ESG, Amazon is on a path toward its stated goals to reach 100% renewable

energy by 2030 and to be net zero carbon by 2040, including its drive toward more sustainable packaging and the purchase of 100,000 electric delivery vans from Rivian.

Apple

Apple built its business models on the ability to generate revenue and profits by leveraging the data collected from its customers to understand their preferences. This customer focus is “baked into” its product designs and ongoing enhancements, as well as services.

Apple’s sustainability team has driven significantly improved visibility and performance on ESG issues beyond its first-tier supply base. Apple is committed to ESG, reducing its

carbon footprint by 35% since 2015. The supply chain community continues to recognize Apple's leadership, awarding it a Top 5 peer vote score again this year.

McDonald's

McDonald's has used its extensive supply chain ecosystem to disrupt its value proposition to consumers, focusing on more fresh, sustainable and even vegan options. This has included the roll out of fresh beef across its network of approximately 14,000 store locations across the United States and a commitment to sourcing 100% cage-free eggs by 2025. One key to the successful deployment of these changes has been its ability to manage trade-offs across the supplier ecosystem. For example, the switch to fresh beef has cost implications for meat suppliers but has been critical to enabling the highest comparable sales growth the business has experienced in more than 10 years. The McDonald's team also runs innovation days that include suppliers as part of a broader effort to continually improve menu offerings and supporting processes.

In partnership with suppliers and noncorporate partners, McDonald's is focused on sustainable sourcing, decreasing packaging waste and reducing carbon emissions.

P&G

P&G continues its digital transformation by radically changing the way that work is done, while driving improved business results and productivity. A key example is in supply planning, where its innovation was recognized with a FICO Decisions Award in 2019. Using algorithm-driven, phase-in and phase-out optimization, P&G has saved millions of dollars, allowing it to reduce time spent on supply chain initiative planning. The supply chain innovation has boosted analytics efficiency by 90%, reducing the weekly analysis time to less than five minutes. P&G has also made changes in

its supply network with redesigns in North America and Europe. These projects were multi-year and multi-site, and affected both manufacturing and warehousing.

Sustainability continues to be a focal point. P&G is now purchasing 100% recyclable electricity in the United States, Canada and Europe (its largest markets). Ninety-two percent of P&G's production sites are zero manufacturing waste to landfill with the remaining plants in the final waste qualification process.

In response to COVID-19, P&G is making critically needed nonmedical face masks in every region of the world, and has leveraged its R&D to quickly produce face shields to be used in hospitals and testing centers.

Unilever

Unilever continues to focus its supply chain around being "purpose-led and future-fit." Unilever is focused on supply chain transformation to drive increased agility for a rapidly changing market. A key area of change is planning. Here, it is building a more responsive organization and using innovative technologies to enable shorter and more agile planning cycles to achieve shorter lead times and inventory reduction.

To expand sustainability capabilities, Unilever is actively developing and deploying technologies to disrupt and transform supply chain transparency. It is investing in satellite data, geolocation, blockchain, AI and working with major tech firms and startups to build new approaches to monitoring and traceability, from downstream operations to plantation or crop source.

To ensure resilience during the COVID-19 pandemic, Unilever is using technology such as RPA crawlers and AI to comb through millions of deliveries and thousands of suppliers to spot potential risks or shortages. Unilever also rapidly adapted deodorant lines to make hand sanitizer for hospitals, and committed to provide free soap, sanitizer, bleach and food to the value of £100 million.

sales event last November, Alibaba processed nearly 1.3 billion orders with a gross merchandise value of \$38 billion in just 24 hours. Of this, the first 100 million orders were shipped in under eight hours.

Coming in at No. 8, supply chain was recently credited for chip giant **Intel's** 18.7% year-over-year growth in first-quarter 2020 revenue, despite a global pandemic. Throughout the global disruption, Intel delivered 90% on-time commits for the quarter. The resiliency of Intel's supply chain is not to be underestimated. Sustainability leadership is baked into Intel's DNA. For example, over the past two decades, Intel's sustainable water management efforts have returned approximately 80% of its water back to the community.

Walmart's supply chain has never been more important than during COVID-19. The business rapidly responded to the demand surge with a clear focus on supporting its community and is being rewarded with significant revenue growth.

Inditex, best known for its Zara brand, landed at No. 9. The importance of supply chain operations to the fast-fashion giant was highlighted by the July 2019 elevation of former COO Carlos Crespo into the role of Inditex CEO. Crespo has been critical in driving the organization toward its digital supply chain leadership role through integration of store and physical operations, and vast product-level RFID deployment. These efforts have been built on top of Inditex's increasing investments in sustainability and historic core strength in supply chain segmentation. Specifically, 20% to 30% of products are fast-fashion, fast-launch products that leverage agile supply chain operations. The remainder of the product portfolio are core lines and follow a more traditional apparel supply chain production and distribution process.

L'Oréal, the world's largest cosmetics company, continued its upward climb to No. 10, its highest ranking to date. L'Oréal raised its ESG score to 10 by being one of only a handful of companies receiving

recognition points from both the Ethisphere Institute and Bloomberg.

L'Oréal recognized the power data has in driving supply chain performance. One key element was a focus on master data management (MDM) that enables business intelligence (BI)-led supply chain decisions and supports advanced analytics and/or AI to drive supply chain performance improvements. Additionally, L'Oréal is working to accelerate product development through the use of 3D printing, digital simulation and connected assets.

Longtime retailer **Walmart** moved up three spots to No. 11, its highest ranking since 2012. Walmart's supply chain has never been more important than during COVID-19. The business rapidly responded to the demand surge with a clear focus on supporting its community and is being rewarded with significant revenue growth. The company focused on ensuring that shoppers with little or no online purchasing experience had a clear understanding of how to use the functionality. Supply chain operations shifted to enable more rapid replenishment of critical, in-demand inventory. Across the supply chain, financial support has been provided to Walmart's small- and midsize suppliers, while resources have been dedicated to speed-up its onboarding process for its supply chain financing program.

High-tech leader **HP Inc.** comes in at No. 12. In 2020, the technology leader has amplified unprecedented supply chain changes it implemented in 2019, mobilizing industrial facilities worldwide to deliver 3D printed products as well as share printing solutions, creating efficiencies for its customers. HP Inc. is becoming more customer-focused and digitally integrated, not just in supply chain, but also aligned across business units. Once again, HP Inc. received a perfect ESG score, by having sustainability built into the hardware, accessories, packaging and an established CE for products.

Coca-Cola moved up seven spots to No. 13 driven in part by the third-highest peer vote among consumer product companies. Coca-Cola is developing a supply chain digital roadmap to innovate its core processes to drive improvement in agility and productivity, as well

as build end-to-end transparency and traceability to best serve consumers and customers.

Coca-Cola's "World Without Waste" initiative has a renewed focus on the entire packaging life cycle, from how bottles and cans are designed and made to how they are recycled and repurposed. In response to the pandemic, Coca-Cola teams around the world are finding creative ways to use their manufacturing facilities to produce and transport needed medical supplies to the COVID-19 frontlines.

Diageo, the U.K.-based beverage leader, claimed the No. 14 spot. During the past two years, Diageo has made considerable investment in transforming its procurement organization with a focus on simplification, supplier partnership and business engage-

ment. Deploying best-in-class digital capabilities is allowing data-driven analytics. A robust supplier relationship management framework is enabling end-to-end supply chain engagement on sustainability and collaboration across the business for long-term, strategic-value creation.

Lenovo rejoins the list, leaping 19 spots to No. 15. Lenovo reported record revenue in 2019, a four-year growth trend. Advanced supply chains learn to build a bridge that involves using data to derive insights and to act on the insights to drive value. Lenovo has done this on multiple fronts. The innovation foundation includes technologies such as predictive analytics, AI, blockchain and autonomous things. Lenovo demonstrates leadership in sustainability, the

Honorable mentions

Companies that demonstrated strong leadership in demand-driven principles but did not make the list are as follows.

General Mills

General Mills is accelerating digital transformation efforts across its entire supply chain, differentiating its capabilities with a focus on segmentation, integrated planning, network optimization and analytics. General Mills set a goal of 100% renewable electricity by 2030, as part of the RE100 global corporate initiative.

Danone

Recognized as a global environmental leader, Danone was one of the six companies with a "AAA" score by CDP worldwide. Additionally, Danone has focused on gender parity in management roles and has provided financial support of over £300 million, including extended payment terms and credits, to farmers, suppliers and smaller customers in its global ecosystem.

CVS Health

In the face of intense competition from the likes of Amazon, CVS Health is expanding its supply chain capabilities with a clear emphasis on the development of last-mile operations. It has established a paid membership service called CarePass that provides subscribers with free one- to two-day delivery across prescriptions and other eligible purchases. In the area of drone delivery, CVS is taking real industry leadership via a partnership with UPS. Since its first drone delivery of a medical prescription in North Carolina in November 2019, the program has been expanded to include a Florida retirement community of more than 135,000 residents.

Finally, Toyota, Adidas, Heineken, Costco, Target and Dell Technologies all received higher than average peer votes from the Supply Chain Top 25 peer opinion poll. All exhibit leadership characteristics, with compelling lessons for the broader supply chain community.

CE, and diversity and inclusion, and raised its ESG score four points to a perfect 10.

Rounding out the list: No. 16 through No. 25

Footwear and apparel leader **Nike** lands at No. 16. Adaptability to change is a key capability at Nike. With people confined at home beginning in January, Nike was able to leverage its digital app ecosystem and its expert trainer network to inspire and support consumers across China to stay active and connected while at home. This resulted in a 3Q increase in weekly users of 80% compared to the beginning of the quarter. This engagement translated into strong engagement with the Nike commerce app and contributed to more than a 30% increase in the digital business in China.

Life sciences company **AbbVie** made its first entry in the Top 25 landing at No. 17. AbbVie has had two unique supply chain opportunities in its short lifetime. First, when spun-off from Abbott in 2014, it was able to design its supply chain from the “ground up”—implementing best practices from its parent company, but also building new ones, where it made sense. Second, the majority of its revenue is driven by one product—HUMIRA (used to treat rheumatoid arthritis). This has allowed AbbVie to focus its supply chain efforts and maximize efficiencies. With AbbVie’s acquisition of Allergan, the company will have to build supply chain processes and teams that excel in different channels and manage product life cycles effectively.

Luxury auto manufacturer **BMW** climbed seven spots to No. 18 in part due to back-to-back perfect ESG scores. BMW recognizes the supply chain as a critical enabler of the company’s product differentiation strategy. Supply chain flexibility enables BMW to offer customers choice and respond to changing market situations and regional demand. More than

20,000 interior variants are possible with the BMW 3 Series. Supply chain flexibility is enabled by the extended production network, comprising 31 locations in 15 countries with 20 sites owned by BMW.

BMW has shipped more than 140,000 electric vehicles on its path toward company digitalization and vehicle electrification. To ensure utilization, it is integrating the production of all-electric and plug-in hybrid vehicles into the existing manufacturing system. Its workforce investments include hiring in future-oriented fields, such as AI, and smart production and logistics.

At No. 19, **Starbucks** has been a longtime innovator and leader in the integration of digital and physical retail, deploying concepts such as electronic payments, mobile apps, pick-up only stores and leveraging third-party delivery networks, all in an effort to improve responsiveness. The business is increasingly using China as a test-bed for new emerging consumer-driven efforts, such as its last-mile delivery partnership with Alibaba’s Ele.me. That was the model for the deployment of online order delivery in the United States starting in 2019. The company is accelerating the sustainability of its operations, including testing of reusable cups at specific airport locations, leveraging blockchain technology to track coffee beans and the expansion of plant-based menu options.

Swedish fashion retailer **H&M** lands at No. 20. H&M continues to maintain its leadership position in the area of sustainability, including opening up its global supply chain operations through a new B2B service called Treadler, which is offered as a service to external companies. This enables even smaller brands to benefit from H&M’s expertise, long-term supplier partnerships, strategic sustainability work and production and logistics resources.

BMW has shipped more than 140,000 electric vehicles on its path toward company digitalization and vehicle electrification.

British American Tobacco (BAT) continued its upward journey, landing at No. 21. BAT has been identified as a global leader for engaging with its suppliers on climate change, being awarded a position on the Supplier Engagement Leaderboard compiled by global environmental impact nonprofit organization CDP, and is the only tobacco company listed in the Dow Jones Sustainability Index (DJSI).¹⁴

3M, a company with a longtime legacy of leadership in innovation, comes in at No. 22. 3M has completed its major ERP implementation, and is implementing a new global operating model — 3M’s business group-led operating model. As part of this initiative, 3M is consolidating its end-to-end supply chain, including manufacturing, under the Enterprise Operations organization, to drive organizational efficiencies across the business. And, in 2019, 3M listed its priorities as portfolio transformation, innovation and people and culture as key initiatives.

During COVID-19, 3M showed its supply chain resiliency as the primary U.S. producer of N95 masks, doubling production to some 100 million masks between January and April of this year.

Reckitt Benckiser, another newcomer, lands at No. 23. The company achieved significant improvement in its packaging, talent attraction and retention, and product quality and recall management scores. Notable progress was made across SCM, human rights and risk management.

No. 24 life science company **Biogen** has long prided itself in its exceptional service levels to patients, primarily in large molecule products. Biogen enables this through strong supply chain leadership and product technology acumen. Unlike many life science supply chains that see product portfolios that continue to diversify, Biogen focuses on biologic medicines and biosimilars, allowing it to tailor supply chains to specific needs of these products.

Realizing an opportunity to leverage the strength of the healthcare ecosystem, Biogen is pursuing digital


technology as a means of creating external connections and to create value by enabling better information flow.

Kimberly-Clark, No. 25, believes that long-term strategic supplier relationships are key to driving innovative solutions that meet its customer and consumer needs. An example of this is how it worked with its eucalyptus pulp supplier, Fibria, to support and collaborate with smallholders across its value chain to address any challenges to obtaining Forest Stewardship Council (FSC) certification. If smallholders are FSC-certified, their land is a renewable, sustainable source of direct income. During the recent toilet paper shortage, Kimberly-Clark implemented #ShareASquare, a social media campaign that encourages those with toilet paper to share with those who need it. The company offered to donate \$1 to the United Way for each social media post that featured #ShareASquare.

Looking ahead

Every year, we see leading companies experiment and advance their supply chain capabilities, leaving the rest of the pack further behind. As Gartner’s supply chain research organization, we remain committed to providing a platform for informed and provocative debate about supply chain leadership. In today’s uncertain and complex world, our Supply Chain Top 25 research is an opportunity to learn how the most advanced companies adapt and thrive to stay ahead of the competition.

As always, we’ll continue to investigate new approaches for measuring supply chain leadership. Of note, we have already identified one change for 2021. To reflect the continued importance of ESG, a company must have an ESG score greater than zero in order to be included in the population and eligible for ranking.

We look forward to leveraging this research to share the lessons, best practices and characteristics of leaders to inspire and challenge the entire supply chain community to new levels of performance and contribution. 



How many people do you know who have worked for Coke and Pepsi, and for Walmart and Target? Those are some of the stops along the way for Shekar Natarajan, the global supply chain leader at American Eagle Outfitters, or AEO, since the end of 2018. Since arriving in the United States from India in 2001, Natarajan has taken a deliberate path through the various supply chain disciplines, working in project management, warehousing and distribution, transportation management and final mile delivery, planning and network design and supply chain transformation. Along the way, he filed some 300 patents, was issued 73 and has authored books on Supply Chain. Those experiences uniquely prepared him for his role at AEO, where he owns a supply chain portfolio that encompasses all of those functions.

In addition to rethinking how the retailer takes its supply chain to market, Natarajan is also thinking about what comes next—what he refers to as Supply Chain 4.0, or the “open on-demand” supply chain model.



— *The SCMR Interview:* —
SHEKAR NATARAJAN

American Eagle Outfitters supply chain leader talks about his career, the future of retail fulfillment and how businesses can survive COVID and the shift to omni-channel delivery.

BY BOB TREBILCOCK

Bob Trebilcock is the editorial director of Supply Chain Management Review

Those are just some of the things we discussed in a far-reaching interview.

SCMR: *Shekar, when we spoke earlier, you mentioned that you came from a very humble background in India and had not originally planned to come to the United States. What brought you here in 2001?*

Natarajan: It was a family necessity. My older brother moved to Alabama in 2000 to get his Ph.D. He broke his arm, and what little money he had was used for his medical requirements. He was in pretty bad shape and asked for help. I applied to a number of universities, and Georgia Tech was the school closest to my brother—I could jump on a bus and be there for the weekend in five hours. I enrolled in the industrial engineering graduate program to complement my undergraduate degree in mechanical engineering and mechatronics; it worked out great. I was thankful to get into a good school and have the opportunity to help my brother.

SCMR: So, you didn't start out in supply chain management?

Natarajan: Not at all. My graduate research involved looking at how to pack electronics into a form factor—like a smart phone—to produce a reliable device. After graduating in 2003, it took seven months to find a role close to the core of my interests. Despite my frustration in the moment, this time turned out to be one of the best things for my career: I used those months to become further educated and gain exposure to things on broader spectrum. It was during this time that I began attending a program geared toward supply chain professionals, offered free-of-charge through the industrial engineering school. The series of courses brought together individuals from a variety of backgrounds, management levels and industries, all to learn the fundamentals of emergent supply chains: ways to think about warehousing, distribution, technologies, pick-to-light, robotics. I was exposed to a new dimension of learning: one with context, giving me a better understanding of the types of problems people were trying to solve. Before I knew it, I'd fallen in love with supply chain. It was a pivotal moment in my career.

SCMR: What were your first jobs in supply chain management?

Natarajan: My first supply chain job offer was in procurement at Starbucks; however, shortly after I was also offered a corporate development specialist position with a small, family-owned company in Hot Springs, Arkansas, that made rubber bands and specialty wristbands. I ultimately decided that I didn't want to start out in a very narrow niche by taking a small role within a big company, so I chose rubber bands over Frappuccinos. My role cut across many different parts of the company, from logistics and production to commercial aspects. I ran projects to increase efficiency and create capacity in manufacturing; I challenged how the business thought about overhead allocations and ways to drive continuous

improvement, while being involved in sales and marketing activities. The exposure gave me a business view rather than a merely functional perspective.

From there, I decided to try out a large organization and joined Coca-Cola Consolidated, the largest independent Coca-Cola bottler in the U.S. That was a big turning point for me. At the time, CPG and beverage companies were experiencing a proliferation of products—four times more than the infrastructure was designed to carry. The Coca-Cola bottling system had launched a very ambitious program to reduce the amount of non-value-added work in the supply chain. We were creating automation capabilities to pick, pack and move products in the warehouses and developing tools like scheduling software, geo-based planning and a delivery system with the right number of mixing centers and satellite networks. We wanted to modernize our last-mile delivery network—based off of an antiquated store delivery model that hadn't changed in 50 years—and create a unique way to make delivery equipment and processes agnostic, from trucks to pallets. I was part of that transformation. We rolled out an enterprise-wide program that allowed us to plan out and execute the networks, including sourcing decisions. We came up with a one-touch model to simplify, streamline and elimi-

nate unnecessary touches within the field by moving them back to a safer, more efficient DC environment. My time with Coca-Cola taught me one of the most important lessons of my career: When you touch one piece of a supply chain, it affects everything. It taught me that to make good supply chain decisions, they must be rooted in good end-to-end business decisions, so that the capabilities and processes brought to life have positive impact throughout the entire business.

SCMR: What happened next?

Natarajan: From the start of my career, I've dedicated

SHEKAR NATARAJAN

TITLE:
Global Inventory, Supply Chain,
Logistics and Services

COMPANY:
American Eagle Outfitters

LOCATION:
San Francisco, Calif.

AGE:
41

**YEARS IN SUPPLY
CHAIN MANAGEMENT:**
17

YEARS AT AMERICAN EAGLE:
2.5

my focus to address major supply chain problems. So, from Coke, I went to Pepsi, which at the time was running center of excellence programs and rethinking its entire distribution fulfillment operations. In my warehousing, distribution and fulfillment role, I led a large transformation project to redesign distribution management across the full warehouse network for the bottling division. I wanted to get planning experience, so from Pepsi I went to Anheuser-Busch InBev to run demand and supply planning and inventory policy optimization. After getting tired of being known as the beverage guy, my next move was joining Disney; Disney was in the process of building an enterprise supply chain team, and my role was to support them with the best technology out there.

SCMR: *You also worked for both Walmart and Target.*

Natarajan: While working for Disney, Walmart recruited me to help solve a very unique problem at the time: competing with Amazon. Among Walmart's strengths was an incredibly strong grocery supply chain with hyper-local presence. The team I led was tasked with developing a hyper-scalable model that made the online, home-grocery-shopping business feasible. We had to figure out how to get backroom processes so efficient that local pick up could be rolled out economically, and delivery was feasible. For the delivery piece, we wanted to leverage cars already driving past the stores all the time: Associates going to and from work, customers coming and going, even Uber drivers. It was a very untraditional yet super successful program for online delivery. While at Walmart, I also ran the emerging sciences group, where the team developed something like 1,800 patents ranging from autonomous vehicles, to drones taking inventory into the warehouse. I myself have somewhere around 300 patents. You name it, we worked on it. After that, I was recruited by Target to work on their end-to-end transformation, which included everything from network planning to inventory planning and control. Target had a very different approach from Walmart, and with that came more opportunities for innovation. One of the most important things I learned from my experience working on such exciting and transformative initiatives was that while supply chain is usually thought of as moving big boxes around, it can be so much more. Supply chain has the power to touch and improve people's lives on a daily basis—that is exciting.

SCMR: *What brought you to AEO?*

Natarajan: With the exception of the rubber band maker,

I had spent the majority of my career working for big companies and big brands. At the time I was recruited in 2018, I was living in the Bay Area, surrounded by the startup culture. Living at the intersection of innovation, technology and operations, and witnessing super successful platform companies like Uber emerge, I wanted to try something different. I was approached by AEO through a board recommendation. Jay Schottenstein, the CEO of AEO, is an inspirational leader and a visionary so I was immediately drawn to the company. I wondered how an entrepreneurial, nimble specialty retail player like AEO could use a supply chain advantage to punch above its weight. I joined AEO in late 2018.

SCMR: *What were your marching orders?*

Natarajan: My marching orders were: Don't screw it up! At the time, AEO was contemplating its supply chain of the future. I have an amazing boss in Michael Rempell, the COO, who wanted a fresh set of eyes to strengthen the supply chain from a leadership and operations standpoint. After spending six months assessing the present state and unique capabilities I thought we'd need going forward, I presented an agenda to tame the retail tsunami for the next five years; that's what we're working on now. Change is always tough and needs to be well-supported, and I'm incredibly thankful to Jay, Michael, the rest of leadership, fellow peers and my team for enabling an amazing journey so far.

SCMR: *As a supply chain leader, what's in your portfolio of responsibilities?*

Natarajan: I'm responsible for the 225 million units that we moved through the supply chain last year. That starts from the time we take custody of product from factories and move into our own networks in North America, as well as enabling availability for our global licensee business and other go-to-market formats. For North America specifically, my team is responsible for consolidating at origin, deconsolidating in the U.S. and floating into our fulfillment networks, enabling delivery to both customers and stores. Within that, my team is also responsible for global trade and compliance which includes things like maximizing free trade agreements, customs clearance, invoice processing and vendor-enablement activities.

I have complete oversight of our end-to-end distribution network, which consists of AEO-owned distribution centers throughout the U.S. and Canada, transloading

operations and consolidation points in Asia and Latin America.

In addition to operating functions such as logistics, distribution, fulfillment, inventory planning and allocation, I also have responsibility for transformation and modernization of the supply chain. Lastly, I also lead supply chain strategy and sciences.

SCMR: *If you summed up what you're trying to accomplish, how would you describe the approach?*

Natarajan: Our goal is to make Supply Chain a strategic differentiator. So, we are creating modern, dynamic and distributed supply chain logistics operations that cater to the ever changing customer preferences and demands. Supply Chain is the engine that connects consumers to their favorite products. The team's mission is to enable trust, transparency and speed, helping to create unparalleled loyalty to the brand.

SCMR: *What are some of the changes you're trying to make now?*

Natarajan: We are on a multi-year, multi-stage journey and the first step of that journey was anchored around building a hyper-scalable and dynamic supply chain. This required us to rethink our entire enterprise value chain—refocusing the team on speed and accountability. We built our transformation flywheel on the premise that speed is the most important supply chain lever to push, while maintaining our cost and budgets; this could only be achieved through out-of-the-box thinking. We looked at every one of our processes, assessing the variability and time in each link of the supply chain and put our focus on reducing that variability—and liability—in the chain.

Stage 2 of this journey is the modernization of our omni-channel capability by creating a multi-tier fulfillment network based on core principles of speed, flexibility and innovation. Pragmatic use of technology and automation has been injected in all parts of Supply Chain from decision sciences to physical execution. Recent consumer trends and the pandemic have accelerated this journey and I am proud to say that we have made great progress in enabling this vision. I cannot thank them enough, I am so proud of the team, our culture and leadership's support in all of this.

Here are a few examples: One is to move into a localized fulfillment model so we can offer same-day, next-day and two-day delivery to the majority of our customers.

We also understand the infrastructure is one of the many levers but to really power this in a smart way, we needed to create data-driven algorithms and intelligence to dynamically position and flow inventory through our network. To maximize our capacity in the fulfillment network while enabling safety and resiliency we are augmenting our operations with on-demand robotics as a service. We have also deployed state of the art goods-to-person solutions.

SCMR: *What do you think is the biggest accomplishment of the last 18 months?*

Natarajan: It goes without saying that the biggest asset we have is our people. All of this needs great teams, and we are assembling the best of the best minds and drawing on the incredible passion of the our associates to bring this to life. And the teams have accomplished amazing things. For the year and a half my team has been in place, we've made a 180-degree shift. Instead of being regarded as just a cost of doing business, Supply Chain at AEO is now a competitive advantage. Pre-COVID, we reduced the time it takes our product to get from manufacturer to store by 20%. We were also able to reduce the time between product allocation to in-store arrival by 80%, going to stores daily. In doing so, our inbound and outbound processes have become faster, in turn prompting a need for our DC processes to get faster as well. It is so tough to make these transformational changes while continuing to manage everyday operations. It is truly remarkable what the entire company has been able to achieve. That goes to show the incredible spirit and entrepreneurship our company has which is the real secret sauce.

Big picture, we're building core supply chain competencies that ultimately can be offered as a service to other specialty retailers. Think of it as Operations-as-a-Service. As an example, we're looking to utilize capital assets and intellectual property the company already owns for last-mile delivery. We want to pivot to decentralized inventory and labor models to wrap all of this into a shared-asset framework that I call Supply Chain 4.0.

SCMR: *We'll come back to Supply Chain 4.0 in a minute. One of the big issues in every DC is labor. How are you addressing that problem?*

Natarajan: We're doing a number of things to take care of our associates. For instance, we allow associates to take bone conduction headphones onto the floor to listen to music; we also allow cell phones on the floor so

associates can stay connected to their loved ones while working. We have moms, dads and primary caregivers who may need to get in touch with their kids while at work. I asked myself, “If I can do that, how can the associates do that and still have a safe environment?”

We also have associate perks for good behavior: If you’re picking fast, you earn points redeemable for a movie ticket or a gift card.

We’re transforming our hiring programs, making offers within 24 hours from the time someone shows up to interview. We’re using AI-based systems to attract talent and keep prospective hires engaged in the interview process. We continue to develop safety programs geared to bringing more assurance and peace of mind to associates.

We’re getting into flex labor and experimenting with a gig workforce in the DCs; this goes along with creating scalable supply chain capabilities which could be opened up to other companies. We’re creating a culture and environment where teams can “visioneer”—going beyond simply dreaming up scenarios: engineering the vision and executing with intensity.

SCMR: *Have you made adjustments during COVID?*

Natarajan: Yes, many. We’ve made our DCs a safer place to operate by implementing high-definition thermal scanners and social distancing protocols, hiring on-site nurses and utilizing static-cleaning measures. Our robotics program allows us to surge capacity without adding as many seasonal staff, thereby keeping density down.

At an industry level, COVID has accelerated the omni-channel requirements that were already straining small-and-mid-size businesses. To support consumer expectations for anytime, anywhere delivery, these businesses are forced to spend an increasing percentage of their budget on supply chain. As competition tightens, I believe this will lead to a mass extinction of retailers.

SCMR: *Let’s talk about Supply Chain 4.0. You created a compelling infographic to illustrate the concept. So, what is Supply Chain 4.0 and how is it different?*

Natarajan: The construct of supply chain management changes as the economy changes, so that changes in the economic paradigm bring paradigm shifts in supply chain. Since the first industrial revolution in the mid-18th century, we’ve already had three paradigm shifts in the economy and now we’re moving into the fourth.

SCMR: *Walk us through those.*

Natarajan: Economy 1.0 was simplistic. It was mass production with a one-size-fits-all, do-it-yourself approach. Think of Henry Ford’s famous phrase, “Any color car you want as long as it’s black.” We had mom

AMERICAN EAGLE OUTFITTERS

FOUNDED: 1977

MOST RECENT REVENUE:
\$4.3 billion, 2019, up 7% over 2018

BRANDS: AE (American Eagle),
Aerie and Todd Snyder

NUMBER OF STORES: AEO operates 1,100 locations across the U.S., Canada, Mexico and Hong Kong and an additional 200 licensed stores located in 25 countries. A total of 81 countries are serviced through AEO’s digital business

NUMBER OF CUSTOMERS SERVED:
More than 20 million

NUMBER OF FACILITIES (DISTRIBUTION CENTERS): AEO operates three distribution centers for e-fulfillment and store replenishment and an additional two supply chain nodes. In addition, the company operates three transload facilities to handline merchandise coming in through the ports and three consolidation distribution centers

NUMBER OF EMPLOYEES IN SUPPLY CHAIN: 240 and the corporate level and an additional 5,000 hourly associates

NUMBER OF SKUs MANAGED:
Active 64,075
Reserve 167,384

THROUGHPUT: AEO sends out approximately 30 million shipments per year, comprising 242 million units

INVENTORY: The company spends approximately \$1.7 billion per year on inventory and carries an estimated \$500 million in inventory at any given point in time

and pop distribution; personalization meant going to the store. Supply chains weren’t so much supply chains as the loosely connected, vertically-integrated management of materials and production systems. They were slow moving with long lead

times. The absence of technology resulted in a paper-based, transactional approach that lacked professionalism, with minimal opportunity for optimization and improvement outside of big companies like GM. Supply Chain 1.0 supported Economy 1.0.

In Economy 2.0, countries opened up their borders and created new trade lanes. The focus was on cost, so production and distribution moved offshore to the low-cost countries now in the news. Sourcing, labor and asset efficiency emerged as priorities for supply chain managers. Technology based on standardized data models was introduced, including the advent of ERP and planning systems, and the need for business connectivity became clear. Supply Chain 2.0 was supply-centric, with no real notion of demand. Supply chains were moving closer to the model we know today but remained slow to change nonetheless.

The advent of the Internet and new digital consumer models led to Economy 3.0. Amazon sparked a demand-and-consumer-driven wave that paved the way for the Airbnbs, Ubers, Facebooks and Googles of the world. It was all about instant gratification: Things like streamed media and consumable goods were only a click away. On the people side of the supply chain, the last economic crisis created a digital gig economy for workers. Supply Chain 3.0 was digitally heavy and asset light, requiring highly scalable systems. The focus shifted from business orders to fulfillment for the consumer; hence commerce had to shift from a self-service model to a full-service model where the company is expected to meet the consumer when and where they choose.

SCMR: *That brings us to Supply Chain 4.0.*

Natarajan: Yes. The consumption side of the economy has shifted again, this time from self-service to full-service, and on the distribution side from pallets and cases to units. In the past, consumers were told to go to the store and serve themselves. Now the focus is on full service, with the ability to meet the consumer where they want to meet us—at a store, at their house, curbside or any other location. The emphasis moves from distribution fulfillment to last-mile efficiencies and fulfillment capabilities. Supply Chain 4.0 requires on-demand, at-scale personalized services: Think of it as an Uber-like experience, individualized for the consumer, as applied to all business-to-business and business-to-consumer transactions. Getting lean—or cost-first focusing—is no longer of sole importance. Supply Chain 4.0 will be delivered in an open shared model that enables omni-channel full-service for a wide variety of retailers, without forcing them to surrender control of assets, data and brands. By enabling retailers to cooperate and

aggregate scale, this open model will enable lower costs and more advanced technology than each player could achieve on their own. This enables retailers to focus on what matters the most—brand, product and customer experience.

SCMR: *Lastly: What excites you the most about the future of supply chain?*

Natarajan: Industries have been undergoing major transformations in recent years: Google set a new standard for information, the explosion of fintechs have forced a reset in the world of finance. But what about supply chain? Transforming supply chains is simply not enough—it's time to revolutionize global trade. The winners of this game are going to re-imagine, re-engineer and re-distribute supply chain operations in the same way that Uber, Spotify and Airbnb have re-cast their sectors.

The global trade industry in its present state is a largely unorganized \$38 trillion business poised for disruption. Technology's constant evolution compounded by how quickly the individual components are changing—from sensory technology to cloud computing to consumer choices—created a recipe for reform. There's an opportunity for a new renaissance: one in which a multitude of outcomes are created for professionals, for companies and for society as a whole.

The challenges and problems professionals will face tomorrow are not as we know them to be today, making way for exciting, new career paths and opportunities. Digital businesses created in the next decade will hold value far exceeding the value of any company today. These new businesses will be tasked with carrying the full burden of global trade while simultaneously maintaining integrity and the flexibility required to manage growing consumer needs. There are huge opportunities ahead within transportation as a service, the conversion of sensory data to platforms, the reorganization of networks and fixed-asset-leveraging solutions to create fixed capacity for the better management of the flow of goods. Whenever all systems undergo a reorganization, industries are forced to shed waste and do away with unsustainable practices. Newness is created; a more forward-thinking society emerges. Betterment for professionals, companies and for society as a whole will serve to drive the triple bottom line: people, profits and the planet.

Up until now, only the giants have been able to deliver on demand and at scale; what's needed now is democratization. Supply chains are finally gaining their deserved prominence and new industries are being uncovered. New companies are forming right as the next generation of professionals enter

GETTING OVER THE BAR

A TRAINING GUIDE FOR WINNING CUSTOMER GOLD

Supply chain managers aiming to deliver unbeatable customer value can learn a lot from winning the decathlon.

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

Vying for the title, “world’s greatest athlete,” this pair of rivals was featured in a series of Reebok commercials hyping the 1992 Barcelona Olympics. Can you name them? If you are a big trivia fan you probably can: Dan O’Brien and Dave Johnson. Reebok’s \$30 million ad campaign, known simply as “Dan & Dave,” has been called the most famous Olympic ad blitz of all time. Neither Dan nor Dave won gold in Barcelona, but Reebok’s ubiquitous ads connected with the public. Dan and Dave became iconic sports celebrities and the decathlon became a must-see event. And, Reebok boosted sales of its new Pump Graphlite cross trainer as well as its credibility as a high-end sports apparel company.

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Reebok's bet on two relatively unknown decathletes to break Nike's stranglehold on the track-and-field market was a bold move. You must be equally as bold as you design your supply chain to connect with customers. Delivering unbeatable customer value is a great start, but it isn't enough. To turn customers into fans, you also need to create remarkable experiences. Dan and Dave's story is your guide to developing critical capabilities needed to win in the world's toughest arena—the heart and mind of the customer. Let's take a closer look at how training for the decathlon can help you earn customer gold (see Figure 1).

earn a spot on the U.S. Olympic team. The Olympic trials wouldn't take place until June, when the three decathletes with the highest point totals would compete a few weeks later in Barcelona. Reebok, however, couldn't wait until June to start its ad campaign. Dan and Dave, both Americans, were basically Nos. 1 and 2 in the world—no one else posed a threat. So, Reebok took a chance. By the time the Olympic trials arrived, Reebok had run a half dozen ads inviting viewers to choose sides. The new tagline: "To be settled in Barcelona."

To fully understand Reebok's gamble, you need to recognize the peculiarities of the decathlon, which consists



Source: Authors

Training Tip #1. Approach: Understand how customers allocate points

If you want to win Olympic decathlon gold—or a lifetime stream of customer profits—you need to know how points are allocated. Ironically, a failure to grasp the decathlon's rules is what made Dan and Dave cultural icons.

They were introduced to the world through four 15-second ads during Super Bowl XXVI. The ads showed Dan and Dave growing from toddlers to world-class athletes. Each ended with the tagline: "This summer they'll battle it out in Barcelona for the title of world's greatest athlete."

The catch was that neither Dan nor Dave had yet to

of 10 events held over two consecutive days. Day one includes the 100-meter dash, long jump, shot put, high jump and 400-meter run. Day two features the 110-meter hurdles, discus, pole vault, javelin and 1,500 meters.

The decathlon is a test of speed, strength, flexibility, endurance and mental toughness; thus, the title: "world's greatest athlete." Critically, in the decathlon, you don't earn points by beating your rivals—you earn points based on a formula for each event. Your time, distance and height for each event determine your point total. Reebok reasoned that in a single-event competition, an athlete might mess up and fail to make the Olympic team. Dan or Dave, by contrast, might make a mistake in one event and lose points, but over 10 events their consistency

made them a seemingly sure bet.

Fast forward to the Olympic trials. Spectators wearing Dan or Dave shirts given out by Reebok filled the stands. Through seven events, Dan and Dave performed to script. With Dan leading by 512 points, he was within striking distance of the world record. Not even Dave, the world's best second-day decathlete, could close this monstrous gap. But then, in the eighth event, the unthinkable happened. In the pole vault, competitors strive to clear increasing heights, one by one. Vaulters pick their starting height and get three attempts to clear the bar. If they fail at this height, they get no points. Both Dan and Dave passed on four entry heights, beginning their jumps at 15'9".

Dave cleared the bar on his first attempt; Dan didn't. Inexplicably, at a height a foot-and-a-half lower than his personal best, Dan missed his next two vaults. His no-height meant no points, dropping him from first to eleventh—and out of the Olympics.

The reigning world track and field champion had no-heighted the pole vault. In that moment, Reebok's promise that Dan and Dave would "battle it out in Barcelona" went bust. Reebok had gone all-in on Dan and Dave. Yet, no one seriously considered the risk that Dan might not make the team. On Dan's part, he skipped four "easy" entry heights before failing at 15'9". Dan, like Reebok, had taken a risk. Both had failed to consider how unrelenting the decathlon's rules can be. Dan wept. His tears, however, didn't stop Steve Miller, the Nike rep sitting in the stands, from smiling. Miller remarked: "We were actively hoping that something bad would happen...It is the first moment in time that I can ever remember taking pleasure in somebody else's pain."

What does Dan and Dave's story mean for you? Let's start with the obvious. You need to know how customers allocate points as they pick partners. Our nearly 30 years of working with great companies reveals too many possess a seemingly trivial grasp of customer priorities. Supply chain professionals unwittingly enable this in two ways:

- they seek to score points via a myopic cost focus instead of delivering unbeatable value; and
- they don't coach up colleagues to build systems to create remarkable customer experiences.

The result: Supply chain professionals aren't using

their unique capabilities to help their companies get over the customer bar.

To get into the mind of your customers and discern how they allocate points, gather a sample of their supplier scorecards. What will you learn? Five criteria dominate most scorecards: *cost*, *quality*, *delivery*, *agility* and *innovation* (see Figure 2).

FIGURE 2

How do customers allocate points?

EVENT	POINTS AVAILABLE	DESCRIPTION OF HOW CUSTOMERS ALLOCATE POINTS	POINTS EARNED
Cost			
Quality			
Delivery			
Agility			
Innovation			
Other			

Source: Authors

To win supplier-of-choice status, you need to build operating systems that create and deliver value in these five areas. Now, a warning: You will see more than five "asks" on customer scorecards. Risk management capabilities, for instance, are now showing up on more scorecards. Further, some criteria are industry specific. Sustainability is gaining traction as a qualifying criterion in the outdoor recreation industry and you need to deliver requisite value in these areas as well.

Customers employ three rules as they evaluate your performance.

- **Rule #1: Cost and quality are the price of entry.** If you want to be taken seriously, you need to offer high quality at a competitive cost. You can bet, however, your top rivals also perform well in these areas.
- **Rule #2: Competitive advantage requires differentiation.** If you are battling tough rivals, you need to ask: "What do we do that's distinctive?" Dan racked up points in the sprints; Dave in the javelin. You need to do something exceptional in delivery, agility or innovation.
- **Rule #3: Champions get over the bar everywhere.** Despite his impressive lead, Dan disqualified himself by failing to clear the bar in the pole vault. If you're good enough to build a big lead vis-a-vis rivals, you still must meet minimum requirements in every area your customers value.

Your takeaway: To earn enough points to win a customer's business, you have to compete like a decathlete, performing consistently well on everything customers count as important.

Toyota. Grasping the rules and raising the bar is a prime driver of Toyota's success. Toyota launched sales in the United States in 1958. Can you name Toyota's big seller? Answer: The Toyopet Crown. "Woefully underpowered and overpriced," Toyopet sales stalled. Toyota had failed to clear the bar. The Toyopet was discontinued in 1961. Regrouping, Toyota asked: "What do customers really want?" Toyota introduced its answer, the Corolla, in 1966. High quality at an affordable price made Corolla a mainstay in Toyota's lineup—and the world's all-time best-selling passenger car. This low-cost, high-quality formula soon defined Toyota, helping it become one of the world's leading automakers by the early 1990s.

Despite a commanding industry lead in productivity and quality, Toyota sought to stretch its advantage by competing on time. The goal: Give customers what they want faster, better and more consistently than rivals.

1. Delivery. Toyota shortened order cycles and minimized variability across all value-added processes. Toyota could produce a custom car within five days of receiving an order.

2. Agility. Next up, Toyota built an agile supply chain, requiring suppliers to locate near Toyota's factories to assure fast, reliable and responsive delivery. Information and logistics systems synchronized materials flow to incoming orders, enabling assembly of up to four models—e.g., Camry, Sienna, Highlander and Lexus RX 330—on a single platform and on the same line. If sales forecasts are off, Toyota can quickly adapt production volumes.

3. Innovation. Toyota saw that "new" sells. So, it streamlined its product development process to bring new models from concept to market in as little as 15 months to 18 months—25% to 50% faster than rivals. And here's a key fact: Year in, year out Toyota leads the pack in U.S. patents awarded, nearly doubling GM's haul in 2018 and 2019.

The bottom line: Toyota dependably earns top marks on the criteria customers value, consistently bringing home the gold. The result: As the coronavirus put the brakes on the global economy, the *Wall Street Journal* noted that Toyota's \$74 billion cash stockpile made Toyota "unsinkable."

Training Tip #2. Vault: Eliminate gaps; exploit gaps

Knowing what matters to customers gives you a competitive edge. But you don't win decathlon gold until you earn *more* points than anyone else across all 10 events. To give yourself a shot, you need what we call a "gap" plan—a plan that leverages your strengths and exploits rivals' weaknesses. To build your gap plan, keep one eye on the competition. Dan and Dave's story highlights three reasons to keep rivals in sight as you compete for customer gold.

1. Strategy and execution. Not even world-class decathletes have the skills—and resources—to dominate every event. They must decide when to give it everything they've got and when to focus on avoiding mistakes. Day one was Dan's time to strike. Why? He assessed Dave's day two as follows: "If Dave Johnson is within 200 points of anybody after the first day, his second day is just so strong that nobody will be able to touch him."

2. Good practice is good practice wherever you find it. Sometimes, a riveted focus on customers makes you vulnerable, especially when disruptions threaten. Desi DiSimone, 3M's former CEO, warned: "The most interesting products are the ones that people need but can't articulate that they need." To remain a supplier of choice, you must be willing to learn—all the time and from anyone.

In his gold medal performance at the 1996 Atlanta Olympics, Dan held a lead after eight events. But, his lead wasn't big. Frank Buseman, a young German, had personal best after personal best and was hanging too close for comfort. More concerning, the javelin and 1,500 meters—Dan's weakest events—loomed. After two disappointing throws, Dan spotted Dave in the stands. Dan went over and asked: "Which javelin should I use?" Dave

had noted Dan's travails. He suggested the 90-meter "nemeth." Dan listened, threw a personal best and bested Buseman.

3. Motivation. Because the fear of loss is often a greater motivator than the hope for gain, a fierce rival can help you sustain the intense preparation needed to deliver remarkable customer experiences. Dan recognized this, saying: "Dave Johnson took me to another level. He was the best in the United States and I wanted to beat him. When we got together in 'Dan & Dave,' it stepped up both our scores. He pushed me, and I pushed him."

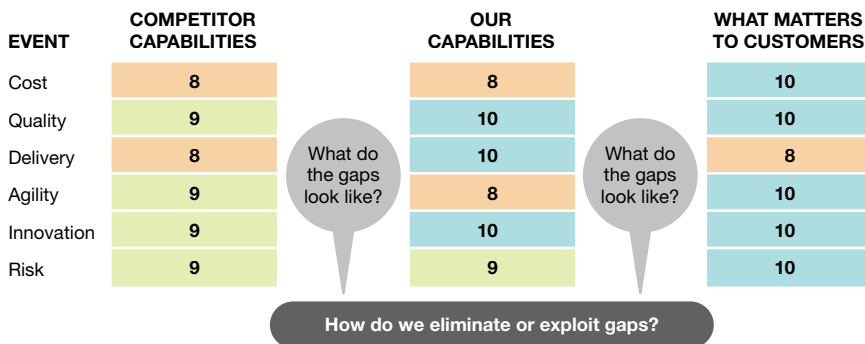
McKinsey consultant Kenichi Ohmae warns, however, not to take your other eye off of the customer. Keeping one eye on customers and one on rivals lets you track two gaps.

1. Threats. If customers want something and a rival does it better than you do, you need to eliminate this gap. You never want to invite your customers to give your rival a try.

FIGURE 3

Managing the gaps

Assessing capabilities (scale: 1 = very low, 10 = outstanding)



Source: Authors

2. Opportunities. If you spot an opportunity to create customer value that your rivals can't copy, you want to exploit this gap, creating the perception you are untouchable (see Figure 3).

Decathletes play the gaps to figure out which events repay their training efforts with the greatest points payoff. You should play the gaps to devise strategy and prioritize capability investments.

Walmart. Playing the gaps enabled Sam Walton to grow

Walmart into the world's largest retailer. Consider Walmart's famous Saturday morning meeting. Walton felt if front-line employees had to work Saturday mornings, so should Walmart executives. These 7:00 a.m. meetings became the venue for eliminating/exploiting gaps. What was working at one store was shared with others. Novel ideas being implemented at rivals were quickly communicated. How quickly? Think about this. As one Saturday meeting concluded, a manager wondered: "How long does it take to share a good idea?" Managers ideated an in-store activity and asked every store across America to do it. The ask came with a request to report back afterward. By Monday at 8:00 a.m., every store had replied: Task complete.

Critically, Walton didn't reserve sensing and sharing for senior leadership. Everyone is expected to eliminate/exploit gaps. Front-line store employees, for instance, are encouraged to talk to customers to "find out what they like, what they don't like, and

what we don't have that we should have." Products like the caldero, a specific kind of Hispanic cookware, made it to the shelf when a Walmart associate observes an unmet customer need.

Sensing and sharing is a capability that helps Walmart clear bars many rivals can't.

1. Exploiting a footprint gap.

In the early 2000s, Walmart was under siege. Wall Street analysts fixated on same-store sales—a metric that rewarded rival Target, but punished Walmart. Walmart's problem was clear: Each new supercenter cannibalized existing stores' sales. Despite the headwinds, Walmart persisted. Leadership had sensed an opportunity. Pretty soon, Walmart stores were ubiquitous, leaving little room for rivals. Target's growth engine, the Super Target, stalled. Sears Grand, a new entry, never gained traction.

2. Eliminating an online gap. By 2015, Amazon was Walmart's nemesis. Amazon's online sales surpassed those of its 12 largest rivals combined, including Walmart. To close the gap, Walmart turned to its huge physical footprint to fulfill customer orders. In 2018 and 2019, Walmart's online sales grew almost 40% per year—twice as fast as Amazon's. During the COVID-19 pandemic, Walmart leveraged almost 4,000 stores for grocery pickup, 1,600 for home delivery and 74,000 personal shoppers for express two-hour delivery.

Training Tip #3. Clearance: Develop winning capabilities

Now that you have a plan, it's time to hit the track. Training is the only way to transform your plan into capabilities that matter—i.e., the ability to impress at every customer touch point. Training, however, is grueling. Dan acknowledged his prowess as a decathlete emerged only after he embraced the brutality of preparation.

Supply chain professionals get it. Beyond the reality that preparation precedes power, what can you learn from a decathlete's training regimen? Consider three parallels.

1. No substitute for commitment. Commitment to training helped Dan win Olympic gold. He related, "Time almost ceases to exist for a decathlete... You're the first guy on the track and you're the last guy to leave... You're out there as long as you need to be. You're working toward a goal of perfect training, perfect competing." Meeting customer needs isn't easy. You must commit to perfect processes if you aim to deliver perfect orders.

2. Every customer touch point matters. Dan trained for consistency. He noted: "We train for the decathlon as a whole. I hit all 10 events in a two-day training period. Consistency will win out in the long run, always." Because customers want it all—always—you must worry about every customer touch point. Processes must reliably deliver remarkable results.

3. Train and test. What kept Dan focused, motivated and improving? The decathlon's train-and-test cycle. Dan explained, "The interesting thing about a track-and-field season is you train throughout the week, and then you compete on weekends. You train and you test yourself. And through the training and testing, you run faster, you jump higher, you throw farther. Train, test, train, test, train, test. That's the dynamic." This is your

dynamic as well—you build capabilities, test them in the market, improve and repeat.

Dan offers one more hint for earning customer gold: "The greatest lesson I learned was how to challenge myself personally each and every day. You always have to be pushing the edge."

Now, a question: What training program can help you push the edge and take home customer gold? Dan offers a word of caution: "Decathlon training is almost a competition in itself: my system versus your system, my theories of training versus your theories of training." The goal of each theory of training is the same—to create a champion—but not all systems are equally effective. You might not remember, but after Bruce Jenner won gold in the 1976 Montreal Olympics, Europeans took over the sport until Dan and Dave came along. Theories of training matter and you need to choose wisely. We see three theories of training at companies we work with.

1. Customer service orientation. Like most decathletes, supply chain managers often argue: "We are going to execute the daylights out of what we do well and bet that it works."

2. Customer satisfaction mindset. Some supply chain professionals aim higher asking: "What does the customer really want? How do we design our value-added systems to do it better than anyone else?"

3. Customer success philosophy. A small, but growing group of SC leaders, are reimagining their customer connection. They reason, "We compete on the same team. We are going to help our customers succeed and we'll win together."

Figure 4 highlights the investment priorities and training regimens you should pursue as you choose one of these theories of training.

3M. Pushing the edge to create customer value is in 3M's DNA. 3M is known for consistently creating products that make customers' lives better. Product innovation, however, isn't 3M's only initiative to connect with customers. Twenty years ago, for instance, 3M launched Six Sigma at the customer for the customer." The goal: Engage customers in Six Sigma projects to solve customers' operating problems. Over the years, 3M has jointly worked on hundreds of projects with customers like Airbus, DuPont, Home Depot, Procter & Gamble, Toyota, Verizon and Walmart.

FIGURE 4

Theories of training to build customer capabilities

CUSTOMER COMMITMENT	Success	Make investments to match or exceed rival's capabilities	Leverage investments to exploit unique capabilities, increase collaboration, and enhance customer intimacy
	Satisfaction	Make investments to eliminate rival's advantage	Invest to exploit unique capabilities, enhance satisfaction, and encourage stronger relationships
	Service	Make minimal investments to eliminate rival's advantage	Make minimal investments to exploit unique capabilities
		Eliminate threat gaps	Exploit opportunity gaps

To make customers partners in profit, 3M encourages every decision maker to look through the lens of customer success by adopting three core behaviors:

- think like the customer to improve customer outcomes;
- measure the way customers measure to affect customer experiences; and
- deliver what the customer needs to strengthen customer relationships.

Distinctive company capabilities

THEORIES OF TRAINING	TRAINING REGIMEN	POTENTIAL HEADWINDS
<p>Customer success: Look downstream to find ways to help customers win in their own markets.</p>	<p>Scan: Systems thinking motivates end-to-end supply chain scanning. Design service system: Design for unbeatable value, remarkable experience and customer consultancy. Measure: Customer outcomes; i.e., how did you reduce customer costs or increase customer revenue and competitiveness?</p>	<p>Coaching customers to help them win is resource intensive. You can only employ a customer success strategy with customers of choice.</p>
<p>Customer satisfaction: Get into the mind of customers to grasp and then exceed their expectations.</p>	<p>Scan: External scanning captures voice of customer and competitive dynamics. Design service system: Design value-added systems to align with and deliver to voiced customer needs. Measure: Measures aligned to customer metrics; i.e., Service As Measured By The Customer (SAMBC).</p>	<p>Getting into the mind of customers may lead you to:</p> <ul style="list-style-type: none"> • ignore operating realities and overlook operating innovations; • create and maintain unprofitable relationships; • and miss signs of unforeseen disruptions.
<p>Customer service: Do what we do best to meet or exceed industry standards.</p>	<p>Scan: Scanning is modest, focused on operational systems. Design service system: Put in place service system to deliver high operational efficiency and effectiveness. Measure: Measurements focus on internal operating metrics like OTIF, PPM defective, cost per unit, etc.</p>	<p>Focusing on doing what you do best may lead you to:</p> <ul style="list-style-type: none"> • invest in outstanding service levels customers don't value; • think you are doing better than you are because you measure inappropriately; • allow value and experience gaps to emerge.

Source: Authors

Six Sigma at the customer is about “owning the customer pain point.” The process is simple: 3M co-locates lean Six Sigma teams with customers to improve productivity, quality, cycle times or whatever causes customer pain. Executive sponsored and data driven, these projects don't just improve performance; they enhance customer intimacy and success even as they drive growth and shareholder value—for both the customer and 3M. Customers give 3M credit, saying things like: “They cared about our operations being successful” and “they are more than simply a supplier.”

3M is confident that when you make decisions through a customer success lens you better meet their needs, even if they themselves don't know what those needs are. 3M's approach to coaching customers creates value gaps rivals can't close, making 3M a champion.

Training Tip #4. Landing: Perform and improve

You already know Dan won the gold medal in the 1996 Atlanta Olympics, but do you know how? Take a look at Figure 5, which shows the final rankings from the 1996 Atlanta games. What do you see? At first glance Dan's

gold seems unlikely. Frank Buseman, the silver medalist, won four events; Dan only two! What made the difference? Dan had seven top three finishes; Buseman only five. The fact is a decathlete can win the gold without winning an event because the decathlon values versatility and consistency. When the moment of truth—i.e., the time to perform—arrived, Dan delivered. His mistake-free consistency earned gold.

Similarly, P&G’s A.G. Lafley advises that you need to win your own two moments of truth: when customers choose you as a supplier and when they use your product or service.

FIGURE 5

The 1996 decathlon final standings

	100M	LONG JUMP	SHOT PUT	HIGH JUMP	400M	110H	DISCUS	POLE VAULT	JAVELIN	1500M
Dan O'Brien	1	7	3	2	1	3	3	5	3	8
Frank Buseman	1	1	7	3	5	1	5	7	4	1
Thomas Dvorak	3	6	2	6	4	2	4	8	1	1
Steve Fritz	8	3	4	3	8	5	1	4	5	4
Eduard Ramalainen	7	8	1	6	2	4	2	5	7	3
Erki Nool	4	2	6	5	3	8	8	1	6	7
Robert Zmelik	5	4	8	8	7	6	7	1	2	4
Ramil Ganiyev	6	5	5	1	6	7	6	3	8	6

Source: Authors

Let’s backtrack to four decisions that defined Dan’s path to gold.

1. Get back in the game. A few weeks after Barcelona, Dan returned to competition—and broke the world record. The next year Dan won his second consecutive world Track and Field Championship in Stuttgart, Germany.

2. Prepare for what counts. Dan had lunch with Bruce Jenner. Dan recalled: “Bruce kept telling me ‘the only thing people are going to remember is the Olympics games.’ Dan thought, “this guy’s crazy. He doesn’t know what he’s talking about.” Yet, Jenner was right: No one cared. The truth is, some performances matter more

than others. Only Olympic gold gets your image on the front of a Wheaties box. Dan set his sights on Atlanta.

3. Add missing capabilities. Despite an impressive string of victories, Dan was struggling with the mental side of the decathlon. So, he hired Jim Reardon, a sports psychologist. Two-plus years later Dan brought up Barcelona, saying he had a dream about the pole vault from 1992. Reardon had been waiting for this moment. He dug up a copy of Dan’s no-height vault and invited Dan to watch it. Dan relived “the horror of missing on the third attempt” something he called “absolutely ghastly.” Reardon asked what he thought. Dan replied: “I don’t want to look.”

Reardon replayed it. Dan said: “I feel like throwing up.” Reardon’s response: “I would much rather have you feel that way in a hotel room in Chula Vista in December than on the runway in Atlanta in June.”

4. Adapt as you go. When Dan came out for the first event at the Olympic trials in Atlanta, the 100 meters, the replay of his no-height vault from 1992 was playing on the jumbotron. Dan noted: “I was ready for it.”

Dan entered the pole vault in second place. In a last-minute decision, Dan opted to come in one bar early—a full foot below his 1992 failure. Dan described his vault, “I swing up, go over the bar, and I got a first attempt make.” Dan moved into first, and went on to win the trials and make an Olympic team.

Aldi. Delivering consistently on what customers value made Aldi a market disrupter. Following World War II, Theo and Karl Albrecht made an enduring decision. To win customers, they would sell products for “decisively less.” The “Aldi way,” a single-minded mandate was born: Take costs out—everywhere. Aldi stores were small (17,000 square feet). SKUs were limited (about 1,000

per store). High-quality store brands dominated (95% of all products). Workers were cross-trained—three to five could run a store. And customers bagged their own groceries using their own bags and returned carts to the rack to get their deposit back.

Aldi's formula worked.

By 2010, the deep discounter had altered the European retail landscape and established a strong beachhead in the United States. Aldi beat even Walmart on price—by as much as 15% to 18%.

But leaders at Aldi noticed something. To grow, Aldi needed to attract a higher-income shopper or expand its geographic footprint. Both options would increase complexity and costs.

Should Aldi adapt, tweaking the Aldi way? Aldi decided to let the data show them the way.

- **Adding Big Data capabilities.** To help design the customer experience and supply chain of the future, Aldi set up a stand-alone division tasked with scanning for best ideas, analyzing alternatives and recommending how to optimize operations. As millions of data points and millions of options needed to be analyzed, Big Data became a big deal at Aldi.

- **Focusing on the SKUs that count.** Decision makers asked: “What keeps high-income customers from frequenting Aldi?” Answers varied: Fresh-baked goods, more fresh, organic options, branded products. Managers tested each proposition. For instance, they weighed the marginal costs and benefits of adding on-site bakeries. They then pilot tested the concept. It worked. The BACKBOX is now a common feature at Aldi stores. The pattern was set. Each suggested SKU would be similarly tested. Some items proved successful; others didn't. Aldi

slowly increased its in-store SKUs by almost 50%.

Aldi's data-driven process—what we call prove and improve—ensures Aldi consistently evolves the shopping experience as customer tastes change. This is the key to staying in the game.

TABLE 1

Key decisions to ensure performance

DAN'S DECISION POINTS	PARALLELS
Get back in the game	When you suffer a service failure, you can win customers back with great service recovery systems.
Prepare for what counts	When you consider making capability investments, be sure to evaluate whether your customer cares and how you stack up against rivals; segment customers based on profitability.
Add missing capabilities	Identify capability gaps across the entire service system from data collection to service delivery to after-service follow-up.
Adapt as you go	Cut red tape and empower front-line employees so that they can effectively respond to customer needs.

Source: Authors

The ever-rising bar

The decathlon is brutal. No one is ever 100% prepared to perform at peak across 10 distinct events over two consecutive 12-hour days. For evidence, consider this: Dan's world-record effort of 8,891 points included just four personal bests. Had Dan achieved personal bests in every event, he would have scored 9,217 points, a record that would still stand today.

Connecting with customers is just as hard. You must create unbeatable value and deliver unique customer experiences. But, customers love to raise the bar. You may never be able to get over the bar at every customer touch point. Don't let failures deter you. Dan didn't. Although he strove for perfection, he knew it doesn't have to be perfect to win a gold medal. Dan's theory of training kept him consistently competitive.

Put our training tips to work and you too will consistently get over the bar to earn customer gold. ∞



DEMAND PLANNING IN A CRISIS

In many industries, demand has never been more volatile and unpredictable than during the COVID-19 pandemic. Here are seven actions to drive demand planning despite an unprecedented crisis.

BY KNUT ALICKE AND KAI HOBERG

Over the past years, demand planning has become a relatively routine task for many planners. While still not perfect, many firms established S&OP processes, took advantage of sophisticated ERP systems and introduced new AI tools. This resulted in higher levels of planning accuracy than ever before. However, the COVID-19 pandemic triggered unprecedented demand shocks—both up and down—and amplified volatility across many industries. This was (and still is) a stress test for demand management processes. Here, we require new best-practices to achieve crucial visibility.

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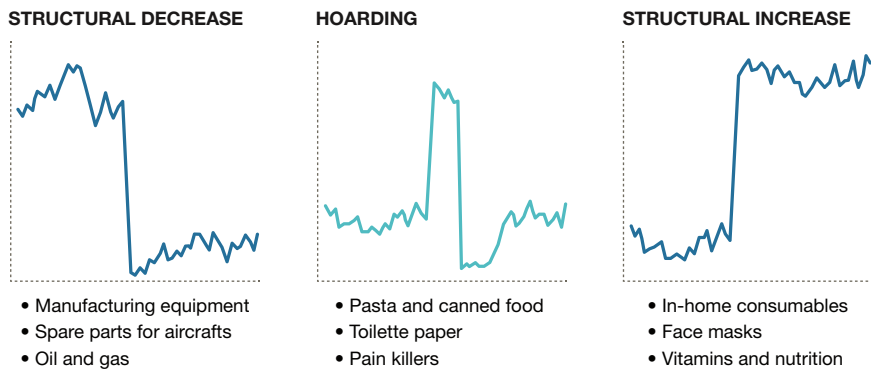
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As the virus started to spread across the globe, many industries were hit by developments that were hard to imagine before (see Figure 1). The lock-downs—first in

huge spikes in demand at the beginning of the crisis that were often followed by drops in demand to below the pre-crisis levels a couple of weeks later. In other set-

FIGURE 1

Common demand patterns in the crisis



Source: Authors

China and later across the globe—forced many manufacturers and retailers to shut down their operations. Major manufacturers like Ford, Volkswagen and Boeing closed many of their factories. Likewise, non-grocery retailers like Apple, Zara or Ikea were not considered essential and had to shut their stores in many countries.

As a consequence, orders at suppliers and more upstream partners dropped significantly—often all the way down to zero. Similarly, other demands have structurally decreased due to changing behaviors and new circumstances, everything from special potato varieties used for French fries in restaurants to luxury goods affected by travel bans on Chinese tourists to spare parts for aircraft affected by the grounding of entire fleets.

Given the rapidly increasing uncertainty, many end consumers started panic-buying and emptying supermarket shelves. In particular, goods like canned food, pasta and pain killers saw

Shifting planning priorities

Supply chain managers had to change their practices given the completely new challenges (see Table 1). In normal times, priorities in planning have focused on increasing forecasting accuracy from already high to very

TABLE 1

Shifting key challenges and demand planning priorities

	PRE-CRISIS	COVID-19 CRISIS
KEY CHALLENGES	<ul style="list-style-type: none"> • Automate routine planning processes to reduce planners' workload • Incorporate effect of own and customers' promotion into forecasting processes • Manage product life cycles with new product launches and products at end of life • Ensure discipline to uphold data quality and data timeliness for planning • Improve statistical forecasting and advanced analytics algorithms by tweaking parameters • Improve capabilities in using the system 	<ul style="list-style-type: none"> • Traditional statistical models cannot rapidly capture new demand realities/non-existing historical demand patterns • Anticipate new and irrational customer behaviors, e.g. hoarding or phantom orders • Dynamics based on government measures, e.g. plant closures and re-openings, lock-downs and border closures • Build capabilities for understanding the implications of the whole ecosystem on demand • Evaluate external influences far more and handle new data sources • Extend activities beyond demand forecasting and forecast other important factors e.g. availability of supply or product capacities
PLANNING PRIORITY	<ul style="list-style-type: none"> • Increase forecasting accuracy from high to very high levels while increasing planners' efficiency 	<ul style="list-style-type: none"> • Create forecasts that are good enough to enable scenario planning for minimum and maximum demand

Source: Authors

high levels, while striving for automation to reduce the workload of planners. This was difficult given the challenges imposed by poor data quality, changing product life cycle or frequent promotions.

During the pandemic crisis, however, planners are facing completely different and more fundamental challenges. Their well-established ERP planning systems, which use statistical forecasting models, are not able to adjust quickly to the new demand realities. Any traditional forecasting approach that is based on historic time series needs a longer time period to capture new levels and trends. Besides, customers behaved completely differently than in normal times and often completely irrationally.

Probably the best-known example is toilet paper, which was practically sold out for weeks because replenishments often did not even make it onto the shelf. Many consumers fell for the psychological fallacy and started stockpiling to prepare for uncertain times. In addition, it was difficult to anticipate and incorporate dynamics based on government decisions in the planning processes, and information on down-stream inventories and lead times that might provide some insight into demand trends were difficult to obtain.

As a result, the priorities of demand planning during this crisis have shifted significantly toward enabling forecasts that are good enough for reasonable scenario planning. For cost-intensive decisions such as plant openings, layoffs or sourcing contracts, it is essential to have a realistic

idea of the minimum and maximum demand with a range that is ideally as small as possible. If demand is significantly higher than the maximum expectation, firms have to expedite shipments, need to find costly alternative suppliers and lose time training more workers. If demand is below the

TABLE 2

Overview of action areas for demand planning

ACTION AREA	RECOMMENDATION
<p>1 CHANGE FORECASTING MODELS</p>	<ul style="list-style-type: none"> • Switch-off traditional forecasting algorithms, especially if connected to automatic replenishment • Implement machine learning algorithms that are able to learn the new situation much faster/auto-selects better forecasting algorithms • Override forecasts manually that cannot be adjusted easily by new algorithms
<p>2 IDENTIFY FUTURE DEMAND DRIVERS</p>	<ul style="list-style-type: none"> • Forecast structural shifts in demand due to new customer needs, changing distribution channels or investment stops • Set-up analytical predictive models, using demand drivers, disease information and available lock-down information
<p>3 UNDERSTAND SUPPLY CHAIN DYNAMICS</p>	<ul style="list-style-type: none"> • Predict end consumer demand and available capacity in the supply chain to challenge customer orders • Consider the effect of lead times and inventories on own demand
<p>4 INCREASE COMMUNICATION WITH CUSTOMERS</p>	<ul style="list-style-type: none"> • Intensify customer collaboration through frequent updates on order forecasts and downstream customer expectations on market development • Establish joint planning with key customers and challenge demand from customers to avoid shortage gaming • Use neutral independent parties (Industry Associations) to solve/help allocating extreme demand-supply mismatches
<p>5 RESTRUCTURE S&OP PROCESSES</p>	<ul style="list-style-type: none"> • Set up cross-functional team consisting of data analysts, demand planners, and sales (if not already done!) • Increase frequency of S&OP meetings and emphasize focus on monitoring supply and transportation • Ensure input on demand and supply changes is synchronized and updated right before S&OP meetings
<p>6 PLAN PRODUCT PORTFOLIO</p>	<ul style="list-style-type: none"> • Focus on fast movers to manage planning effort • Reduce portfolio of slow-moving products to pool demand and decrease demand uncertainty • Sense demand developments based on A-B testing
<p>7 CLEAN DATA FOR THE FUTURE</p>	<ul style="list-style-type: none"> • Agree on the clean baseline data for forecasting • Ensure that all functions use the same processes and agree on the same baseline data throughout the company for the time after recovery

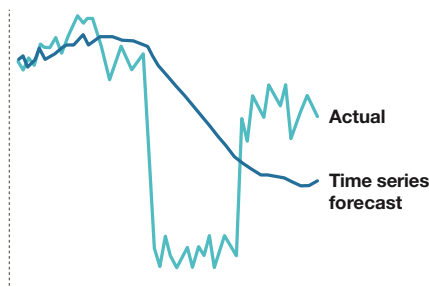
Source: Authors

minimum expectation, excess inventories build up, orders must be canceled and staffing costs surge. To match supply—at least loosely—to demand, supply chain managers must leverage all available resources and introduce new practices, which we group into seven action areas.

1. Change forecasting models. To better understand the challenges of many forecasting models in the rapidly changing situations, it is important to be familiar with some standard forecasting approaches. Many demand planning systems are configured to generate demand forecasts using statistical time-series models, such as exponential smoothing. These models only consider sales data from prior periods and typically work well if demand is relatively stable, shows clear seasonality or/and growth. However, if demand is rapidly ramping up or down, the models need time to adjust to the new realities and lag behind real-world sales patterns leaving forecasts that are structurally too low or too high.

Figure 2 illustrates how the forecast lags behind actual sales: As demand drops, the forecast is initially too high and later, it is too low as demand recovers. Therefore, it is important to switch-off these traditional algorithms if demand changes quickly, especially if they are connected to automatic replenishment systems.

FIGURE 2
Time series forecast lagging behind actual



Source: Authors

Many modern AI systems already generate forecasts with dozens of different algorithms. As the system realizes a poor performance of the algorithm that is normally working well, it can automatically tune to alternative models that currently work better and obtain structural insights from the many SKU-store combinations simultaneously observed. If this is not supported, manual overrides need to do the job—in many situations, even a simple moving average of the sales of the past three days or weeks works well. As

more data becomes available and the volatility drops it is time to revisit the model selection.

2. Identify future demand drivers. To model structural shifts in demand, it is important to build demand models that consider the factors that really drive the demand. For example, for a food manufacturer it is important to consider the opening and closing of different channels: Demand for portfolio of professional products is driven by the number of open restaurants or canteens whereas demand for the consumer portfolio is driven by structural shifts to in-home consumption that is served by online stores or supermarkets. Besides, market shares, price surges and (de-)listings are important factors to consider. In other industries, demand drivers could be GDP developments, investment activities or recoveries of down-stream customers.

Ultimately, managers should set up predictive demand models that use the individual demand drivers identified, but also disease and lock-down information. Good examples are airlines that need to predict demands in their network. To estimate passengers on the leg between New York and Munich factors like business trips, canceled events and travel bans must be considered.

3. Understand supply chain dynamics. While many companies were directly and immediately affected by demand disruptions at the beginning of the coronavirus crisis, more upstream players, such as in the chemical or semiconductor industry, only see the effects on their demands over time. With many stages between them and the end-user of their products, long lead times and high safety stocks, these companies will only observe demand changes after months. It is therefore critical to establish transparency on the sale of the goods in which their products are used.

For example, a coatings manufacturer must monitor the automotive market. If sales of new cars shrink by 25%, the company should challenge any customer information indicating that demand is at pre-crisis levels. Secondly, it is essential to understand the dynamics in the supply chain and to estimate the downstream inventory levels and lead times. Thus, it is possible to understand when any demand shift affects

an upstream player. If, for example, production for a certain product is ramped up after the shutdown, any uncoordinated supply chain will take months before orders are received by a third tier supplier. Further, demand patterns might be hugely inflated based on the well-known bullwhip effect and additional stocking and de-stocking of safety stocks. Companies without smart planning could overreact.

4. Increase communication with customers.

Direct interactions with customers are an important element in understanding future demand. In the crisis, intensifying customer collaboration through frequent updates on order forecasts and downstream customer expectations about market developments can help to improve transparency. Establishing joint planning is particularly useful when a few key customers capture a large portion of the demand. However, it is also essential to challenge any demand assumptions to avoid customers inflating their expectations. To avoid any shortage, gaming it out might also be required to play hard and remind customers of their contractual obligations.

In the case of extreme demand-supply mismatches, it is helpful to engage neutral independent parties to help with the allocation. One example is the Japanese Auto Association that was called upon after the Fukushima crisis to take an intermediate role to ensure a fair allocation of short components—with the goal of maximizing the overall output of all affiliated plants.

5. Restructure S&OP processes. Well-designed and properly executed sales & operations planning processes have always been a key asset for successful companies. This is particularly true now: Companies that had set up cross-functional teams, defined clear roles and engaged in scenario modeling often did not have to change much. These companies just increased the frequency of their S&OP meetings and ensured that any information was synchronized and updated before the meetings. In addition, they paid more attention on monitoring transportation and supply to keep their different scenarios up-to-date.

However, firms that did not do their homework

needed to learn their lessons fast—Excel does not provide the required functionality to assess implications of demand and supply disruption on a daily/weekly basis. Companies set up war rooms with cross-functional teams consisting of data analysts, demand planners and sales, and met frequently to adjust for volatilities in demand. As tools, many companies took advantage of control tower solutions like SAP IBP / O9 solutions or E2Open that software providers offered free of charge for a limited time. Clearly, the crisis accelerates the adoption of these tools.

6. Plan product portfolio. During the crisis, many firms streamlined their product portfolio in order to cope with surges in demand. They focused on A-products, standardized packaging for different countries and stopped producing products on the long tail. As a result, manufacturing processes could be simplified (both internally and at suppliers) and maximum output is increased.

There are also planning advantages as demand is pooled across different SKUs and the challenge of correctly forecasting the SKU mix is greatly reduced. As the crisis recedes and the higher output is no longer required, it is important to see this as an opportunity to plan the future product portfolio. Companies must learn which B and C products are still required in the “new normal.” Here, the A/B test can be an important tool to sense the real demand, that is to start experimenting to reintroduce some of the B and C products back into the portfolio; this will drive the agile supply chains much more.

7. Clean data for the future. In a final action area, the planners must prepare their data for the recovery. As discussed above, the crisis has affected many demand patterns that might return to normal once the situation improves. However, if a planning algorithm makes forecasts based on “actual” data that was “distorted” during the crisis, automatic forecasts will not achieve the required accuracy.

For example, the demand peaks and dips for toilet paper sales in the winter/spring of 2020 will certainly

not be a relevant source of data for forecasting the seasonal demand in 2021. Therefore, planners need to define the right baseline data for the forecasting purpose. This could be the data from winter/spring 2019 that might be manually tweaked to link it to new products or other structural changes.

Furthermore, it is difficult to reconcile the aggregated demand data with the demand for different channels/products. Overall demand patterns might be reasonably clean, due to a shift from brick-and-mortar customers to online customers, but the baseline data for both channels need to be revised. What's more, it is vital to ensure that all functions agree on the same clean baseline data; otherwise sales, finance and manufacturing will be working with different data sets and deploying different plans. The clearly defined role of a data steward is essential here.

Toward the “new normal”

As the crisis continues, many demands will be less affected by COVID-19 but driven by overall economic developments. Many countries will go into recession and demand patterns will become more similar to those observed in previous crises. However, as managers prepare for demand planning in the “new normal,” they need to carefully consider four important learnings.

First, many companies have been forced to embrace agility in the past months. Important decisions were taken much faster than normal—often within days instead of weeks. More frequent S&OP meetings, tighter cross-functional integration and better preparation were key enablers here. As war rooms close and operations go back to the new normal, the need for agility will remain. To enable this agility, companies need to bring their S&OP processes and systems on par with their competitors and get their homework done: Data must be clean, and processes and systems must be set up and used in a smart way.

Second, in line with new processes and systems, managers must review the capabilities and skills that they need for the future. Rather than forecasting demand only, planners have to monitor production and shipping at suppliers, estimate own production

capacities and understand downstream market developments. All of this information feeds into scenario planning, which was often very ad-hoc and Excel-based. The crisis has shown that thinking in scenarios is key and real control tower solutions must be used in the future (and not disregarded as software trials expire).

Third, there has been much opposition to the idea of removing production planners from the plants and demand planners from the local markets to facilitate shared service centers for planning. However, successful communication and interaction from the home office during the crisis has shown that co-location is not a prerequisite for effective planning. Instead, planners can learn from each other and become much more efficient in a shared planning hub. Accordingly, it is the right time to rethink the organizational structures for the new normal.

Finally, the crisis highlights the need for excellent supply chain planners in all their different roles. While AI systems will continue to support planners and improve their decision making, the crisis has highlighted that the hands-off-the-wheel mentality is still a long way off. As long as AI systems are only extrapolating the past and do not understand the structure of demand, complex planning in situations with high volatility will continue to be AI-supported but human-driven. ∞∞

To read more on this subject, the authors suggest the following articles:

Alicke, Knut, Hoberg, Kai, Racher, Jürgen (2019) “The supply chain planner of the future,” *Supply Chain Management Review* May/June, p.40-47.

Sterman, John D., and Gokhan Dogan (2015). “I’m not hoarding, I’m just stocking up before the hoarders get here: Behavioral causes of phantom ordering in supply chains.” *Journal of Operations Management* 39, p. 6-22.

Udenio, Maximiliano, Kai Hoberg, and Jan C. Fransoo (2018). “Inventory agility upon demand shocks: Empirical evidence from the financial crisis.” *Journal of Operations Management* 62, p.16-43.



SUPPLIER ECOSYSTEMS

MANAGING COMPLEXITIES IN THE SUPPLIER CHAIN

Supplier ecosystems provide an opportunity for supply chain managers to overcome the shortcomings of conventional supply chain approaches when managing complex supply chains.

BY FRANK WIENGARTEN, THOMAS CHOI AND DI FAN

Companies are under constant pressure to optimize their supply chains to provide complex product and service solutions for customers. The conventional approach has been to find the best suppliers, wherever they are located. By doing so, companies have dispersed their sources of supply across long supply chains that often span the globe. The unanticipated consequence of this approach has been increased supply chain complexity, characterized by a lack of visibility and an increased risk of disruption. Many companies experienced all three of these during COVID. And in this model, the management of that complexity is centralized in the buying company, which bears the responsibility for managing and coordinating the activities of culturally and geographically diverse suppliers.

Supplier ecosystems present a different approach that may provide an opportunity for supply chain managers to overcome the shortcomings of the conventional approach to complex supply chains. In a supplier ecosystem, suppliers have more autonomy and supplier-supplier relationships are allowed to emerge. That shifts some of the responsibility from the buying company and enables supply chain complexities to be managed decentrally.

While the traditional approach leads to long, dispersed supply chains, the ecosystem approach focuses on tightening and integrating supply chains. The ecosystem approach highlights supplier autonomy while acknowledging the buying company's leadership.

At the Center for Advanced Procurement Strategy (CAPS) Research, we conducted in-depth case studies involving nine multinational companies with varied ecosystem approaches. Based on these case studies we developed a maturity model of supplier ecosystems that is based on processes and practices with implications to the strategic and operational performance benefits from applying the ecosystem approach. Our research has identified various operational and strategic benefits stemming from the supplier ecosystem approach (see About our research).

Supply chains versus supplier ecosystems

The traditional approach to supply chain management typically happens one supplier at a time, in a top-down way. The buyer drives the relationship, and often tries to gain leverage through adversarial posturing, by, for instance, taking away business, negatively modifying conditions and canceling contracts.

Supplier ecosystems are different. They present a dynamic, communal environment. Instead of involving one supplier at a time in, say, new product development, a buyer may create an ecosystem where multiple suppliers come together to collaborate on the project. Yes, the buyer still exercises leadership, but now the buyer faces not just one but a network of suppliers. If the conventional supplier relationship approach could be likened to a series of bilateral trade agreements, the ecosystem approach might be called a multinational trade agreement.

As the initiator of the ecosystem, the buyer plays

About our research

For this project, which was sponsored by CAPS Research, we asked two questions: (1) *How can companies create and manage supplier ecosystem to deliver solutions to business problems and opportunities?* (2) *What is the type and level of value that companies can expect to gain through supplier ecosystems?*

Using a case study approach, we conducted an in-depth analysis of nine companies operating in various industries across manufacturing and service sectors.

Two companies were from the electronic/IT/telecommunications sectors (IT.SERV and IT.PROD), one financial institution (FIN.SERV), one fast-moving consumer goods company (FMCG), one utility company (ELEC.SER), one company that works in healthcare and training (DRHT) and another company that provides logistical/delivery services (MAIL). Two companies were in automotive industry as industrial suppliers (BREM and FSA). Overall, six companies had their headquarters in the United States, one in Asia (Japan) and two in Europe (Germany).

These companies provided a broad spectrum of ecosystem approaches in terms of maturity and sophistication (see Table 1 for an overview). The level of maturity was assessed on a seven-item scale ranging from 1 (low) to 7 (high). The scale is cumulative and reflects the level of practices relative to the maturity of ecosystems: sharing of the benefits, competition, sharing the costs, soft side of relationships, knowing each other's capabilities, varied leadership, communication, stakeholder consideration and problem definition.

Data was collected during the second half of 2018. Interviews lasted between 35 minutes and 50 minutes and often multiple interviews were conducted with the same informant. The informants were mostly supply chain or purchasing managers in senior positions. Secondary data was also collected from company webpages and was mainly used for contextual, background information such as company size, performance and other factors.

More information on these practices can be found in the CAPS report "Developing supplier ecosystems to create value." It can be found on capsresearch.org.

the role of facilitator and must allow relationships among the suppliers to emerge over time as suppliers interact and work together. The relationships in ecosystems are built on the sharing of knowledge and mutual benefits. This represents a hybrid form of sourcing strategy where suppliers cohabit in one ecosystem organized by the focal buying company.

In this context, cooperation and competition happen at the same time as a group of competitors cooperate in activities associated with creating mutual benefits while at the same time they may compete against one another in other settings associated with dividing up the benefits—what is more commonly known as co-opetition. The ecosystem approach offers a real chance for competing suppliers to truly cooperate by sharing capacity and capability. For instance, two competing third-party logistics (3PL) suppliers can share their warehouse space and the know-how of working with trucking companies.

The business case for supplier ecosystems

One recurring theme appeared in our research to explain the need for an ecosystem: Complexity. That can be defined by the depth and scope, or the number of tiers and suppliers, of a supply network.

Globalization and free-trade agreements have contributed to complexity. On the one hand, they have enabled supply chain managers to gain access to cheap materials, sources of low-cost labor and specific capabilities that may not be available in their country of origin. On the other hand, supply chain executives must now manage processes across borders and over long distances, while dealing with diverse cultures and differences in business practices. Global supply chains have provided great opportunities for many companies, but also increased the likelihood of disruptions, loss of efficiencies and increased transaction costs.

As part of our research, a company in the electronic/IT/telecommunications sectors we'll

refer to as IT.PROD told us that “the traditional efficiency focused supply chain strategy is not working for our complex products and services anymore.” Such complexity requires a diverse set of capabilities that many companies do not yet possess for the entirety of their products and services. What is needed is a collaborative approach with a varied group of suppliers across the supply chain to gain access to multifaceted capabilities.

Supplier ecosystems present an effective tool for supply chain managers to address those high levels of complexity for companies like IT.PROD. While the structure and length of traditional global supply chains have in many incidents led to communication difficulties, ecosystems create a hub and spoke communication design where the initiator is located in the middle and all other ecosystem members can dynamically interact directly with the initiator and with all other members.

For instance, FMCG, one of our study companies in the fast-moving consumer goods sector, involves its suppliers and end customers in supplier ecosystems to develop new products. The strategy is to use the ecosystem approach only for products that are extremely meaningful and important to consumers. This enables FMCG to gain crucial feedback from consumers right from the start and throughout the product development process.

Ecosystem approaches like those just described also recognize suppliers as stakeholders and offers them a context within which to collaborate and pool capabilities. Sharing knowledge and capabilities is required across competing suppliers. The combination of co-opetition and the co-evolution among the ecosystem members is another factor that sets an ecosystem apart from traditional supply chain management.

Supplier ecosystem maturity framework

From our interviews, we identified significant variances in the maturity levels of the ecosystem approach across our sample companies, as is illustrated in Table 1.

Our case analysis revealed that differences in

TABLE 1

Overview of companies and their supplier ecosystems

COMPANY (abbreviation)	MATURITY OF THE ECOSYSTEM (scale 1-7; 1 = low; 7 = high)	ECOSYSTEM MANAGEMENT
BREM	6	They include mainly suppliers along multiple tiers down into their supply chain. They also include customers in their ecosystem, but not by choice. Customers sometimes demand to be included to dictate the ecosystem setup.
FSA	1	Only limited number of suppliers. They do not really apply the ecosystem approach as such. FSA's main concern with ecosystem is that they believe that a competitive environment cannot be created.
FIN.SERV	5	The decision as to whom to include in the ecosystem is entirely driven by the end service that is developed. Thus, they don't prefer internal nor external stakeholders. However, overall the ecosystem members are mainly comprised of 1st tier service providers.
IT.SERV	6	They take a building block perspective to stakeholder management. They mix internal with external stakeholder. This company has a very defined view on stakeholders in terms of which stakeholders are "always" included: Supply partners, sales team, pricing team and delivery team.
IT.PROD	7	IT.PROD have a very inclusive approach to stakeholder management. They include all entities together that have a stake in the end product. This refers to all stakeholders that contribute to the value proposition of the end product of service. This includes customers etc.
FMCG	7	FMCG have a simple philosophy but also the most sophisticated approach to ecosystems: "Bring in all that have a stake in the end product (including customers)".
ELEC.SERV	5	They only use internal stakeholders for their ecosystems. But interestingly sometimes uses a contractor to manage their ecosystems.
DRHT	4	They only use its 1st tier suppliers in their ecosystems.
MAIL	4	MAIL only use its 1st tier suppliers in their ecosystems.

Source: Authors

maturity levels comes primarily from four different dimensions as shown in Figure 1.

At the low end (i.e., 1-2), companies seem to apply the ecosystem approach as a project to find solutions for specific business needs. This project-based approach is best suited for radically new developments. Furthermore, project processes are generally used to develop highly customized products and services. As such they have a defined and limited time span in terms of the duration of the ecosystem. They are not continuous, and the project ecosystems dissolves after all milestones are reached and the deliverables are made.

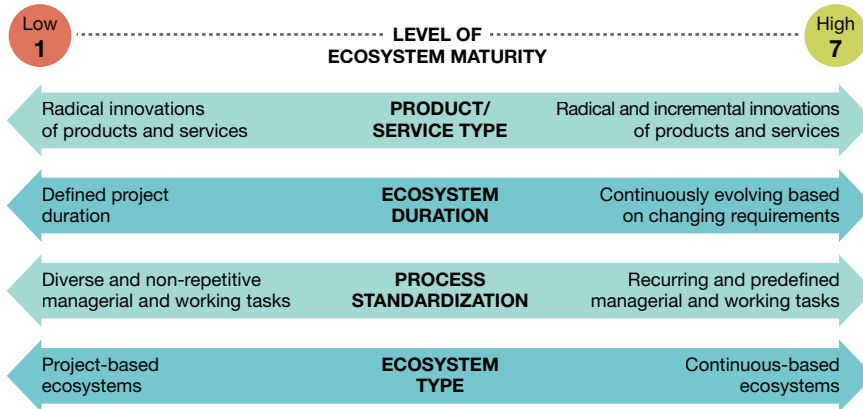
technological developments or changing demands.

FMCG was also at the mature end of the spectrum. During our research, one manager said "we define an ecosystem as a group of individuals that depend on each other." The key word here is dependency—it comes not so much from the financial side but from a shared goal. Another company, FIN.SERV, offered a good example of accomplishing a goal together through an ecosystem approach. As a financial service firm, it launched an initiative to redesign its branches to be more ecologically sustainable. FIN.SERV developed

On the opposing end of the scale at the high levels of maturity (i.e., 6-7) are more established and sophisticated ecosystems in terms of processes and practices. These ecosystems generally do not get dissolved, but instead evolve over time. IT.PROD, for example, uses specific ecosystems for product lines on a continuous basis. For a specific portable, handheld communication device, IT.PROD consistently uses the same group of stakeholders in its ecosystem to continually improve the product or product line. Small adjustments are made to the ecosystem as required, based on

FIGURE 1

Maturity levels of ecosystems



Source: Authors

As expected, companies that are mature in their ecosystem approach reap operational performance benefits and strategic benefits. In contrast, companies at the lower end of maturity levels experience only strategic performance benefits. This observation was interesting in the sense that these lower-end companies tend to set up operational outcomes as their goals.

an ecosystem of all stakeholders, including branch leadership and the construction companies involved in designing, selecting and renovating the facilities. Capitalizing on existing knowledge outside their area of business expertise, the supplier ecosystem developed innovative solutions together. Subsequently, the learnings were applied to other projects.

Value generation

A manager at IT.SERV, another company in the electronic/IT/telecommunications sectors, noted, “We clearly see three value dimensions: technical innovation, cost takeout and speed.” This comment captures two types of values—operational and strategic value. Operational value refers to cost, quality, delivery and flexibility. Strategic value refers to innovativeness, including areas such as new product development. With different levels of maturity come different performance benefits.

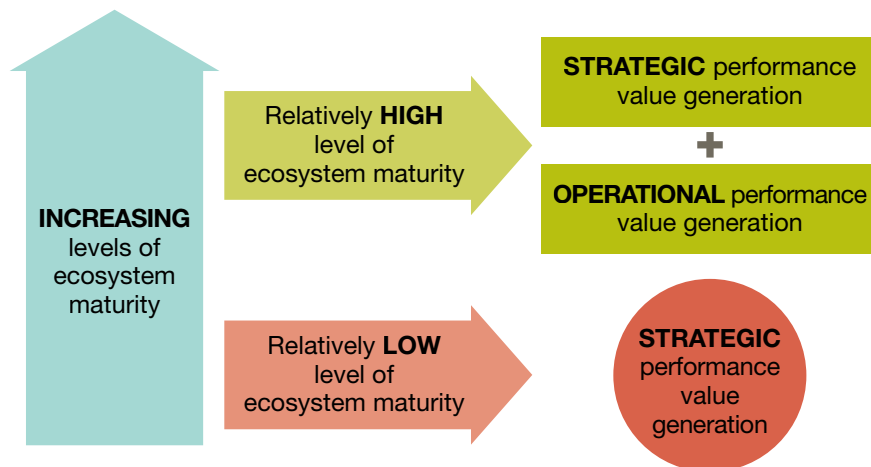
Generating strategic value

At the lower end of ecosystem maturity, companies in general attain strategic value. This value comes through a project-based approach that focuses on radically new product/service developments or internal solution development. In contrast, more-mature ecosystems undergo ongoing developments that can be both incremental and radical in nature (see Figure 2).

This is probably also the reason that the managers

FIGURE 2

Ecosystem value generation



Source: Authors

using a less mature ecosystem approach, such as those ELEC.SERV, a utility company in our survey, can get enthusiastic about the ecosystem approach. There are low-hanging fruits to be picked and quick performance improvements to be gained from implementing supplier ecosystems. Overall, the major strategic value generated through ecosystems are associated with innovativeness.

For example, IT.SERV and IT.PROD, as mature users of ecosystems, reported that the main value of ecosystem lies in the ability to generate new product or service innovations, in addition to the operational performance benefits discussed below.

Less mature companies, however, have predominantly used supplier ecosystems from a project perspective to develop and push radical innovations. This priority is probably the reason why less mature supplier ecosystems predominately result in strategic benefits. Higher levels of maturity bring not only higher levels of performance, but also additional benefits, such as both strategic and operational performance.

All in all, innovation is the key reason behind why most companies start engaging in ecosystems in the first place. IT.PROD told us, “(through the ecosystem approach) we have reduced the time to market from formerly just more than one year to three months.” The company noted that it achieved this through the inclusion and integration of extended stakeholders with whom they now have direct access and communication with. This presents a crucial competitive advantage for them as the increased introductions of new products drives their innovative capabilities.

Another strategic objective of ecosystems is to gain access to new markets. This less apparent performance benefit can result in the ability to tap into sources of supply talent that were formerly out of reach. IT.PROD reported that the combination of the access to new sources of supply and new sales markets enables them to generate such high value through ecosystems. They used consumers in their ecosystems to adapt their products to the specific market needs to induce a country/regional perspective.

Generating operational value

Conventional wisdom holds that operational performance benefits come before strategic performance gains. For example, operational performance benefits such as quality improvements may increase customer satisfaction and required innovativeness.

In supplier ecosystems, however, we find that strategic benefits come before operational benefits. According to IT.SERV, the ecosystem approach provides a different process setup that can then positively affect the cost and speed dimension. What the company refers to as cost takeout encompasses procurement costs for parts and materials as well as transaction costs beyond costs that occur on the supplier’s side. Furthermore, by breaking down the barriers associated with conventional, linear supply chains and an increase in focus, ecosystems are able to significantly speed up the time to market.

While IT.PROD initially set up strategic benefits as the goal for its supplier ecosystem, it unexpectedly discovered operational benefits as a byproduct. For example, one initial objective was to gain access to new suppliers, new markets and to generate ideas. Then, it noticed improvements in operational performance. In essence, by being able to more accurately match supply with demand through the supplier ecosystem, the company began to reap some of the fruits of the ecosystem approach, including reduced time-to-market, lower costs and increased quality.

In short, operational performance benefits are attained by building on previously achieved strategic benefits of the supplier ecosystem approach. The resulting operational performance benefits are incremental but lead to continuous process improvements. As mentioned previously, the operational value can be in any operational performance dimension, depending on the priorities, such as innovation and quality process, or on other dimensions such as flexibility gains. At IT.PROD, increasing agility through improved communication and supplier connectivity represents an important improvement that can strengthen a company’s competitive position.

How FMCG practices supplier ecosystem

One of the companies we interviewed was a fast-moving consumer goods company we'll call FMCG. This company's approach to its supplier ecosystem exemplifies some of the best practices we observed in our study. A combination of these practices make this company's supplier ecosystem a significant departure from traditional supply chain management. We identified nine significant practices.

1. Something for everyone. Ecosystems need to be managed so that there is “*something in it*” for each participant. FMCG has clear rules and regulations with regard to sharing gains from a new product or service that comes out of the supplier ecosystem. It provides a revenue percentage of sales based on the intellectual contributions of each ecosystem member.

2. Co-opetition as *modus operandi*. The tension between cooperation and competition among the ecosystem members is an important aspect of the value creation effort. Co-opetitive environments need to be created and fostered to appropriate value. FMCG, the ecosystem initiator, kickstarts it through supplier summits.

3. Communication across diverse membership. To start and initiate the ecosystem, FMCG uses supplier circles and partner workshops where suppliers begin to interact with one another. At this juncture, FMCG communicates by emphasizing a collaborative environment. However, as the ecosystem matures, FMCG actively communicates competition among the members in order to achieve desired performance outcomes.

4. Problem definition. FMCG emphasizes the success of an ecosystem depends on a concise definition of the problem. The company highlights that as an important exercise with which to begin the ecosystem. It provides the direction for the ecosystem members on the deliverables as well as member company selection based on their capabilities.

5. Sharing the pain. FMCG treats its suppliers fairly and openly. It collaborates together, not just in words but through actions. Action speaks loudly when FMCG partakes in cost and resources. Transparency, in terms of cost and resources, is extremely important for the successful management of an ecosystem.

6. Soft side of relationships. Supplier summits are used to select potential suppliers for specific ecosystems. FMCG uses these summits to get to learn about the supplier's company culture—how they “do business.” Understanding the soft side of the relationship is instrumental in creating an innovative ecosystem culture based on trust, commitment and collaboration.

7. Knowing supplier capabilities. Assessing a supplier for its soft and hard skills is important. To do that, FMCG involves both qualitative and quantitative assessments. FMCG does this through a very sophisticated tracking and storage system of supplier information that includes both objective performance data and relationship related data and information.


8. Varied leadership styles. FMCG primarily adopts a value-based leadership style. However, in the way FMCG practices it, two different leadership styles manifest—charismatic leadership and team-oriented leadership. When FMCG leads the discussion to identify what values would drive actions, it behaves in a charismatic way. When the members begin to engage in action to move toward the goal, FMCG resorts to team-oriented leadership in which they allow autonomous activities among the team members.

9. Technology. FMCG uses two blocks of technologies for successful ecosystem management. First, it relies on technology that enables connectivity and communication among the ecosystem members. Second, it also relies on sophisticated knowledge management systems with AI that contain information regarding supplier capabilities and previous ecosystem data.

A new approach to managing complexity

An ecosystem approach is presented as a new way of managing complexity in supply chains. Under this approach, a manager should view suppliers as a network rather than as isolated entities. In that regard, how they interact and work together should be closely observed and studied.

Overall, a low maturity approach tends to confine

supplier relationships for short-term projects, while a high maturity approach views supplier relationships as being continuous. A low-level maturity approach does not mean it sees no benefits—as long as the company follows through, all levels of maturity reaps innovativeness as the benefit. However, only the more mature can gain the operational benefits in cost, speed and quality. 

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CLOUD AND SUPPLY CHAIN SOFTWARE

How Software-as-a-Service (SaaS) took over the supply chain software market, where it stands now and how far we have to go before the supply chain is truly autonomous.

BY BRIDGET McCREA, CONTRIBUTING EDITOR



Coming into 2020, the worldwide public Cloud services market was on track to grow by 17% for a total of \$266.4 billion in revenues this year—up from \$227.8 billion last year. “At this point, Cloud adoption is mainstream,” Gartner’s Sid Nag pointed out at the time. “Adoption of next-generation solutions are almost always ‘Cloud-enhanced’ solutions, meaning they build on the strengths of a Cloud platform to deliver digital business capabilities.”

Breaking the Cloud down into two different segments, Gartner said software as a service (SaaS) will claim \$116 billion of the market in 2020, while Infrastructure-as-a-Service (IaaS) will hit \$50 billion. Gartner attributes much of the growth to the demands of modern applications and workloads, “which require infrastructure that traditional data centers cannot meet.”

Safe to say, COVID-19 will elevate those numbers even further as companies scramble to find technology that supports more remote, socially-distanced work arrangements. So, while Cloud adoption was already on the rise—with very few companies doing big, on-premise software installations anymore—it’s taking on a larger responsibility as organizations invest in applications that help them be more flexible, agile and resilient.

Supply chain software has been front-and-center in many of these conversations. Valued at over \$15 billion, the supply chain management (SCM) sector grew at an 8.6% pace in 2019, exceeding \$15 billion in vendor revenue by helping companies automate and manage their domestic and global supply networks.

According to Balaji Abbabatulla, Gartner senior director analyst of product management research for SCM software, Cloud software revenue grew almost 2-1/2 times faster than the overall SCM market in 2019. In total, it accounted for nearly 34% of the market as all leading vendors in the space took their new product strategies into the Cloud.

“The impact of Cloud has been all-pervasive across all of the supply chain submarket segments,” Abbabatulla points out. Gartner divides

those segments into procurement, supply chain planning (SCP) and supply chain execution (SCE) applications. For procurement, he says many of the procurement platforms being adopted right now are Cloud-based, and many of their users are accessing those platforms remotely (via the Cloud). “It’s really about usage and adoption,” he says.

In the SCP space, Abbabatulla is seeing a big push for legacy software modernization that’s being supported by the adoption of Cloud-based applications. Much of what’s in place right now is antiquated, so companies are looking for new ways to be able to react quickly across multiple time horizons. Cloud is helping them achieve those goals, and more.

“At a broader level, business leaders are looking for tech tools that help them achieve better supply chain resilience—as opposed to finding ways to improve efficiency and productivity,” says Abbabatulla. “Where efficiency was once a driving force for Cloud-based SCP adoption, now it’s all about resilience.” Credit COVID-19 with driving this trend. Where Cloud was a “nice to have” pre-pandemic, it has since become a “must have.”

“COVID has made it imperative for supply chain leaders to have some form of a modern planning solution that cuts across various individual functions—be it sourcing planning, execution planning, manufacturing planning or sales and distribution planning,” Abbabatulla explains. “To manage any of these functions, organizations need to be able to understand and react quickly to environmental changes.”

Top 10 supply chain management software suppliers

SCM (SCE, SCP, Procurement) Total Software Revenue

No.	Supplier	2018 Revenue	2019 Revenue	SCP	WMS	TMS	Procurement	Website
1	SAP	\$3,789.8	\$4,122.1	x	x	x	x	sap.com
2	Oracle	\$1,716.7	\$1,734.9	x	x	x	x	oracle.com
3	Blue Yonder (previously JDA Software)	\$781.1	\$835.8	x	x	x		jda.com
4	Coupa	\$226.4	\$334.8				x	coupa.com
5	Infor Global Solutions	\$322.3	\$333.1	x	x	x	x	infor.com
6	e2open	\$168.5	\$287.2	x		x	x	e2open.com
7	Descartes Systems Group	\$240.2	\$282.3			x		descartes.com
8	WiseTech Global	\$199.9	\$261.1		x	x		wisetechglobal.com
9	Jaggaer	\$225.5	\$260.7				x	jaggaer.com
10	Manhattan Associates	\$215.5	\$244.9	x	x	x		manh.com
Top 10 total		\$7,886.0	\$8,697.0					
Other vendors		\$6,088.1	\$6,478.6					
Total		\$13,974.1	\$15,175.7					

Revenue listed in millions of USD.
Source: Gartner

Improving productivity and efficiency

As the third component in Gartner's 3-legged SCM stool, SCE is all about improving operational productivity and efficiency. It's where warehouse management systems (WMS), transportation management systems (TMS), yard management systems (YMS) and others come together to support the overall supply chain. Using the warehouse as an example, Abbabatulla says Cloud-based WMS stands at the intersection of emerging technologies and the need for multi-enterprise collaboration.

"The Cloud allows warehouse applications to integrate with external sources that, in turn, send signals (i.e., a

delay or disruption in the upstream supply chain) that help the company in question automatically optimize its own internal processes," Abbabatulla explains. "As a result, overall internal efficiency improves."

As Cloud continues to affect all three facets of SCM, Abbabatulla expects to see more companies moving over to this software delivery model. With or without technology, he says all organizations are focused on enabling better decisions by improving intelligence in the supply chain. A trend exacerbated by COVID-19, this movement in and of itself continues to drive the high demand for Cloud-based supply chain software.

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Moving toward the autonomous supply chain

Operating in a world where the ability to make anything “autonomous” is technology’s latest siren call, supply chain managers are envisioning a day when some or all parts of their global supply chain are, indeed, autonomous. The Cloud could help them get there.

Salim Shaikh, a digital transformation executive at Blue Yonder, says the high levels of uncertainty that COVID-19 brought with it are driving even more supply chain operations to explore their autonomous supply chain options. Seeking better resilience and adaptability, more of these companies are looking to the Cloud for help in this area. For many, the “Holy Grail” is the autonomous supply chain, or that place where planners can use real-time data to reduce latency, manage disruption and turn their attention to more value-added tasks, like managing exceptions and collaborating with customers and suppliers (versus analyzing data).

For the company that doesn’t want to rip out and replace the on-premise systems that it has been using for decades, the Cloud paves the path to newer, more modern applications that can be integrated into existing enterprise resource planning (ERP) and other systems using application programming interfaces (APIs).

“This allows organizations to leverage new software capabilities and technology like machine learning, artificial intelligence (AI) and predictive/prescriptive analytics,” says Shaikh, “on top of their existing solutions.”

Acknowledging that the autonomous supply chain creates predefined scenarios that can be automatically implemented when a particular event is triggered, Abbabatulla says the end goal for such supply chains is that every single supply chain decision should be made and implemented autonomously. And while this is certainly something to aim for in the future, Abbabatulla says we’re not quite there yet, nor is it presently a key driver of Cloud-based SCM investment.

“The autonomous supply chain has long-term business potential,” Abbabatulla concludes, “with supply chain leaders currently investing in applications that improve their business outcomes today, so they can recover from the downturn, gain competitive advantage and grow quickly.”

The modernization of the supply chain

With all of the top supply chain software providers now offering Cloud-based options—and some focusing solely on this delivery model—it’s no longer a question of if a company

is going to move in that direction, but when that’s going to happen. As chief sustainability officer and group vice president of SCM product strategy for Oracle, Jon Chorley says COVID-19 has brought to light the value of the Cloud across nearly all software segments, SCM included. For example, he says Cloud go-live implementations can take place 100% virtually, which means no worries about travel, social distancing or other COVID-related workplace challenges.

The fact that Cloud-based SCM integrates machine learning, AI, IoT and even blockchain (in some cases), makes it particularly attractive for newer companies, and for those that are saddled with on-premise and legacy systems that lack the modern bells and whistles. With little to no investment being funneled into non-Cloud-based enterprise software platforms at this point, Chorley says the “pendulum has swung” over to the SaaS delivery model.

“Companies are recognizing that some of these newer technology capabilities can really make a difference in supply chains,” he adds, “and they want to leverage them within their own environments.”

Where in the past these add-ons may have required expensive customizations, consulting and integration work, most are simply built into the modern, Cloud-based options. “As technology continues to evolve and develop, those capabilities just become part of our solution,” Chorley says. “You can’t go out and integrate them, extend your software or add them on. They’re part of the intrinsic value proposition.”

5-year success plan

Looking ahead, Abbabatulla sees three phases of supply chain modernization coming. The first is migration to the Cloud (timespan: 2021-2022); followed by process modernization supported by growth technologies such as AI and advanced analytics (2022 and beyond); and finally, we’ll see process augmentation, as companies will implement emerging technologies such as hyper-automation to deploy convergent SCM solutions across their global supply chains in 2023 and beyond.

By the time 2025 rolls around, more companies will have gone beyond just creating specific pockets of intelligence or resilience in their operations, and will be using technology to extend those strengths across the broader supply chain. “By phase three,” says Abbabatulla, “organizations will be getting true value from the investments they made during the first two phases.” ☞

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Planning for the supply chain of the future

To survive and thrive, organizations must balance efficiency with adaptability, flexibility and effectiveness

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

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C OVID-19 and the resulting economic downturn have challenged organizations to re-evaluate their ideas about how to optimize the supply chain. Rather than focusing solely on cost and market share, organizations must now consider how to address risk and meet strategic goals while achieving efficiency. This responsibility falls primarily on supply chain planners, who must consider the need to keep logistics modes flexible, quickly

react to unforeseen high-impact events and pivot to address shifts in demand.

Being able to balance these needs is essential to building the supply chain of the future. Organizations leading the way in supply chain planning exhibit key behaviors that drive their superior performance and make them well suited for both weathering the current uncertainty and emerging from it positioned for success.

These organizations keep themselves flexible to react quickly to unanticipated interruptions, yet they also plan for the future by ensuring that they can support both existing and future business models. They are also increasing their analytical maturity so that they can use data in both a predictive and prescriptive manner. Additionally, they track trends in emerging technology to keep supporting business strategies and goals. As organizations position themselves to develop the

supply chain of the future, they would do well to adopt the practices of other organizations leading the way.

Balance efficiency with risk

APQC's research indicates that leading organizations exhibit adaptability by reconsidering how they decide on supply chain strategies. Traditional supply chain wisdom states that organizations should focus on efficiency to control costs. However, to achieve stability and guard against unanticipated events, organizations must balance the need to control costs with the need to mitigate risk.

The disruption caused by the pandemic has revealed the vulnerabilities of organizations that made their supply chains as lean as possible, particularly from an inventory perspective. Planning with risk in mind enables organizations to quickly adapt to unanticipated shifts in demand and position themselves to thrive once things stabilize.

APQC recommends that supply chain planning decisions aimed at efficiency also consider the full range of possible risks to the business. This includes high-probability, low-impact events as well as low-probability, disastrous events. As part of this, organizations should build scenarios and compile risk profiles of key business partners to provide a complete picture of the impact of an event.

However, APQC’s research reveals that one-third of organizations do not use an electronic system that provides risk profiles of their suppliers, materials, supplier manufacturing sites, categories or products. Such a system provides a robust picture of threats to the business and allows an organization to assess the impact of various types of disruptions. Not having systems for risk profiles can leave organizations vulnerable and slower to react to unforeseen disruptions.

Global agricultural equipment manufacturer AGCO is an example of an organization that both survived during the COVID crisis and positioned itself to thrive after the economic downturn. The organization proactively manages information and potential risks to its supply base and extended supply base that enabled AGCO to quickly respond to supply chain challenges during the pandemic. The organization empowered its staff to act outside of its normal operating principles for inventory management, and the organization shifted across regions hard hit by COVID-19 so that it could stabilize and thrive.

Align with organizational strategy

For supply chains to remain successful, they must maintain the flexibility to adjust based on organizational strategy, as well as adapt to external changes. APQC recommends that all partners within the supply chain understand the organization’s strategic priorities. Planners should establish communication channels to convey strategic shifts such as new products, changed business models, new partnerships and any disruptions in supply or demand.

As shown in Figure 1, organizations vary in the extent to which their supply

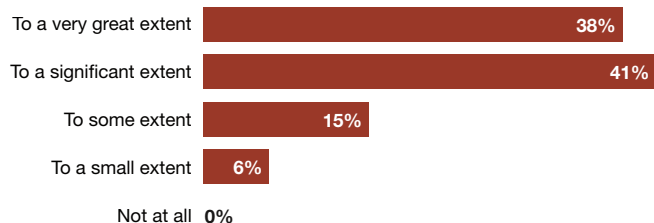
chains are capable of supporting existing and future business models. For about 20% of organizations, this capability is limited.

These results indicate significant opportunity for the 20% to improve, given the importance of strategic alignment to supply chain planning performance. Organizations successful in supporting current and future business models have lower supply chain planning costs, shorter customer order cycle times and faster cash-to-cash cycle times—powerful motivators for increasing strategic alignment. In addition to these strengths, organizations with strategic alignment can also quickly pivot when responding to changes in the market.

Tool provider DME, for example, shows that a focus on strategy, rather than solely on cost or efficiency, can lead to success. DME’s strategy is to be an essential resource to customers. Accordingly, all of its supply chain operations are aligned to meet customer requirements. DME focuses process improvement efforts on increasing transparency, matching supply and demand, trading off inventory against cycle times and leveraging supply contracts to access high-demand materials. It makes sourcing decisions based on customer requirements rather than location and works to create a seamless supply chain experience for customers.

DME extends this approach to its work with business partners. It has adopted an ERP that gives its supply chain planners visibility into the entire supply chain and immediate information on issues such as availability and shipment time for products across the

FIGURE 1
Extent to which supply chain is capable of supporting existing and future business models



Source: APQC

world. In alignment with its strategic focus on the customer experience, DME tracks customer-related KPIs such as on-time delivery, back order levels and percentage of orders fulfilled on time. Because of its approach, DME is achieving a large market share in each industry it serves.

Develop decision-making maturity

Another practice necessary for organizations to be future-ready is developing their use of analytics. In supply chain, analytics can provide valuable information needed for forecasting logistics and inventory optimization, as well as scenario planning. All of these capabilities enable organizations to increase the effectiveness of supply chain planning. In fact, supply chain managers that rely more on data are three times more likely to report significant improvements in decision making, compared with those who make decisions based on intuition.

The main goal for developing analytical maturity is to digitize transactions in every supply chain process so that decision makers and planners have complete visibility into the supply chain's performance. Organizations vary in the degree to

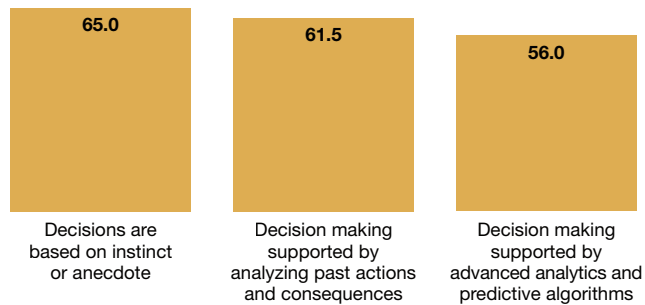
of organizations still use analysis of past actions and consequences to support their decisions.

The most immediate opportunity lies with those organizations making decisions based on analyzing past actions and consequences. Without a more data-driven approach, they will be unable to anticipate changes that are not expressed in historical patterns, making them exceptionally vulnerable to unprecedented events such as the COVID-19 pandemic.

In addition to being prepared for the unknown, organizations using more advanced

FIGURE 3

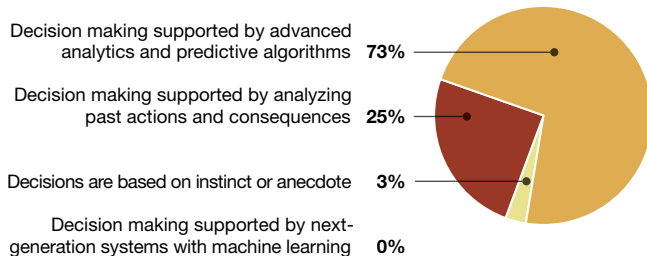
Decision-making culture and cash-to-cash cycle time in days



Source: APQC

FIGURE 2

Supply chain decision-making culture



Source: APQC

which they support decision making with advanced analytics. As shown in Figure 2, most organizations use advanced analytics and predictive algorithms to support decision making, but a quarter

analytics also perform better on standard supply chain planning metrics. As shown in Figure 3, they have much shorter cash-to-cash cycle times than their counterparts making decisions based on instinct or anecdote, as well as those making decisions based on historical data.

An organization focused on increasing the maturity of its analytical decision-making is technology company Lenovo Group. Lenovo worked with SAP to co-develop a supplier collaboration platform to forecast its costs in real time. Lenovo has since reduced its supply chain planning time from 10 hours to 10 minutes. It is now focused on transforming its supply network into

one supported by data analytics, artificial intelligence and the Internet of Things. Its efforts have enabled Lenovo to quickly respond to COVID-19 by re-balancing production throughout its in-person and third-party manufacturing sites. Further, it has exceeded its projected revenue despite the uncertain economic climate.

Re-evaluate emerging technologies

APQC finds that leading organizations keep an eye on emerging technologies to ensure continued efficiency and effectiveness in their planning. In a survey of priorities for 2020, APQC found that almost all the trends organizations expect to affect supply chains by 2023 involve technology or technology-enabling process standardization.

Currently, organizations are most focused on digitization of the supply chain, followed in order by analytics, Cloud capabilities, process standardization, AI/cognitive computing, mobile technology, robotic process automation and blockchain. With so many technologies being considered, supply chain planners should ensure that they use a systematic approach to leveraging practical tools while tracking trends and technologies.

However, planners must remember that implementing a technology requires a thorough understanding of the organization's current supply chain processes, performance, needs and organizational capacity. The primary concern for supply chain organizations should be meeting business needs rather than implementing technology for the sake of implementing a technology.

Using advanced technology such as predictive analytics does have its benefits. APQC has found that organizations that have adopted predictive analytics to a significant or very great extent outperform others on cash-to-cash cycle time by eight days. These organizations also reduce supply chain management costs as a percentage of revenue from 7.2% to 6.3%.

Oil and gas organization Technip FMC has a strategy for digital transformation focused on identifying projects that meet one or more of what it has dubbed the "three E's:"

- *efficiency*: projects that generate cost savings, improve throughput and increase effectiveness through automation and other digital abilities;
- *experience*: projects that improve the end-customer experience; and
- *expansion*: projects focused on identifying new products or services that will help the company expand and bring in new business.

Technip's digital team further narrows its list of potential projects based on additional criteria: feasibility, usability and viability. It aims to work quickly and seamlessly to solve end user problems.

Improve for the future

The global disruption caused by the COVID-19 pandemic has demonstrated that the way organizations think about supply chain has fundamentally changed. To be the supply chain of the future, which can meet the ever-changing needs created by the new business climate, organizations must embody adaptability, flexibility, effectiveness and efficiency. It is no longer enough to be focused on the lowest cost as the primary method of ensuring an organization's survival.

APQC recommends that organizations position the supply chain to anticipate and navigate unexpected storms while also improving for the future. This involves much more than what has worked in the past: Organizations must actively assess risk, align planning efforts with organizational strategy, develop decision-making maturity, and re-evaluate emerging technologies for supply chain planning use. ☞☞

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