AI, big data, and supply chain resiliency

Supply chain transformation in a post-COVID 19 world

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When economic conditions are good—as they were for nearly a decade before the COVID-19—supply chain risk management initiatives could take a back seat to those that could accelerate growth and manage costs. Now, amid what the International Monetary Fund calls the biggest economic contraction since the Great Depression, resiliency is top of mind. In our conversations, supply chain leaders are looking not only to craft strategies for immediate survival and short-term business continuity, but also prepare for future disruption, in whatever form it comes. They’ve absorbed a takeaway from previous crises that is still true: piecemeal contingency plans and relatively superficial management tactics will yield piecemeal results and a skin-deep business resilience.

Why this COVID-19 is different

When economic conditions are good—as they were for nearly a decade before the COVID-19—supply chain risk management initiatives could take a back seat to those that could accelerate growth and manage costs. Now, amid what the International Monetary Fund calls the biggest economic contraction since the Great Depression, resiliency is top of mind. In our conversations, supply chain leaders are looking not only to craft strategies for immediate survival and short-term business continuity, but also prepare for future disruption, in whatever form it comes. They’ve absorbed a takeaway from previous crises that is still true: piecemeal contingency plans and relatively superficial management tactics will yield piecemeal results and a skin-deep business resilience.

Seasoned supply chain leaders have been through economic downturns before. They know this one is different—and not just because of the suddenness or severity of the COVID-19 impact. COVID-19 has forced global supply chain organizations to acknowledge a resurgent economic nationalism underway since at least 2017, and only likely to intensify after the global health threat passes. Some political observers have suggested that COVID-19 is the reminder that economic globalization outpaced political globalization, and the retreat behind national borders is an overdue correction. So supply chain’s perfect storm is of current emergency on top of tectonic—and seemingly permanent—shifts in labor, tax, and trade policy conditions.
AI and big data as resiliency tools: A new state of play

For supply chain organizations, what is also different about the economic ripples created by COVID-19 are the maturity, availability, and cost effectiveness of big data and AI as strategic tools, coupled with much wider adoption of cloud-based technology. Since the last major economic downturn, the state of play for big data, AI, and cloud have advanced rapidly, for all the generally accepted reasons—rapid digitization, advances in machine learning, the growing availability of external data streams, the maturation of natural language processing (NLP) and robotic process automation (RPA) technologies to ingest that data, and much greater comfort with off-premise data storage. Generally, big data, AI, and cloud have evolved from technologies-to-watch to must-haves; and pilot initiatives have given way to enterprise-wide deployments.

The external-providers marketplace for big data, AI, and cloud have also matured, following a Moore’s Law-type continuum seen in other technology arenas. Price points for some advanced technologies have come down, while solutions have become more powerful and sophisticated. As the cost barriers to entry have lowered, new market entrants have proliferated, offering comprehensive transformation platforms that allow for integration of multiple supply chain technologies. AI-as-a-service (AlaaS) offers have joined them as delivery-model alternatives. Generally, while supply chain organizations still vary significantly in their level of big data, AI, and cloud maturity, more and more have demonstrated commitment to the technologies, processes, and skills that use them.

“For Supply Chains, this disruption is qualitatively different. Partly, it’s the combination of multiple challenges, some immediate, some in the making for years. But it’s also the availability of affordable risk management tools that didn’t exist ten years ago. That changes the equation.”

— Brian Higgins, US Practice Lead
KPMG Supply Chain & Operations
An emerging discipline: predictive supply chain risk management

We’ve watched as the convergence of value preservation agendas with data science advances has given birth to a new supply chain discipline, which we call predictive supply chain risk management. It merges data engineering, economic modeling, root-cause analysis, real-time simulations, and ongoing monitoring components. The objective is a granular level of visibility into exactly where value is made, lost, or exposed to potential risk—throughout the entire supply chain. This level of transparency is attained for every unique SKU, customer, order, facility, raw material—and combination thereof. At their most visionary, these platforms are intended to calibrate end-to-end economic value impacts in real time, giving supply chain the enterprise-specific insight it needs to prioritize contingency planning.

The emergence of cost-to-serve as a third critical performance metric, alongside Supply Risk and Demand Forecasting is worth noting. When supply chain organizations first ventured into big data and AI application, the use cases were organized around value creation, as captured by performance metrics such as topline revenue growth, speed, operational efficiency, and cost reduction. By the time the COVID-19 triggered its many economic impacts, some supply chain leaders had already built capabilities to identify supply risk, mapping their bills for material, structure, and nested parts to specific sources of supply. Others had acquired the means to produce demand curve scenario analysis, though they were hard pressed to keep up with the data and analytic implications of customer preferences for instant delivery and endless product variation. As they expanded their SKU portfolios, usually without retiring old products, the operational complexities were challenge enough; tracking end-to-end costs at the product or SKU level was a futurist dream. As a result, few supply chain organizations have end-to-end economic cost models in place that can accurately measure cost-to-serve at the level of detail needed to take action.

In a COVID-19 world, organizations will need a different type of analytical capability—one that instantly measures and predicts supply risk, demand changes, and end-to-end economic contribution based on continuously changing external conditions. What the conditions created by COVID have revealed is the need for all three, integrated end-to-end to create a virtuous circle of value preservation insight.

“Ultimately, understanding economic impact is what lets you know which contingencies to prioritize.”

— Chris Gottlieb, Partner Advisory, KPMG LLP
Game theory: Digital twin scenario planning

To anticipate and mitigate uncertainty, some supply chain organizations are turning to digital-twin modeling, which combines big data feeds, predictive risk analytics, and AI technologies such as neural networks, robotic process automation, and machine learning. Not unlike game theory, digital twin modeling recognizes the complex interdependencies in supply chain contingency planning. When prompted with hypothetical risk scenarios, digital twin supply chain models calculate for ripple-effect impacts in the form of consequent demand curves, identified supply chain vulnerabilities, and simulated end-to-end economic outcomes. Armed with precise predictive insight, supply chain teams can put preemptive response mechanisms in place to help minimize disruption and preserve value.

Digital twin resiliency platforms use a combination of standardized and purpose-built components. The required external data feeds, for example, are necessarily unique to each business—focused on its priority regions, sectors, and partners. Similarly, the contingency levers that determine impact will be different for every organization. Examples include backup supplier and carrier agreements, portfolio reprioritization, emergency make-versus-buy options, temporary labor-pool options, available virtual tools, and disaster recovery plans for IT and critical infrastructure. On the other hand, digital twins are based on shared state-of-the-art AI foundations, such as automated capture, scanning, and analysis of market signals; Machine Learning that refines algorithmic models based on inputs; and risk-weighting analytics to prioritize actionable items.
New signals, new analysis

The big data and AI leaps required for the kind of supply chain resiliency platform we have described are both qualitative and quantitative. Organizations will need to configure a mix of external data streams relevant to their sector, product mix, and regional priorities and potential addition of trillions of new data points. They will have to put AI applications such as NLP into place, to ingest, structure, and integrate across structured and unstructured data formats—at scale. Qualitatively, they will need to develop new antennae: supply chains are generally not used to factoring for the kinds of regulatory, labor, and social-risk side inputs that COVID-19 has made clear are new must-haves.

At the next stage, they'll need to build advanced financial models that can harvest cost-to-serve insight, perform root cause analysis, and perform dynamic “what if” simulations to identify operational or commercial levers. These models will need to include automated refresh features to support ongoing monitoring.

“Supply chain leaders want an end-to-end resiliency platform that leverages the big data and AI capabilities they have already built.”

— Kayneel Kadakia, Director
Supply Chain & Operations, KPMG LLP
Advisory

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Beyond “good enough”: What good supply chain resiliency looks like

The stresses of COVID-19 have raised the bar for global supply chain organizations, demonstrating a new threshold of “necessary but not sufficient” resiliency platforms that will still require foundational pillars such as process, impact analysis, governance, visibility and contingency planning, but also fold in new enhancements which include:

— **More comprehensive definitions of risk:** The number and specificity of risk categories will increase, to encompass financial (e.g., third-party stability, exchange rates); brand (supplier reputation); industry (market-capacity constraints on security alternate suppliers); location (geo-political factors, Tier 1 supplier footprints); workforce (demographic trends, cultural factors); operational (supply and demand flexibility, supplier-failure recovery); and regulatory.

— **Predictive capabilities:** Risks across the extended enterprise (including Tier 1 suppliers) are predicted and managed on a continuous basis, combined with a proactive risk-mitigation and remediation strategy.

— **Technology enablement:** Process, policy, and procedure are important foundations, but robust supply chain resiliency requires technology enablement. Centralized control-tower models, enabled by cross-functional risk technology platforms, will become the norm, ingesting both internal and external data feeds; offering both birds-eye and drill-down visibility; generating bot-driven prompts and AI- and Machine Learning-powered recommendations; and conducting simulation analyses.
Execution: Putting the actionable in “actionable insight”

Supply chain leaders know that predictive insight is part of the resiliency equation. But they’ll also need to put into place the means to act, whether that means triaging contingency planning, or the embedding of processes that support rapid response to risk alerts. There is a behavioral and cultural dimension to this: The application of big data and AI to resiliency platforms is never just a pure technology play. It can generally only improve and sustain programs that have solid processes and qualified people behind them. Most supply chain organizations still operate with deeply engrained value-creation mindsets; a new worldview will not take overnight. Businesses cannot skip the implementation of tools and training that will support empowered, appropriate risk management and value-preservation decisions.

Conclusion: A permanent war footing

Now that the immediate shock of COVID-19 has receded a bit, supply chain leaders are realizing the wartime mobilization and vigilance required may well become a new operating baseline. They are already taking discrete steps that include evolving their global footprint analyses for tax and trade optimization, establishing micro supply chains, and revisiting long-standing inventory strategy. The good news is that profound circumstances can open the door to completely new thinking. In the face of continuous political, economic, market, and technology disruption, our bets are on supply chain organizations willing to see current conditions as an opportunity to rethink and then systematically overhaul their operating model for a new world order.
About the KPMG supply chain and operations

KPMG LLP is here to support you in this unprecedented situation. Organizations are asking mission-critical questions pertaining to supplier and operations risk that have arisen in the COVID-19 environment. We recognize that during this time, business leaders don’t only need solutions, they need reliable advisers. Whatever your sector, 2,000 + supply chain, strategy and value chain management professionals from the KPMG network of member firms worldwide can help you address the issues of today, from crisis response planning, to rapid diagnostic for supply and demand risks across your operation, to scenario analysis and contingency planning. Our professionals are skilled in all areas of supply chain operations from strategy and analytics, supply chain risk, planning and execution, and logistics and distribution. We also have the capabilities to help you integrate tax planning into your business operations to help minimize expenses and risk, enhance return on investment, and drive efficiencies across operations.

We are here to help.
Contact us

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