Advancing E2E Agile Resiliency in Supply Chains

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A PROACTIVE APPROACH TO CREATING VALUE DURING GLOBAL SUPPLY CHAIN DISRUPTIONS

This leadership guide offers practical and contemporary insights on adding E2E Agile Resiliency Capabilities into your supply chain design requirements

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Executive Summary

Supply chain leaders have become accustomed to tumultuous conditions and disruptions brought on by trade wars, digital innovation, and rapidly changing customer preferences. However, the unexpected appearance of a virus seemingly uninhibited by time zones, global distance, public health containment efforts, and even temporary economic closures has further stress-tested global supply chains. While vaccines might soon surmount the initial disruption, the loss to value creation and other secondary effects will remain for years to come. It’s an extreme test of global supply chains, but it also indicates a rising class of disruptions that can and will wreak havoc upon populations, stakeholder interests, and the very survival of enterprises.

How vulnerable is your supply chain to disruption? It’s no longer a question of avoiding and surviving periodic crises. Real resiliency involves growing and protecting the value creation capabilities of our supply chains during and outside of any disruption. We cannot accomplish that with work-around solutions or incremental continuous improvements. Industry leaders are adopting a new supply chain design that embraces the best attributes of supply chain agility and resiliency readiness: an end-to-end (E2E), agile resiliency in supply chain design.

Our research for this white paper examined how supply chains are faring across multiple industries during the pandemic and how SC leaders can begin developing more agile-resilient supply chains in the months and years to come. We built a starter kit of core agile resiliency design considerations based on quantitative analysis and discussions with executives from 22 leading supply chain organizations.

Industry Leaders are adopting a new supply chain design that embraces the best attributes of supply chain agility and resiliency readiness: an end-to-end (E2E), agile resiliency in supply chain design.
In our first section, “Tying Agile Resiliency to Value Creation,” we apply our proprietary Diamond Analysis to the top 16-24 firms in three industries: Consumer Packaged Goods (CPG), Medical Devices, and Industrial Machinery. Our analysis leverages the same critical metrics that analysts reference on quarterly earnings calls and year-end reviews, following their same standards and data sources. Our platform helps visualize value gains or losses, trends over 24 months, macro shifts in median industry performance, and micro views of competitor moves.

We applied this methodology comparing performance before and during COVID-19 to understand COVID-19’s impact across industries and between enterprises. The results were both predictable and shocking. Although some industries were harder hit than others, in all three industries COVID-19 exposed preexisting stress points in supply chain designs. Our analysis contextualizes these quantitative findings with discussion from our supply chain leaders and provides guidance moving forward.

Strong supply chain leadership is key to implementing an agile-resilient supply chain model, as it requires cross-enterprise partnerships and collaboration to be effective. Our study cohort identified a leadership assessment and model as their top need for building agile resiliency, and we dedicated an entire section of the paper to this purpose. We provide a series of questions, along with feedback from our cohort of SCM leaders, to help you assess whether your leadership is ready for agile resiliency and help you develop the right leadership model to guide this effort.

We also provide tools for assessing and building agile resiliency as a core enterprise capability in the section on implementing agile resiliency. Working with supply chain leaders, we identified the Top 10 Critical Capabilities for Agile Resiliency and an Agile Resiliency Implementation Model for each.
Our quantitative analysis helped us identify an organization with remarkable agile resiliency adoption, and the shareholder performance to demonstrate its investment value. In our case study, we detail this firm’s key performance metrics and recount how it leveraged each of the critical capabilities for agile resiliency during COVID-19.

Because each firm must create its own design, rate of speed, and path to achieving agile resiliency, we provide an Agile Resiliency Enablement Blueprint process to guide your organization through the steps of creating the pathway for adoption. It includes five key steps to take along the way, and suggested approaches and validation for each.

Lastly, it is important to note that, much like leadership, E2E collaboration is a precursor to agile resiliency adoption. Many firms are still early in their E2E journey and may need to focus there before they can begin making significant strides to manage disruption. To address this potential need, we provide some ideas for breakthrough Collaboration Models That Drive Agile Resiliency and partnering opportunities for firms that need assistance implementing them.
Introduction

End-to-end, agile supply chain designs are now critical to enterprise performance. But with an agile global network comes challenges like operational complexity, distance-related cycle time constraints, and the threat of global disruptions. As COVID-19 has shown in the extreme, agility must be balanced with resiliency to provide durable success. A recent McKinsey study found that 93 percent of supply chain leaders intend to take further actions to strengthen resiliency in their supply chains.

Quick-fix, crisis-response solutions – perhaps the core capability of all supply chains – have now drawn concerns in boardroom and shareholder communities. The greater frequency and extended duration of disruptions implore organizations to build systemic readiness to grow and protect shareholder value.

Supply chain leaders must step beyond traditional supply chain design and temper their operating models with resiliency capabilities. Doing this successfully requires working outside a single enterprise. It means raising the bar across the E2E supply chain. Interdependencies must be aligned carefully and more tightly synchronized to achieve competitive advantage, as was highlighted in our recent GSCI whitepaper, “End-to-End Supply Chain Synchronization.” Modern supply chain resiliency requires a systemic change far beyond short-term solutions that have been the backbone of disruption response strategies in the past.

Our research addresses this re-balancing of agility and resiliency considerations, and we refer to the resulting approach as agile resiliency in supply chain design. We leveraged a group of 22 supply chain leaders from a diverse set of industries as our think tank and sounding board for this research, and it is our hope that this work will help supply chain leaders accelerate their supply chains’ transformational journeys post-COVID-19 in our rapidly changing world.


2 Dan Pellathy, Mike Burnette, Scott Meline, and Ted Stank, “End-to-End Supply Chain Synchronization” (Global Supply Chain Institute, 2020).
Tying Agile Resiliency to Value Creation

E2E supply chain management drives value creation in all enterprises. Leading firms have leveraged advancements in their supply chain models to:

- Crush customer response time while approaching perfect order fulfillment
- Expand EBITDA by reducing cost of goods sold and selling, general, and administrative expense
- Release critical working and fixed capital
- Accelerate cash-to-cash cycle times
- Drive market share and revenue growth through service and value

This approach to supply chain management has helped enterprises achieve competitive advantages in price earnings ratios and share price valuation growth. It has become an expected set of enterprise outcomes for shareholders, customers, employees, and suppliers. But the efficiencies gained in E2E agile supply chains can also leave enterprises vulnerable to disruption.

As the most severe supply chain disruption to date, COVID-19 poses a unique opportunity to examine how firms are executing the tenuous balance between staying on the bleeding edge of innovation and managing risk. The assumption is that a disruption’s impact on value creation correlates with design decisions that firms make, like E2E network design, vertical integration, new product designs, and demand variability controls. Our analysis attempts to quantify these assumptions.

With our proprietary Diamond Analysis, we assessed COVID-19’s impact on the value that E2E supply chains create. The analysis uses competitive financial benchmarking that identifies firms’ value creation gains or losses and ranks the top 16-24 firms in selected industries by performance during the disruption.

Supply Chain Performance Diamond Analysis Method

The Diamond Analysis will help organizations connect their E2E supply chain design efficacy to key financial metrics. Firms fall into one of four quartiles on the diamond based on their performance in metrics relating to four interdependent and critical E2E value creation areas: customer, cost, capital, and growth (see Figure 1.1).
We leverage the same critical metrics that analysts reference on quarterly earnings calls and year-end reviews, following their same standards and data sources. We pull this data through a proprietary platform to help us visualize value gains or losses, trends over 24 months, macro shifts in median industry performance, and micro views of competitor moves. Most of these metrics (EBITDA, C2C, SG&A, IDS) will be familiar to supply chain leaders, but we have provided our specific definitions and equations for clarity.

It’s important to note that we calculate many of these metrics as a percent of net operating revenue (NOR). Doing so better demonstrates how business processes react to changes in revenue (i.e., whether the organization can scale down COGS and SG&A as revenue decreases or maintain stability in IDS and C2C during times of revenue growth). A perfect model of agile resiliency would show the metrics based on internal workflows (COGS, SG&A, IDS, DSO, C2C) remaining neutral as the firm scales them up or down alongside revenue changes. That is neither possible nor always preferable in the real world, and different industries will have different acceptable ranges of tolerance in performance variability for each metric as well as timeframes to correct metrics outside their tolerance. We provide these insights to help SCM leaders develop performance goals for their organizations, but we believe more standard thresholds that shareholders will use to assess performance are on the horizon.

One relatively new metric that illustrates supply chain performance is Return on Supply Chain Assets (ROSCA). ROSCA measures EBITDA return on working capital. Positive ROSCA despite revenue retraction is possible, as our data reflects, and this is a clear indicator of agile resiliency. For example, a leading firm in the Industrial Machinery industry had a revenue reduction of 5.1 percent, while simultaneously improving ROSCA performance by 2.6 percent. They accomplished this outcome through agile resiliency efforts despite the complexity of their E2E supply chain and a high SKU count.

We present these metrics in the context of their respective industries to demonstrate how individual firms fare compared to their peers given similar disruption constraints. Competitive benchmarking using publicly traded firm databases provides a critical reference perspective and ongoing monitoring tool for our research. Note, however, customer performance data is not as robust or reliable as shareholder data from publicly traded firms. We therefore excluded customer performance metrics from the analysis.
For our COVID-19 impact analysis, we compared enterprise performance during the first two quarters of COVID-19 to a parallel pre-disruption period in three industries: consumer packaged goods, medical devices, and industrial machinery. Our analysis of each industry included the top 16-24 revenue producing multinational companies listed on the U.S. and European Exchanges. The COVID-19 performance perspective is currently constrained to six months (reporting periods spanning April through September 2020). But the data provides a critical first view into trends.

We coupled this data with discussion from the supply chain leaders in our study cohort to assess what supply chain capabilities underline value growth or constraint. Among our key findings were that COVID-19’s impact was significantly uneven - creating both loss and gains - within industries, and that the range between loss and gain appears connected to the level of agile resiliency practiced in the firm.
SIGNIFICANTLY ADVANTAGED PERFORMERS

While upside and downside demand variability ranged widely in the early days of COVID-19, significantly advantaged firms were better able to address their highest priority customer needs amid constrained supply through a combination of segmentation and allocation. They also prioritized service above cost to protect and grow market share. In both the CPG and Medical Device industries, this ranking category captured revenue growth opportunities without a significant build of inventory days of supply and days sales outstanding, which in turn helped them improve their ROSCA performance and gain deeper competitive advantage during the disruption periods. They supported higher customer satisfaction by dynamically shifting production to meet demand within their customer’s actual lead-time window.

Significantly advantaged firms’ EBITDA performance in both CPG and Medical Device industries during COVID-19 as compared to significantly disadvantaged firms reflects their ability to manage upside and downside flexibility with more limited cost impact on COGS and SG&A (as a percentage of net operating revenue), while managing increased volume. Clearly, the payback on agile resiliency capability investments produced strong competitive advantage for these top-performing firms.

SIGNIFICANTLY DISADVANTAGED PERFORMERS

Significantly disadvantaged organizations faced a strong headwind from lost sales and had difficulty changing their operating models to meet demand downside without incurring non-value-added costs and inventory. The red metrics in this category across all three industries demonstrate this group’s agility barriers.

Significantly disadvantaged firms saw marked underperformance relating to inventory. Inventory days of supply grew in spite of decreasing revenues for disadvantaged firms in each industry. Inventory increases for significantly disadvantaged performers tied up cash in each industry that would offer much needed capital if released (see left).

The financial metrics suggest a favorable return on capital employed for agile resiliency investments, and the silver lining for the significantly disadvantaged group is clear metrics that bring a heightened awareness in the boardroom of the need for change. Assessing agile resiliency constraints in core workflows and their related impact on performance would be a critical diagnostic step to improve SC performance in negatively impacted groups. Our case study offers further insights into best practices that can be coupled with the Top Ten Critical Capabilities for Agile Resiliency to diagnose and improve on these constraints.
The CPG industry offers a comparatively mature example of agile resiliency adoption. Customer demands have incentivized deeper levels of E2E workflow collaboration, and shareholders have rewarded industry leaders who can achieve ongoing value creation. CPG firms performing at our significantly advantaged status have landed in the top ranks of Gartner’s Supply Chain Top 25 Leaders. Even during COVID-19, they achieved remarkably negative C2C cycle times and remarkable ROSCA improvements, using agility coupled with resiliency to achieve these results. However, not all CPG firms delivered consistent value creation improvements.

Revenues at firms that manufacture only discretionary spending items, such as cosmetic firms, were hardest hit by COVID-19, and we did not see any examples of firms in the discretionary products segment that had the agile resiliency to maintain ROSCA despite revenue losses. By contrast, companies with products serving consumer necessities, such as Clorox and Procter & Gamble, saw revenue growth. However, revenue surges during bullwhip demand peaks often were capped by capacity constraints and related performance challenges, as we can see in Figure 1.2, where IDS, COGS, and SG&A increase. In such cases, the decision to protect customer service level above incremental cost investment to do so is the likely driver.
Growing and protecting their value propositions while strengthening their competitive advantage creates a favorable PE ratio and corresponding growth in market cap valuation for top performers.

We examined the competitive gaps in performance between significantly advantaged firms and significantly disadvantaged firms by calculating the actual median performance during the two COVID-19 quarters. The results, shown in Figure 1.3, illustrate a staggering gap across all metrics. As Wall Street analysts and investors increasingly examine these comparisons, their valuations will likely drive the identified gaps even further apart. Growing and protecting their value propositions while strengthening their competitive advantage creates a favorable PE ratio and corresponding growth in market cap valuation for top performers. Underperforming firms that are unable to realign their supply chain operating models and correct these dips quickly will likely begin to lose shareholder confidence.

Figure 1.3: CPG Value Creation Performance Gaps Between Significantly Advantaged and Significantly Disadvantaged Groups

<table>
<thead>
<tr>
<th>Key Value Metrics: Median Scores</th>
<th>ROSCA</th>
<th>IDS</th>
<th>CTC</th>
<th>COGS</th>
<th>SG&amp;A</th>
<th>EBITDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quartile One Firms</td>
<td>86%</td>
<td>53 Days</td>
<td>(45) Days</td>
<td>26%</td>
<td>17%</td>
<td>28%</td>
</tr>
<tr>
<td>Quartile Four Firms</td>
<td>15%</td>
<td>140 Days</td>
<td>140 Days</td>
<td>66%</td>
<td>66%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Growing and protecting their value propositions while strengthening their competitive advantage creates a favorable PE ratio and corresponding growth in market cap valuation for top performers.

Agile Resiliency adoption contributes to the success of Quartile One performers based on our research. The analysis and interviews also highlight the important opportunities for firms currently listed in the underperforming quartiles. Bottom line: CPG is a bellwether indicator for supporting agile resiliency adoption as a critical strategic priority and opportunity in this industry.

Medical Devices Group

The Medical Device industry experienced a dramatic hit to revenue, with 71 percent of the firms in our study sample experiencing revenue declines. Firms struggled to realign their business models to the new revenue realities because of several inherent hurdles in the industry, including:

- Rigid regulatory requirements that add to enterprise workflow complexity
- Long product lifecycle development processes that have higher risk
- Complex manufacturing and logistics control burdens such as serial number tracking and cold chain of custody requirements
- Hospital practices requiring prepositioned medical device inventories, housed in the hospital that only transfer title upon use
- Placing decision making regarding brand of device in physicians’ hands, making forecast accuracy problematic and pushing safety stock levels very high on all SKUs
- Number of elective surgeries scheduled in flux with COVID-19’s hospitalization rates
These conditions shed a light on why even the top performers in this industry experienced value losses in IDS, C2C, and COGs, as depicted in Figure 1.4. Complexity and long cycle times slowed reactions across the E2E workflow. Yet, significantly advantaged firms demonstrated that agile resiliency can promote value creation amidst disruption even in industries where time-to-value capture is slower due to the process, information, costing, and capital engineering and organizational complexities.

Figure 1.4: COVID-19’s Impact - Changes in Key Performance Metrics in the Medical Device Industry Between Q2-Q3 2019 and Q2-Q3 2020

<table>
<thead>
<tr>
<th>Key Metric Average Gain/Loss Impact as %</th>
<th>Quartile One: Significantly Advantaged Performers</th>
<th>Quartile Two: Advantaged Performers</th>
<th>Quartile Three: Disadvantaged Performers</th>
<th>Quartile Four: Significantly Disadvantaged Performers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue Growth/(Loss)</td>
<td>22.0% ▲</td>
<td>(2.5%) ▼</td>
<td>(9.1%) ▼</td>
<td>(22.1%) ▼</td>
</tr>
<tr>
<td>Return on SC Assets</td>
<td>8.7% ▲</td>
<td>(12.2%) ▼</td>
<td>(12.2%) ▼</td>
<td>(22.7%) ▼</td>
</tr>
<tr>
<td>Inventory Days of Supply</td>
<td>6.1% ▲</td>
<td>11.0% ▲</td>
<td>9.2% ▲</td>
<td>12.1% ▲</td>
</tr>
<tr>
<td>Cash-to-Cash Cycle Time</td>
<td>9.6% ▲</td>
<td>4.3% ▲</td>
<td>2.5% ▲</td>
<td>14.4% ▲</td>
</tr>
<tr>
<td>COGS % of NOR</td>
<td>10.8% ▲</td>
<td>0.6% ▲</td>
<td>(4.0%) ▼</td>
<td>1.8% ▲</td>
</tr>
<tr>
<td>SG&amp;A % of NOR</td>
<td>(7.4%) ▼</td>
<td>(7.3%) ▼</td>
<td>0.1% ▲</td>
<td>2.1% ▲</td>
</tr>
<tr>
<td>EBITDA % of NOR</td>
<td>10.6% ▲</td>
<td>(1.6%) ▼</td>
<td>(10.2%) ▼</td>
<td>(2.5%) ▼</td>
</tr>
</tbody>
</table>

▲▼ Sample average value creation gains ▲▼ Value creation loss

High-performing firms held median PE ratios of 74.7 versus 9.7 for firms in the significantly disadvantaged segment.

In the Medical Device industry, firms ranked significantly advantaged were the only segments to experience revenue, EBITDA, and ROSCA growth. Their lower performance with inventory build is likely due to the aforementioned complexity of hospital VMI and inventory title transfer.

The many red performance indicators in Figure 1.4 provide a clear business case to elevate stakeholder discussions and align prioritization on agile resiliency. The differences in performance across each of the ranking segments also points toward varying levels of early adoption, which is already impacting shareholder valuation. High-performing firms held median PE ratios of 74.7 versus median PE ratios of 9.7 for firms in the significantly disadvantaged segment. Figure 1.5 illustrates the actual gaps across all metrics that occurred during the two COVID-19 operating periods.
Significantly advantaged firms held at least a 2.4X advantage on working capital metrics and a 1.6X advantage in the areas of cost and profitability. The differential here and in the previous analysis suggests that firms in the significantly disadvantaged group are insufficiently ready for periods of disruption. Their levels of value loss and competitive advantage distancing warrants careful analysis of their core workflows to identify constraints and consider adopting accelerated agile resiliency capability as a remedial investment. Firms in the first quartile enjoy a fragile advantage at this stage and appear to warrant more aggressive deployment strategies to protect and grow their value advantage positions.

**Industrial Machinery**

The Industrial Machinery industry offers a dramatic example of COVID-19’s disruption impact. All 24 firms faced challenges, and 94 percent of firms in the sample faced revenue losses ranging from a median -2.8 percent to -35.1 percent. The Industrial Machinery vertical follows a pattern of booms and slowdowns that results in tension between idling capacity and creating excess inventory.

Much of this is due to the complexity of the industry’s supply chain, coupled with rapid demand peaks and troughs. Products require spare parts coverage for decades after the OEM sells them. The demand for downtime repairs within hours of identifying problems also necessitates localized parts warehousing, often in challenging locations across the globe. Further, products fall within capital equipment budgets, which are often canceled in downturn or disruption periods. Bottom line: Industrial Machinery’s disruption sensitivity is much higher and the risks to shareholders multiply in times of uncertainty.

Figure 1.6 demonstrates the common refrain that disruption cycles impact all firms negatively. However, there is a clear difference in performance across the ranking segments on core metrics, and early adoption of agile resiliency capabilities dampens the level of negative impact.
Inventory days of supply rose between 0.8 and 13.7 percent, despite revenue reduction during this same six-month window. The growth in value of excess inventory ranged from $60M to $2.2B. Overall declines in C2C performance further tied up otherwise useful cash for operational needs. The combined decline in EBITDA with increases in working capital in less-than-optimal levels created a negative impact that resulted in all firms facing a reduction in their ROSCA of 2.1 percent to 35.1 percent. This important negative cash flow implication forced more drastic capital investment delays. The increased COGS costs also required some firms to impose furloughs or layoffs to protect margin and profitability goals.

Our analysis points to six high-performing firms who did not dip into disadvantaged quartiles on any of their metrics. The remaining firms experienced a variety of disadvantaged metrics positions. We should highlight that 25 percent of the study group leveraged a variety of agile resiliency capabilities to prevent damage from revenue loss from cascading across remaining key performance indicators.
### Figure 1.7: Industrial Machinery Value Creation Performance Gaps Between Significantly Advantaged and Significantly Disadvantaged Groups

<table>
<thead>
<tr>
<th>Key Value Metrics: Median Scores</th>
<th>ROSCA</th>
<th>IDS</th>
<th>CTC</th>
<th>COGS</th>
<th>SG&amp;A</th>
<th>EBITDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quartile One Firms</td>
<td>32% of NOR</td>
<td>65 Days</td>
<td>66 Days</td>
<td>58% of NOR</td>
<td>9% of NOR</td>
<td>23% of NOR</td>
</tr>
<tr>
<td>Quartile Four Firms</td>
<td>9% of NOR</td>
<td>145 Days</td>
<td>207 Days</td>
<td>81% of NOR</td>
<td>24% of NOR</td>
<td>8% of NOR</td>
</tr>
</tbody>
</table>

The analysis in Figure 1.7 parallels the findings in the other two industries. In Industrial Machinery, significantly advantaged firms outperform their significantly disadvantaged peers on ROSCA by nearly 4X, and more than 2X in the areas of cost and profitability. Our six high-performing firms reveal a compelling argument that growing and protecting value can be achieved amid disruption in the industry, and firms in trailing positions also have great potential for closing current gaps through agile resiliency deployment.
Agile Resiliency Leadership

The increasing frequency and severity of disruptions require responses far beyond traditional supply chain boundaries, and these responsibilities are raising the bar for supply chain leadership. Shareholders are already beginning to identify supply chain resiliency as a financial concern. SCM leaders will be at the forefront of making agile resiliency an enterprise core competency, setting agile resiliency strategies, gaining alignment, building the roadmap of change, and overseeing implementation.

Members of our study cohort elevated the need for a model to assess and build these leadership capabilities as their top priority. We posed a series of interview questions to them to help create a baseline assessment of agile resiliency leadership and readiness and identified six areas of concern. SCM leaders can use these questions to gauge their organization’s readiness for agile resiliency and create a model for building the SCM leadership required to implement it. Figure 2.1 outlines these six key assessment areas, and we provide the questions and key insights from our study group in the content that follows.

Figure 2.1: The Six Key Areas to Assess Your Organization’s Agile Resiliency Readiness
Leadership Assessment Questions and Related Findings

Q1

Is there a sense of urgency in your organization around closing performance gaps from the latest disruption event?

PARTICIPANT RESPONSE: All participants confirmed that COVID-19 and previous disruptions have created a rising concern about growing and protecting shareholder and customer value. The expectation for supply chain leadership to respond is high, and this will create varied challenges in rebalancing priorities between short-term actions and systemic changes.

SUPPLY CHAIN LEADERSHIP IMPLICATIONS: Tightening the connection between disruption response needs and protecting customer/shareholder value creation is now paramount for the supply chain leaders we interviewed. Disruptions are not only a cost and working-capital efficiency concern; they are also viewed as a strategic opportunity to capture new value growth from weakened competitors.

PARTICIPANT RESPONSE HIGHLIGHTS:

- Clearly prioritize meeting customer requirements over costs with a recognition that this cannot become a long-term threat to margin.
- A common rule to do no harm to existing supply chain performance contributions through new agile resiliency capability investments should be adopted.
- Recognize that creating advantages over weakened competitors is an important opportunity.
- Tighten disruption impact diagnostics and link them to boardroom metrics.

Q2

Is your C-suite team expressing urgent concern regarding supply chain resiliency including how to balance agile supply chain capabilities with resiliency?

PARTICIPANT RESPONSE: All participants confirmed there is an increasing openness to rebalance existing strategies with new resiliency needs. The degree of boardroom awareness and involvement varies by industry and the maturity of supply chain influence at the board level. While active boardroom presence builds familiarity and trust, the clarity of response urgency and acceptance of the need for systemic change is still an evolving opportunity in most cases.
SUPPLY CHAIN LEADERSHIP IMPLICATIONS: Building the case for agile resiliency is still in the hands of supply chain leadership. Awareness of SCM trade-off decisions in areas like dual sourcing or regional supply network designs is a complexity not yet well understood. Aligning enterprise thinking and diagnostics will take time, but the urgency to respond to COVID-19 creates a window for change. Building support across functional organizational divides will require changes in thinking and a single enterprise team.

PARTICIPANT RESPONSE HIGHLIGHTS:
- There is heightened awareness and concern at the C-suite level.
- There is a gap between the level of understanding and prioritization of rebalancing agility and resiliency.
- Quick actions post-COVID-19 are important before urgency drops again.

Is your organization experiencing workflow constraints at functional, geographic, and trading partner intersections that slow disruption response?

PARTICIPANT RESPONSE: Most participants confirmed that horizontal workflows could be improved at the handoff points between functional/geographical support team members. The opportunity for improvement varies with the complexity of the workflow handoff conditions, process adherence, and continuous improvement efforts. Enterprise interdependencies increase in areas like vertically integrated plant production. The added complexity of organizational structures and vertical performance metrics can also be a concern during disruption periods. E2E workflow leadership models are emerging in some verticals, but the remaining gaps often limit progress toward alignment and tighter design integration.

SUPPLY CHAIN LEADERSHIP IMPLICATIONS: Supply chain leaders must first address the enterprise adoption of an E2E workflow. The lack of leadership clarity at the supply chain level or delegation to a single point of authority limits the rate of innovation.

Further, strategic value creation is increasingly completed by suppliers. Gaps in trading partner outreach and alignment on agile resiliency priorities will slow time to value, digitalization advances, and the elevation of issues to executive decision-makers.

PARTICIPANT RESPONSE HIGHLIGHTS:
- There is heightened awareness and concern at the C-suite level about E2E trading partner resiliency vulnerabilities.
There is a gap between the level of understanding and prioritization of rebalancing agility and resiliency that is heightened by functional, geographic, and external partner handoffs.

Quick actions post-COVID-19 are important before urgency drops again, particularly as change across the enterprise and supply chain requires a sense of urgency and momentum.

Organizational leadership conflicts present a significant barrier.

There must be heightened focus on E2E visibility within supplier networks.

Does your supply chain team have the tools and methods to accelerate response during disruptions? (e.g., have supply chain decision tools, digital backbone coverage, or response collaboration methods been a constraint during COVID-19?)

**PARTICIPANT RESPONSE:** Disruption response tools and methods are not commonly applied or available across the enterprise. Existing tools using Lean or Six Sigma are useful but not sufficient in systems analysis, diagnostics, and rapid solution design. Digitalization gaps slow progress on visibility and tighter integration across trading partner networks. Among the tools to consider are value stream analysis with a detailed view on vulnerabilities from disruption variability in supply and demand, upside/downside buffers, and handoffs between functions and trading partners. Process control tools that monitor tolerance levels and alert the designated parties also are useful, particularly with the advances in AI-enabled systems to recognize changes in patterns that are otherwise less noticeable. Analytics, coupled with value stream engineering and rapid diagnostics, can provide time to respond before the constraint becomes critical. Other tools that assist in dynamic planning across the supply base also offer examples of promising solutions to disruption mitigation.

**SUPPLY CHAIN LEADERSHIP IMPLICATIONS:** Supply chain leaders face challenges in building internal response team readiness, L&D capabilities, and team deployment practice scenarios. Pilot applications with proof-of-concept deliverables are needed to maintain a sense of urgency along with C-suite directives and clear prioritization.

**PARTICIPANT RESPONSE HIGHLIGHTS:**

- Investment priority and progress varies widely; participants elevated the need to refresh their tools and methods to keep pace.
- The analytical team’s bench strength is a critical enabler for response speed in all cases.
- Continuous planning progress and disruption decision response speed critically depend on integrated command center deployment strategies.
- Digitalization is a key enabler and a supplier network rapid-response constraint.
Did your supply chain organization rely on workarounds to respond to COVID-19? Would those solutions be sustainable in an environment of semi-consistent disruptions?

**PARTICIPANT RESPONSE:** Most respondents relied on extraordinary contributions from their employees and trading partners to respond to COVID-19 disruptions. Some used premium cost options to circumvent workflow challenges. Other firms used higher levels of working capital to deal with demand volatility or extended lead-times on customer orders. Well-practiced firms quickly recovered organizational momentum and returned to stability. These differentials in response experiences reinforce the value of enterprise readiness for disruptions.

**SUPPLY CHAIN LEADERSHIP IMPLICATIONS:** Supply chain leaders are well positioned to prioritize constraints and systemic change requirements. The first critical constraint is capacity to meet daily operations and change efforts over time. The second barrier will involve accelerating the reduction in non-value-added work steps and complexity through value stream management to free up resources for redesign work. Rapid knowledge-transfer capability and competencies in data analytics and digitalization are becoming a top priority for response teams.

**PARTICIPANT RESPONSE HIGHLIGHTS:**
- All respondents employed work-around solutions, often in unsustainable ways.
- Maintaining internal flexible capacity in manufacturing drove competitive advantage and market share capture.
- E2E workflow processes/value stream physical networks, visibility/digitalization, and collaboration teaming need to be reexamined.

Should agile resiliency response become an enterprise core competency? Do your supply chain teams have the necessary tools and partnerships to build this competency?

**PARTICIPANT RESPONSE:** The respondents differed on this consideration. Firms holding complex value streams with higher risk drivers were more inclined to embrace this core competency. Others with regionalized supply chain solutions and more mature response capabilities were less inclined to elevate agile resiliency as a core competency. Should this capability become a competitive advantage in the marketplace, there will likely be an aggressive shift toward adoption.
SUPPLY CHAIN LEADERSHIP IMPLICATIONS: Supply chain leaders will need to rethink their learning and development strategies. Cross-functional response team development will also require new applied learning designs and coaching bench strength. Opportunities to identify best practices through benchmarking or collaboration with key suppliers, university experts, and innovative customer leaders in this area are needed.

PARTICIPANT RESPONSE HIGHLIGHTS:

- Firms should adopt agile resiliency as a core competency. The urgency depends on the complexity of the firm’s supply chain and their competitive environment.
- Learning and developmental architectures should be changed to fill skill gaps.
- There is a need to build internal expertise and speed in disruption response teams.
- Disruption scenario-based learning models and contingency planning are a priority.
Implementing Agile Resiliency

Prioritizing where to focus agile resiliency improvement often presents a significant barrier for supply chain leaders trying to create systemic change in their organization. We tackled this challenge, consolidating a large set of options into the Top 10 Critical Capabilities for Agile Resiliency and creating an Agile Resiliency Implementation Model. The consensus, despite industry boundaries, demonstrates the universality of these capabilities as the core building blocks of E2E agile-resilient supply chains.

We describe each of the Top 10 Critical Capabilities for Agile Resiliency in this section and provide an Agile Resiliency Implementation Model in each, including some initial deliverables to assist leaders embarking on agile resiliency improvement initiatives.
AGILE RESILIENCY METRICS

To develop an E2E agile-resilient supply chain, your organization first must be able to measure its disruption limiting factors. This means tracking disruption events’ impact and creating early indicators around constraints. Gaps in predictive and diagnostic metrics along core workflow streams constrain a firm's ability to prioritize. Without these metrics, leaders cannot quantitively measure and track cross-functional and external partner response capabilities. Firms must also be able to measure the value gains and losses during disruptions to create the business case for improvement investments.

DISRUPTION EVENT IMPACT METRICS: Tracking the changes in value creation metrics (customer, cost, capital, and growth value drivers) during disruption events provides insight into disruption performance implications and trade-off decision-making.

WORKFLOW CONSTRAINT INDICATORS: Diagnostic metrics that correspond to critical E2E workflow constraints help prioritize management attention.

ACTIONABLE EXAMPLES:

- A disruption impact tracking process and metrics that capture the economic implications over time.
- An agile resiliency metrics dashboard for each critical workflow, including evolving prioritization and E2E scope rollout in time-phased releases
- Event alert controls with designated escalation process for leadership actions
- Clear accountability on metric analysis and response recommendations
- Tightened integration of metrics/reporting with business-continuity planning processes and management decision-making response speed
LEADERSHIP & CROSS-ENTERPRISE TEAMING

The complexity of core E2E workflows makes understanding disruption implications particularly difficult. Even outside of disruptions, supply chain interdependencies are not commonly understood, especially at the handoff points between workflow steps, supply chain partners, and functional intersections. Disruption response readiness requires competency and alignment across the enterprise; in most organizations getting there requires a tailored, dedicated development plan.

ACTIONABLE EXAMPLES:

- A plan to develop agile resiliency understanding across the supply chain, including timeframes and phases
- Structure and technology in learning tools that accommodate diverse audience requirements
COMMAND CENTER

Chasing supplier information and capabilities creates unsustainable stress points in the E2E supply chain. A centralized virtual or physical command hub for visibility and dynamic planning and execution is a requirement for long-term growth. Capturing data from disparate sources in the same format facilitates a complete view of supply chain performance, quick decision-making, and dynamic re-balancing of resources. It enables leaders to respond at appropriate weekly/daily/hourly intervals during disruptions or as needed in normal operational periods.

Agile Resiliency
IMPLEMENTATION MODEL

COMMAND CENTER

Begin by identifying and prioritizing business objectives including problem statements and KPIs for each functional area, then develop the data detection mechanism pertinent to those KPIs and workflows. Create a command center road map to deploy digital and process building blocks. Continuously assess and enhance value creation by monitoring KPI data.

ACTIONABLE EXAMPLES:

- Digitalization support solutions that help E2E workflow constraints and automate pre-alert notifications
- Workflow decision support tools incorporating AI assistance and process automation
- Disruption response processes that guide E2E planning and decision making
- Deep data analytics tools and expertise to reactively and predictively assess constraints and guide management decisions
- E2E visibility for inventory, capacity, and commitment status across key suppliers and customer networks
AGILE-RESILIENT WORKFLOW DESIGN

Current E2E workflow designs often do not identify disruption vulnerability risk points, response plans, or risk reduction capabilities. Design for Agile Resiliency (DFAR) methods, rules, and review audits are not sufficiently defined or deployed in vulnerable workflows, legacy products, or new product introduction value stream designs. These workflow vulnerability areas warrant review protocols. Preemptive design reviews offer a critical opportunity to fulfill the E2E’s promise of value creation, even amidst disruptions. Some key opportunity areas to integrate agile resiliency principles include:

NEW PRODUCT INTRODUCTION: introduce design steps to accommodate new Design for Agile Resiliency rules at the appropriate stages of the product introduction phase-review exit requirements.

ORDER TO CASH: Adopt defined allocation process rules to use during constrained supply. Address bullwhip causal factors and upside flexibility agreement needs with key customers.

SUPPLIER/SERVICE PROVIDERS: Revisit source-to-manufacture upside and downside flexibility requirement levels, tighten operating process integration steps, and align contract standards for periods of disruption.

SALES AND OPERATIONS PLANNING: Modify process steps to accommodate dynamic planning adjustments on shorter horizons (from monthly to weekly/daily).

INVENTORY POLICIES AND LEAST COST SOURCING: Change rules across the extended value stream where predictive constraints require rapid response alternatives.

The stress testing steps proposed in this capability area will take time to complete and must be adjusted to address changing disruption conditions. Prioritizing E2E workflows based on performance during the COVID-19 test offers a more informed approach. Pilot applications will also demonstrate vulnerabilities, contingency, or new capability needs as well as opportunities to gain alignment. Here, perfect is the enemy of progress. Applied learning examples will fuel further endeavors and business cases can become fact-based through demonstrations.

ACTIONABLE EXAMPLES:

- Perform COVID-19 Impact Audit on three core E2E workflow examples.
- Audit one core E2E process identified as a critical concern during COVID-19 and leverage the learnings to align enterprise understanding and motivation to accelerate necessary actions.
Disruption response tools and methods, along with experience deploying them, are critical elements to building agile resiliency as an organizational core competency. Teams need speed to address multiple disruptions simultaneously, diagnose and prioritize workflow constraints, and deploy solutions on rapid cycle times. Predictive pattern recognition, AI-based systems and other digital dependencies will become backbone elements of shifting from reactive to predictive response capabilities.

**Agile Resiliency**

**IMPLEMENTATION MODEL**

**DISRUPTION RESPONSE TOOLS AND METHODS**

Quick response times are founded in a mastery of workflow designs and standard value stream design tool applications. Response teams also need practice deploying predictive and reactive tools, and they must have the authority to make quick decisions. Start with a gap analysis on current tools, methods, and your team’s understanding of them. Then create make/buy criteria for supply chain disruption response tools and processes. Pilot deployment on multiple core E2E workflow value streams using scenario-based application learning.

**ACTIONABLE EXAMPLES:**

- An assessment of current capabilities and systemic change requirements
- First release of tools and methods workbench capabilities
- Test cases for several value stream disruption scenarios
- Business case value analysis and recommendations for stakeholders
DISRUPTION EVENT READINESS

Most supply chain disruption readiness routines are not formally prioritized, and opportunities to develop response action plans are limited. No doubt this increases response times during disruptions. Disruption event scenario planning and practice provide structured opportunities for executives and cross-functional response teams to explore and evaluate disruption conditions before they occur. Scenario planning designs should include practice opportunities for:

RESPONSE TEAMS: To identify and design plausible workflow operating system solution alternatives.

STAKEHOLDER LEADERSHIP TEAMS: To understand the impact of disruption constraint risks and performance implications on value creation.

OVERALL TEAM DEVELOPMENT: To enable fast response tools and methods application practice, readiness for the actual event as well as contingency plan preparations.

ACTIONABLE EXAMPLES:
- Scenario planning interface and process integration with risk management and business continuity planning teams
- Selection process/pilot scenario prioritization, team deployment process and oversight
- Documentation of recommendations, process improvements and expanded deployment support beyond the pilot
AGILE-RESILIENT SUPPLY CHAIN NETWORK DESIGNS

Many organizations address agile resiliency concerns in their analysis of network designs, but optimization models usually lack the data to quantify gains or losses. Elevating agile resiliency metrics to the network design level addresses both optimization modeling and ongoing assessment of business decision drivers through disruption scenario testing, product value stream shadow testing for vulnerabilities, and by providing additional data and visibility on event constraint implications. Bringing tier-1 to tier-3 supplier disruption metrics (e.g., risk scenario costing, disruption vulnerability mapping) into the analysis will be challenging but are necessary requirements if organizations want to excel.

ACTIONABLE EXAMPLES:

- Common requirements documentation that incorporates extended multi-echelon value chain perspectives
- Agile resiliency decision-factors and risk-based penalty/reward values incorporated across E2E global network
- Roadmap of functionality rollout expectations and pilot test releases
- Rollout of pilot design applications for assessing the new optimization functionality

IMPLEMENTATION MODEL

AGILE-RESILIENT SUPPLY CHAIN NETWORK DESIGNS

Begin by collaborating strategically with cross-industry users confronting similar network design enhancements. Next, leverage modeling software service providers to assess optional solution design requirement roadmaps. Add structured benchmarking modeling designs across service providers. Introduce third-party facilitators in supporting roles where their unbiased perspective can overcome trading partner trust issues and rapidly engage in E2E collaborative design improvements. Finally, incorporate collaboration pilot applications to accelerate action steps and test new capability benefits.
DYNAMIC RESPONSE

Disruption events now require daily optimization of both working capital and fixed production assets, which is only possible through E2E visibility and agility. Calibrating the flexibility necessary in the upside and downside of both inventory deployment and production/supply requirements creates a baseline for attaining agile resiliency. The unforecastable nature of disruptions requires dynamic response flexibility in inventory deployment rules and supply planning and capacity in shorter fixed fence horizons. Deeper alignment with interdependent functions and internal suppliers is not simple and often requires greater blurring of organizational boundaries, tighter integration across teams and faster decision making at the functional alignment boundaries. By definition, rapid response must occur quickly, so the organizational clock speed must be reset to accommodate shorter forecast horizons and execution response.

**ACTIONABLE EXAMPLES:**

- Prioritization of risk dampening buffer requirements (safety stock, capacity buffers, and utilization targeting)
- Gap analysis in current decision support capabilities and trade-off optimization needs
- Data analytics capability and capacity requirements
- Decision process and responsibilities in balancing enterprise value creation conflict situations
- Alignment with boardroom IBP process steps and integration with business continuity team collaboration requirements
- One or more scenario-based (pilot test) learning lab events

**Agile Resiliency IMPLEMENTATION MODEL**

**DYNAMIC RESPONSE**

The scope of this effort includes technical tool resource requirements, analytical process steps, segmentation of risk types and sensitivities to risk, causal analysis on the sources of risk, and determining how variability barriers can be deployed efficiently and effectively to dampen vulnerabilities to service commitments. The rapid response needs also require deeper internal alignment and integration in the response teams and decision-making dependencies.
E2E TRADING PARTNER ALIGNMENT

Longer cycle times and E2E complexity require greater agility in solution designs and a blurring of organizational boundaries to meet disruption response readiness. Aligning with key suppliers and customers on disruption management means tightly integrating processes, policies, contract terms, and capability response. To enhance this capability, leaders must address systemic obstacles like trust gaps, incentive misalignment, stress-points in make-buy outsourcing, and clarity on shared values and long-term commitments.

ACTIONABLE EXAMPLES:

- Trading partner mapping of critical value stream supplier network nodes at the tier-2 and tier-3 levels for critical components
- Assessment of value stream disruption bottleneck risks
- Roadmap with intervention actions to dampen vulnerability priority concerns
- Agile resiliency collaboration models piloted with key suppliers and customers
The scope of this effort includes cross-functional response team development strategies, stakeholder alignment, reduction of alignment constraints, and applied learning tools and events that allow team members to practice and improve response deployment of tools and methods.

**ACTIONABLE EXAMPLES:**

- One Team developmental strategies and implementation plan
- Metrics for monitoring response team alignment and readiness for disruption events
- Test pilot deployment and measurement of response team readiness (one initial core workflow priority of focus with rollout if success criteria are met)
- Reduction/elimination of top barriers to response team developmental progress as defined by the pilot team members

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**E2E ONE TEAM READINESS**

Many organizations struggle to unite their business functions as a single team because of siloed and misaligned incentives. Creating E2E One Team readiness means first creating unified internal values on agility and resiliency then bringing both internal and external supply chain partners into the fold. Aligning critical cross-functional resources along with external partners and creating unity of purpose enables inter-enterprise rapid response capabilities. For a true One Team rapid response, firms must:

- Incorporate and balance every business function’s perspective
- Aggressively reduce organizational boundary bias
- Step outside the boundaries of the enterprise with trading partners
- Adopt E2E value stream thinking and design awareness

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**Agile Resiliency IMPLEMENTATION MODEL**

The scope of this effort includes cross-functional response team development strategies, stakeholder alignment, reduction of alignment constraints, and applied learning tools and events that allow team members to practice and improve response deployment of tools and methods.

**ACTIONABLE EXAMPLES:**

- One Team developmental strategies and implementation plan
- Metrics for monitoring response team alignment and readiness for disruption events
- Test pilot deployment and measurement of response team readiness (one initial core workflow priority of focus with rollout if success criteria are met)
- Reduction/elimination of top barriers to response team developmental progress as defined by the pilot team members
Case Study

Our research aimed to identify a firm that demonstrates excellence in the Top 10 Critical Capabilities for Agile Resiliency and a significantly advantaged performance ranking in its industry with good agile-resilient performance. Exploration with a variety of firms in each of the three industries studied (CPG, Medical Devices, Industrial Machinery) helped us identify potential candidates.

We began the selection with several analytical steps to gain a closer perspective, comparing the top performers within each of the three industries. The CPG industry emerged as the top-performing sector, with significantly advantaged firms mastering five of the nine key metrics.

Among the significantly advantaged ranked firms, one (a multinational CPG firm) demonstrated a remarkable level of agile resiliency implementation on all of the Top 10 Critical Capabilities for Agile Resiliency and exceptional performance outcomes in its key metrics.

Figure 4.1: Median Metric Values for First Quartile Firms During COVID-19 (Q2-Q3 2020)

<table>
<thead>
<tr>
<th>Key Metric</th>
<th>CPG</th>
<th>Medical Devices</th>
<th>Industrial Machinery</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WORKING CAPITAL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDS (Days)</td>
<td>53.0</td>
<td>78.8</td>
<td>65.4</td>
</tr>
<tr>
<td>DSO (Days)</td>
<td>19.6</td>
<td>51.0</td>
<td>57.3</td>
</tr>
<tr>
<td>Cash-to-Cash (Days)</td>
<td>(44.6)</td>
<td>96.6</td>
<td>66.1</td>
</tr>
<tr>
<td><strong>COST/PROFIT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SG&amp;A (% of NOR)</td>
<td>17.2</td>
<td>19.8</td>
<td>8.9</td>
</tr>
<tr>
<td>COGS (% of NOR)</td>
<td>26.1</td>
<td>35.8</td>
<td>57.8</td>
</tr>
<tr>
<td>EBITDA (% of NOR)</td>
<td>27.6</td>
<td>30.4</td>
<td>23.5</td>
</tr>
<tr>
<td><strong>GROWTH</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenue Growth (% of NOR)</td>
<td>10.4</td>
<td>26.5</td>
<td>(3.0)</td>
</tr>
<tr>
<td>Return on Supply Chain Assets (% of NOR)</td>
<td>85.7</td>
<td>52.5</td>
<td>32.3</td>
</tr>
<tr>
<td>PE Ratio</td>
<td>28.4</td>
<td>74.7</td>
<td>37.5</td>
</tr>
</tbody>
</table>

Among the significantly advantaged ranked firms, one (a multinational CPG firm) demonstrated a remarkable level of agile resiliency implementation on all of the Top 10 Critical Capabilities for Agile Resiliency and exceptional performance outcomes in its key metrics. We engaged the organization’s representatives on a series of collaborative discussions regarding their experiences. Their mastery of agile resiliency adoption and the resulting performance provides a compelling case illustrating how agile resiliency can grow and protect value.
Leveraging quarterly performance filings published through the Thomson Reuters Eikon Financial Database, we can illustrate this firm’s leadership advantage implications on our Diamond analysis in Figure 4.2. This organization has an astounding six metrics in the Significantly Advantaged (first) quartile of the model, and none in the Significantly Disadvantaged (fourth) quartile.

Figure 4.2: Diamond Analysis of the Case Study Firm

Overall Performance Ranking in CPG Industry Peer Group Across All Nine Financial Metrics:
First Quartile - 1st out of 16 Firms

The enterprise’s representatives confirmed in discussions that they have aggressively adopted the Top 10 Critical Capabilities for Agile Resiliency, as demonstrated in their self-assessment of the importance of each of our Top 10 Critical Capabilities for Agile Resiliency as well as their firm’s maturity level of implementation.
Advancing E2E Agile Resiliency in Supply Chains

Figure 4.3: Case Study Firm’s Agile Resiliency Capability Rankings and Completion Level

<table>
<thead>
<tr>
<th>Top Capability Ranking</th>
<th>Priority</th>
<th>Implementation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agile Resiliency Metrics</td>
<td>HIGH</td>
<td>75%</td>
</tr>
<tr>
<td>Leadership and Cross-Enterprise Teaming</td>
<td>LOW</td>
<td>75%</td>
</tr>
<tr>
<td>Command Center</td>
<td>HIGH</td>
<td>75%</td>
</tr>
<tr>
<td>Agile-Resilient Workflow Design</td>
<td>MED</td>
<td>75%</td>
</tr>
<tr>
<td>Disruption Response Tools and Methods</td>
<td>HIGH</td>
<td>75%</td>
</tr>
<tr>
<td>Disruption Event Readiness</td>
<td>MED</td>
<td>75%</td>
</tr>
<tr>
<td>Agile-Resilient Supply Chain Network Design</td>
<td>MED</td>
<td>75%</td>
</tr>
<tr>
<td>Dynamic Response</td>
<td>HIGH</td>
<td>75%</td>
</tr>
<tr>
<td>E2E Trading Partner Alignment</td>
<td>HIGH</td>
<td>50%</td>
</tr>
<tr>
<td>E2E One Team Readiness</td>
<td>MED</td>
<td>75%</td>
</tr>
</tbody>
</table>

The descriptions that follow provide high-level views of how the case study firm deployed each of the Top 10 Critical Capabilities for Agile Resiliency during the COVID-19 disruption. These experiential learnings are directional in nature and offer insights for others assessing their own adoption journey.

**AGILE RESILIENCY METRICS:** The case study firm demonstrates an ability to gauge near-real time demand and manufacturing capacity and optimize SKU level decisions with disruption variability periods as well as normal variability challenges. Key diagnostic agile resiliency metrics enable smart decision making. The firm examines metrics daily and uses them to guide disruption response team thinking and leadership decision making.

**LEADERSHIP AND CROSS-ENTERPRISE TEAMING:** The enterprise makes learning investments in the team and across the organization to align thinking and behaviors. It conducts continuous scenario reviews to bulletproof the team’s success and decision making during normal marketplace dynamics as well as an extreme challenge like COVID-19. It has embedded dynamic adjustments to address the emerging disruption-driven complexities, demand variability, production and inventory immediate response needs and cycle time implications across the value stream.

**COMMAND CENTER:** Command and control are centralized with common processes, and specialized E2E cross-functional expertise is embedded in the
team. Common processes allow fast diagnostics and rapid decision making escalation when necessary, and the firm has disruption response playbooks. While meeting response capabilities was certainly a demanding challenge during COVID-19, the team and tools were already well established and practiced in meeting ongoing SC dynamics outside of disruption periods. They were able to quickly shore up weak points exposed by COVID-19.

**AGILE-RESILIENT WORKFLOW DESIGN:** This capability is ongoing in the case study firm. An annual review was in place for core processes in anticipation of disruption events, and during COVID-19, changes needed to be addressed in core workflow areas due to unanticipated stress points. For example, their customer demand surged, causing a bullwhip that pushed their order-to-cash process into allocation. The knock-on implications of their bullwhip experience require further attention, such as working with key customers to examine/dampen demand variability and tighten alignment.

The case study firm’s representatives said that some workflow design adjustments were like designing and flying a plane at the same time during COVID-19. They spent significant time reinforcing the changes in areas such as product allocation workflow steps. The initial modifications were then later improved to strengthen the designs. In summary, the annual process reviews are critical in DFAR, but the teaming capabilities for adjustments during disruption periods need to be in place, and E2E workflow constraints need to be aligned across internal and external trading partners.

**DISRUPTION RESPONSE TOOLS AND METHODS:** The case study firm adopted common process and team practice. Data analytics and planning tools along with dedicated talented team specialists in application sciences enable its superior performance. Formal assessments held on an annual basis strengthen readiness and adaptive needs to changing environmental challenges. Regularly monitoring emerging disruption concerns, risks, and business continuity implications guide response team thinking and action steps.

**DISRUPTION EVENT READINESS:** A formal yearly planning process addresses likely scenario design and readiness preparations. In addition, the case study firm examines ongoing assessments of disruption factors such as weather events through risk management/business continuity teams with early alerts provided to key response teams. The enterprise considers business implications in each likely scenario for contingency requirements. The executive teams embrace this step and all functional organizations impacted by the scenario are involved.
AGILE-RESILIENT SUPPLY CHAIN NETWORK DESIGN: The enterprise embeds network modeling and related decision support and uses it as needed to optimize E2E value stream designs. The modeling for disruption implications is currently conducted outside the modeling designs as are “what if” contingency assessments and the business implications of cost versus agile resiliency trade-offs. This approach has been both effective and more tailored to the business disruption questions and conditions that confront the firm.

DYNAMIC RESPONSE: This capability is a cornerstone in the case study firm’s command center success and related planning processes. Dynamic adjustments on the manufacturing planning front, coupled with visibility into logistics, warehouse and transportation capacity utilization, allows the firm to respond to situational constraints and optimize the available capacity for service, cost, and capital benefits.

Constraints in upside capacity during COVID-19’s early days did occur and resulted in allocation requirements being placed on customer orders. While this constraint was immediately addressed and benefited from a formal allocation process, customer behaviors drove unproductive response needs. The firm indicates that it will undertake correcting the cause of the bullwhip effect in the future. It currently addresses upside flexibility with labor overtime rather than idle capacity beyond normal upside flex, which many firms state is targeted at approximately 20 percent.

E2E TRADING PARTNER ALIGNMENT: The interdependencies of behavioral responses during a disruption like COVID-19 test the weakest links in E2E value streams. They can throw supply chain operating models into chaos, forcing customer order allocations, excess inventory/shortfalls on safety stock, and cycle time variability on order lead-times. These occurrences depend the most on the connections between trading partners, contract terms, and process expectations. One winning strategy illustrated in this firm was the blurring of boundaries between supply chain management and commercial sales. Co-locating and aligning expectations, daily decisions, and communications with trading partners dampened the impact and surprises to a more manageable situational daily effort.

As mentioned earlier, the order-to-cash workflow has the largest interdependencies on trading partner alignment. This is a priority and can create the greatest risks in this industry. The firm highlighted the need to achieve cross-enterprise alignment before extending disruption readiness plans to external partners post-COVID-19.
**E2E ONE TEAM READINESS:** The case study firm elevated a one-team strategy within the enterprise years ago but continues to refine it. The residual benefits of consolidating response teams into one planning hub has allowed teams to gain speed, effectiveness in decision making, and efficiency in COGS, EBITDA, ROSCA and customer service performance metrics.

Other industries have adopted similar strategies to grow and protect value in spite of disruptions. An oft-cited example is ZARA, the fast-fashion leader in demand-driven SCM systems design. It too consolidated cross-functional response teams and accomplished performance metric leadership results similar to our case example.

Consolidation can be advanced through means that do not involve co-location. Technology allowed virtual teaming during COVID-19’s shift to remote work models. However, forming and aligning cross-functional teams is driven by organizational structure, shared outcome metrics, and the blurring of boundaries, as well as experiential learning strategy deployment. Our case study firm embraced these supporting strategies and continues to enhance them as it looks ahead. People will always be the most important asset in any disruption period. Readiness preparations before the crisis was a critical success factor for our case study leadership and response teams.
Agile Resiliency Enablement Blueprint

The supply chain leaders interviewed identified a structured approach to adopting agile-resilient supply chain design as a critical need. The complexity and customization required demands a structured approach, so we tested ideas and created a starter framework as depicted in Figure 5.1. The proposed approach encompasses five recommended steps for building a customized blueprint for enabling E2E agile resiliency and strengthens your organization’s probability of supply chain success.

**Figure 5.1: Five Key Steps to Creating an Agile Resiliency Enablement Blueprint**

1. **Diamond Disruption Impact Analysis**

The first step in the Agile Resiliency Enablement Blueprint process is to analyze COVID-19’s disruption impact on SC-sensitive boardroom performance metrics. Again, we return to our four performance outcome categories: customer, capital, cost, and growth. Examples of key metrics that should be examined in each category include:

- Customer delivery to promise
- Order lead-time
- Inventory days of supply
- Cash-to-cash cycle time
- EBITDA
- Revenue growth
- Market share

Benchmarking against industry competitors can offer you an even richer view of value creation or loss. Adding the analysis of disruption implications to value creation among industry peers can help the SCM leaders more fully understand the marketplace and economic implications of disruptions. Connecting these implications to overall financial performance is a critical means of elevating attention to SCM agile resiliency as an enterprise priority.
2 Disruption Impact Lessons Learned
Capturing lessons learned from disruptions is the next step to creating an Agile Resiliency Enablement Blueprint. Reviewing system designs for core E2E workflows diagnoses stress points and identifies disruption concerns and new capability needs. The interdependencies between stress points reveal the most critical concerns. While step two is perhaps best completed shortly after disruption events, an annualized diagnostic stress test can also predict risk areas. Firms should take the time to understand the risk management and business continuity teams’ process steps to ensure you align timing commitments.

3 Agile Resiliency Capability Prioritization: The 80/20 Rule
The third step in the Agile Resiliency Enablement Blueprint process focuses on prioritizing capability improvements. Transitioning supply chains to an agile resiliency design will stretch beyond one year, and improvements to core enterprise workflow capabilities should be the first priority, followed by additional aspirational priorities. Our study cohort suggested a ratio of 80 percent core to 20 percent aspirational resource allocation as a reasonable starting place.

This step to creating your enablement blueprint should involve both interdependent internal functionals and external trading partners. You cannot gain alignment with simple directives informing others of new processes. Capability improvements will require investment on all sides, so timing must accommodate. Common PMO process and oversight will be very helpful in this endeavor. As alignment with risk management and/or business continuity team members is critical, integration steps may be advisable in this step as well.

4 Agile Resiliency Capability Needs, Timing, Milestones, and Roadmap
Step four in the Agile Resiliency Enablement Blueprint process concerns aligning stakeholders, interdependent organizational representatives, and external parties. This design step should address:
1. Performance outcome goals (Identified in Step 1)
2. A short-listing of core and aspirational capability initiatives (Identified in Step 3)
3. Milestones and timing by initiative with prioritization implications
4. A roadmap of interdependent needs and stakeholder alignment commitments
Feedback from our study participants suggests that your enablement blueprint should be constantly revisited as you identify new risks and upcoming concerns throughout a given plan cycle. You should also renew the blueprint to be leveraged as input into the Integrated Business Planning Process. This series of alignment steps will support the overarching goal of involving critical stakeholders who hold an interdependent role in the process but may be outside the SCM organizational line of authority.

**Agile Resiliency Leadership Model**

All members of our study cohort raised the need for a leadership model, and creating one is the fifth step in the Agile Resiliency Enablement Blueprint process. This step should include elevating the agile resiliency leadership role to a strategic reporting level, establishing the governance design decisions on centralization or decentralization of authority, senior executive team sponsorship, and integrating expectations with other interdependent enterprise teams such as risk management or business continuity planning.

Instilling prioritization, enabling shared understanding of disruption constraints, priorities and investment commitments is often new and/or not clearly understood. While past approaches to address crises may have met your organization’s immediate needs, our survey feedback strongly suggests that SCM leaders should step back from their traditional role of saving the day through brute force. Instead, your organization needs a more systematic approach for disruptions going forward. The blueprint process should not only help you form a plan, but also a coalition to support it. Both are critical to success. It is indeed a journey versus a destination.
Disruptions occur in the same places where the biggest opportunities for improvement hide - at the handoff points.

Collaboration Models That Drive Agile Resiliency

Our research revealed a pattern that brings both concern and opportunity: disruptions occur in the same places where the biggest opportunities for improvement hide - at the handoff points. It should be no surprise then that effective collaboration models have proven a key performance driver. Cross-organizational collaboration underlies most successful reductions in non-value-added variability, complexity, and cycle time in all of the core E2E workflows.

Based on all of this, we studied collaboration models as a mechanism for reducing disruption impact and expanding and deepening agile resiliency. We focused on new or underserved collaboration models with the goal of expanding consideration for these designs. Further, we hoped that early adopters would advance the initial design thinking and provide pilot applications to test the proposed opportunities.

Collaboration Breakthrough Suggestions

We prioritized areas that pose current knowledge gaps and constraints due to the absence of both a process and facilitation support mechanism. Although SCM experts often cite the need to advance internal collaboration models, our study team focused on the external enterprise leverage points.

During our interviews, we identified four areas of opportunity and need: advisory support for best practices, innovation research and deployment, internal advisory to SCM leadership teams, and leveraging government policy. Firms may wish to consider one or all of the opportunity areas. However, we recommend they undertake a structured review and assessment.

Figure 6.1: Collaboration Models to Accelerate Agile Resiliency Knowledge Transfer and Breakthrough Solutions
Below, we provide example deliverables in each area of opportunity. The University of Tennessee, Knoxville, also offers collaboration models in each area of opportunity. Our overarching goal is to stimulate new thinking, accelerate value creation, and advance pilot design applied learning success.

Each of our collaboration model recommendations offers flexible participation design configurations. As an example, each model could be supported independently within a single enterprise leadership model, with a “focus” industry design, or as a cross-industry consortium of sponsor firms with Global Supply Chain Institute’s Advanced Supply Chain Collaborative serving as an exemplar.

### Agile Resiliency Best Practice Support
- Identification and advisory support on best practice access/deployment
- Benchmarking facilitation in SME – contact connections or facilitation
- Best practice survey designs, facilitation, and metric benchmarking

### Agile Resiliency Innovation Research and Deployment
- Dedicated R&D support to individual firms
- Multi-firm AR research board and commissioned studies
- AR core versus aspirational capabilities research

### Agile Resiliency Internal Advisory Board Member Role On SC Leadership Teams
- Traditional adviser on periodic review sessions
- Advisory participation on active program solution team
- Facilitation support of E2E value stream trading partners

### Agile Resiliency Cross-Industry Leverage On SC-Related Government Policy Impacts During Disruption Periods
- Regulatory matters that constrain SC capabilities (e.g., transportation regulations on weights and hours)
- Trade-related constraints such as Port of Entry rules during disruptions
- Federally funded AR research grants and policy/infrastructure investments
What an exciting (and tiring) time to be a supply chain management professional! After 20 years of almost unbridled growth of global supply chain designs that typically prioritized efficiency and cost minimization, our field is now challenged with adopting a more balanced approach, while still driving ever-increasing financial returns. As leaders in our field, we have advocated for this more balanced approach for years, yet we would not have wished nor dreamed that an unpredictable period of politics plus a major global pandemic would be the trigger points that usher it into reality. Yet, that may be just the case.

The road to an agile-resilient supply chain is not easy to embark upon or uniformly undertaken. Each firm must create its own design, rate of speed, and path to achieve it. The one commonality right now is the reality that disruptions are becoming a more frequent and severe threat to business value creation. In the past, it was easier for SCM leaders to write off disruption implications as one-time events that workaround solutions could address. But shareholder interests have elevated the topic to the boardroom, exposing fault lines in confidence on earnings and share price valuations.

COVID-19 has exposed that lack of resiliency poses an even greater threat to the economy and the marketplace at large. Employees bore the burden of keeping many firms afloat through furloughs and layoffs. Customers demonstrated their lack of confidence in value chains with bullwhip purchasing behaviors. These behaviors fueled their fears into reality by multiplying demand variability, crushing operating system design logic, and causing supply shortages in every vertical. Suppliers faced difficult decisions both upside and downside as their customers grappled with rebalancing needs within the window of customer demand.

COVID-19 disrupted every link in the value chain. Experts warn that it won’t be a black swan event; rather, it is characteristic of the risk and uncertainty that will persist well into the future due to the multiple shaping forces at work in our world.

However, as we stated at the very beginning of this white paper, disruption drives new thinking. SCM leaders will use the current urgency to drive their organizations to best practices that can create value in crisis as well as calm. They will take up new roles at the upper echelons of the organization, quantitatively demonstrating how their strategies drive shareholder value. They will create new learning models from the partnerships across organizational boundaries that arose during this time.

We hope you will be among them. The University of Tennessee’s Global Supply Chain Institute has the talent development expertise to help you take the critical steps along this path, and we hope to partner with firms across all industries to make agile-resilient supply chains the next baseline for our industry.
THE GLOBAL SUPPLY CHAIN INSTITUTE

The University of Tennessee’s Global Supply Chain Institute (GSCI) shapes and influences the practice of supply chain management (SCM) by serving as the preeminent global hub for leading practitioners, academics, and students to learn, network, and connect.

It was in this spirit of engagement and impact that the Department of Supply Chain Management and the Graduate and Executive Education programs in the Haslam College of Business at the University of Tennessee created the Global Supply Chain Institute to serve as their vehicle to extend relationships to industry and to drive an impact on the profession.

If you are interested in collaborating to better understand and advance the field of SCM, please contact us. Ultimately, we want to partner with you to help you identify your SCM strategy and develop your people.

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