

Operations Practice

# Supply-chain recovery in coronavirus times—plan for now and the future

Actions taken now to mitigate impacts on supply chains from coronavirus can also build resilience against future shocks.

*by Knut Alicke, Xavier Azcue, and Edward Barriball*



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### Even as the immediate toll on human health

from the spread of coronavirus (SARS-CoV-2), which causes the COVID-19 disease, mounts, the economic effects of the crisis—and the livelihoods at stake—are coming into sharp focus. Businesses must respond on multiple fronts at once: at the same time that they work to protect their workers' safety, they must also safeguard their operational viability, now increasingly under strain from a historic supply-chain shock.

Many businesses are able to mobilize rapidly and set up crisis-management mechanisms, ideally in the form of a nerve center. The typical focus is naturally short term. How can supply-chain leaders also prepare for the medium and long terms—and build the resilience that will see them through the other side?

### What to do today

In the current landscape, we see that a complete short-term response means tackling six sets of issues that require quick action across the end-to-end supply chain (Exhibit 1). These actions should be taken in parallel with steps to support the workforce and comply with the latest policy requirements:

1. *Create transparency* on multitier supply chains, establishing a list of critical components, determining the origin of supply, and identifying alternative sources.
2. *Estimate available inventory* along the value chain—including spare parts and after-sales stock—for use as a bridge to keep production running and enable delivery to customers.

Exhibit 1

## There are multiple immediate, end-to-end supply-chain actions to consider in response to COVID-19.

### Supply-chain actions

#### Create transparency on multitier supply chain

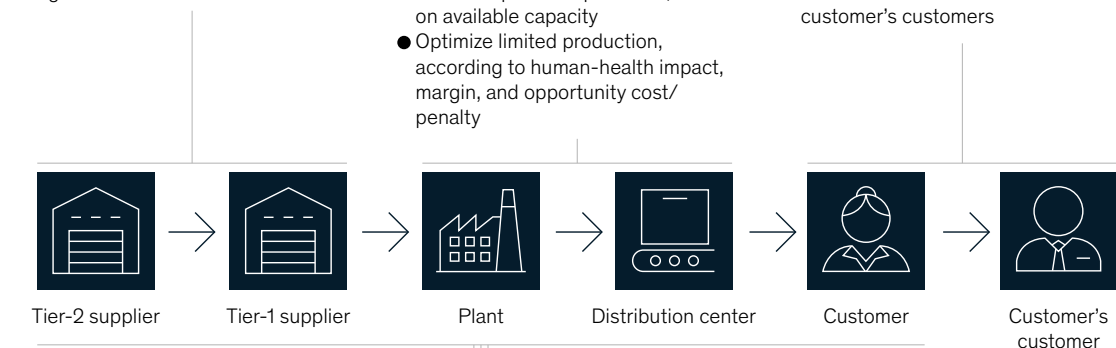
- Determine critical components and determine origin of supply
- Assess interruption risk and identify likely tier-2 and onward risk
- Look to alternative sources if suppliers are in severely affected regions

#### Optimize production and distribution capacity

- Assess impact on operations and available resource capacity (mainly workforce)
- Ensure employee safety and clearly communicate with employees
- Conduct scenario planning and assess impact on operations, based on available capacity
- Optimize limited production, according to human-health impact, margin, and opportunity cost/penalty

#### Assess realistic final-customer demand

- Work with sales and operations planning to get demand signal to determine required supply
- Leverage direct-to-consumer channels of communication
- Use market insights/external databases to estimate for customer's customers



#### Estimate available inventory

- Estimate inventory along the value chain, including spare parts/remanufactured stock
- Use after-sales stock as bridge to keep production running

#### Identify and secure logistics capacity

- Estimate available logistics capacity
- Accelerate customs clearance
- Change mode of transport and prebook air/rail capacity, given current exposure
- Collaborate with all parties to leverage freight capacity jointly

#### Manage cash and net working capital

- Run supply-chain stress tests vs major suppliers' balance sheets to understand when supply issues will start to stress financial or liquidity issues

3. *Assess realistic final-customer demand* and respond to (or, where possible, contain) shortage-buying behavior of customers.
4. *Optimize production and distribution capacity* to ensure employee safety, such as by supplying personal protective equipment (PPE) and engaging with communication teams to share infection-risk levels and work-from-home options. These steps will enable leaders to understand current and projected capacity levels in both workforce and materials.
5. *Identify and secure logistics capacity*, estimating capacity and accelerating, where possible, and being flexible on transportation mode, when required.
6. *Manage cash and net working capital* by running stress tests to understand where supply-chain issues will start to cause a financial impact.

In the following sections, we explore each of these six sets of issues.

### **Create transparency**

Creating a transparent view of a multitier supply chain begins with determining the critical components for your operations. Working with operations and production teams to review your bills of materials (BOMs) and catalog components will identify the ones that are sourced from high-risk areas and lack ready substitutes. A risk index for each BOM commodity, based on uniqueness and location of suppliers, will help identify those parts at highest risk.

Once the critical components have been identified, companies can then assess the risk of interruption from tier-two and onward suppliers. This stage of planning should include asking direct questions of tier-one organizations about who and where their suppliers are and creating information-sharing agreements to determine any disruption being faced in tier-two and beyond organizations. Manufacturers should engage with all of their suppliers, across all tiers, to form a series of joint agreements to monitor

lead times and inventory levels as an early-warning system for interruption and establish a recovery plan for critical suppliers by commodity.

In situations in which tier-one suppliers do not have visibility into their own supply chains or are not forthcoming with data on them, companies can form a hypothesis on this risk by triangulating from a range of information sources, including facility exposure by industry and parts category, shipment impacts, and export levels across countries and regions. Business-data providers have databases that can be purchased and used to perform this triangulation. Advanced-analytics approaches and network mapping can be used to cull useful information from these databases rapidly and highlight the most critical lower-tier suppliers.

Combining these hypotheses with the knowledge of where components are traditionally sourced will create a supplier-risk assessment, which can shape discussions with tier-one suppliers. This can be supplemented with the described outside-in analysis, using various data sources, to identify possible tier-two and onward suppliers in affected regions.

For risks that could stop or significantly slow production lines—or significantly increase cost of operations—businesses can identify alternative suppliers, where possible, in terms of qualifications outside severely affected regions. Companies will need to recognize that differences in local policy (for example, changing travel restrictions and government guidance on distancing requirements) can have a major impact on the need for (and availability of) other options. If alternative suppliers are unavailable, businesses can work closely with affected tier-one organizations to address the risk collaboratively. Understanding the specific exposure across the multitier supply chain should allow for a faster restart after the crisis.

### **Estimate available inventory**

Most businesses would be surprised by how much inventory sits in their value chains and should estimate how much of it, including spare parts and

remanufactured stock, is available. Additionally, after-sales stock should be used as a bridge to keep production running (Exhibit 2).

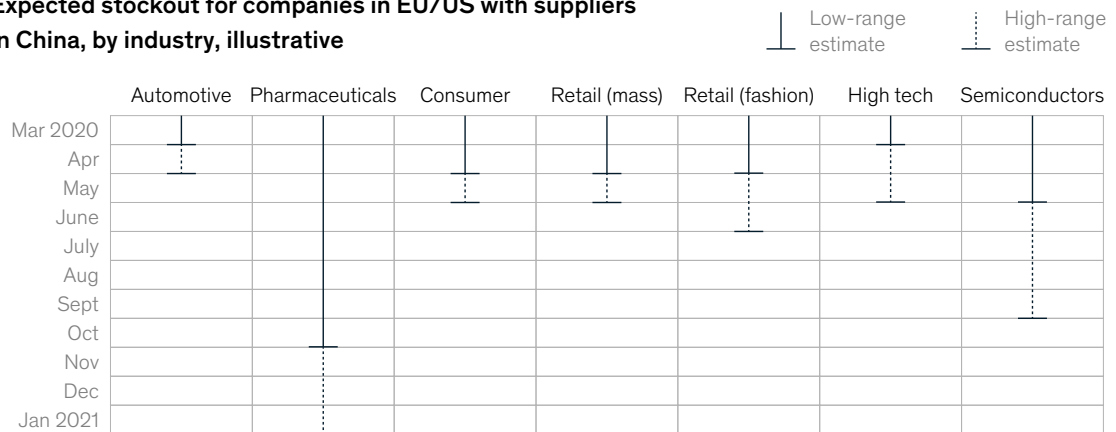
This exercise should be completed during the supply-chain-transparency exercise previously described. Estimating all inventory along the value chain aids capacity planning during a ramp-up period. Specific categories to consider include the following:

- *finished goods* held in warehouses and *blocked inventory* held for sales, quality control, and testing
- *spare-parts inventory* that could be repurposed for new-product production, bearing in mind the trade-off of reducing existing customer support versus maintaining new-product sales
- *parts with lower-grade ratings or quality issues*, which should be assessed to determine whether

Exhibit 2

## Built-in inventory in the supply chain will delay the full impact of halted production.

### Expected stockout for companies in EU/US with suppliers in China, by industry, illustrative



### Inventory, days of stock (including supply in transit)

	Automotive	Pharmaceuticals	Consumer	Retail (mass)	Retail (fashion)	High tech	Semiconductors
2nd-tier supplier	30–40 (China)	35–70 (China)	20–30 (China)	N/A	N/A	40–60 (China)	N/A
1st-tier supplier	7–17 (EU/US)	120–140 (EU/US)	60–90 (China)	60–90 (China)	15–35 (China)	55–70 (China)	70–110 (China)
Assembly/packaging	2–12 (EU/US)	55–100 (EU/US)	10–17 (EU/US)	10–17 (EU/US)	15–29 (EU/US)	19–45 (China)	60–90 (Philippines)
RDCs <sup>1</sup>	N/A	80–90 (EU/US)	14 (EU/US)	15–17 (EU/US)	15–23 (EU/US)	N/A	N/A
Market buffer	0–30 (EU/US)	N/A	N/A	7 (EU/US)	21–28 (EU/US)	24–40 (EU/US)	20–30
Total inventory days <sup>2</sup>	40–70	230–320	60–90	70–100	70–110	40–100	130–200

<sup>1</sup> Regional distribution centers.

<sup>2</sup> Figures for total inventory buffer and expected stockout are calculated assuming production stop at latest link based in China.

the rework effort would be justified to solve quality issues or whether remanufacture with used stock could address supply issues

- *parts in transit* should be evaluated to see what steps can be taken to accelerate their arrival—particularly those in customs or quarantine
- *supply currently with customers or dealers* should be considered to see if stock could be bought back or transparency could be created for cross-delivery

### **Assess realistic final-customer demand**

A crisis may increase or decrease demand for particular products, making the estimation of realistic final-customer demand harder and more important. Businesses should question whether demand signals they are receiving from their immediate customers, both short and medium term, are realistic and reflect underlying uncertainties in the forecast. The demand-planning team, using its industry experience and available analytical tools, should be able to find a reliable demand signal to determine necessary supply—the result of which should be discussed and agreed upon in the integrated sales- and operations-planning (S&OP) process.

Additionally, direct-to-consumer communication channels, market insights, and internal and external databases can provide invaluable information in assessing the current state of demand among your customers' customers. When data sources are limited, open communication with direct customers can fill in at least some gaps. With these factors in mind, forecasting demand requires a strict process to navigate uncertain and ever-evolving conditions successfully. To prepare for such instances effectively, organizations should take the following actions:

- Develop a demand-forecast strategy, which includes defining the granularity and time horizon for the forecast to make risk-informed decisions in the S&OP process.

- Use advanced statistical forecasting tools to generate a realistic forecast for base demand.
- Integrate market intelligence into product-specific demand-forecasting models.
- Ensure dynamic monitoring of forecasts in order to react quickly to inaccuracies.

With many end customers engaging in shortage buying to ensure that they can claim a higher fraction of whatever is in short supply, businesses can reasonably question whether the demand signals they are receiving from their immediate customers, both short and medium term, are realistic and reflect underlying uncertainties in the forecast. Making orders smaller and more frequent and adding flexibility to contract terms can improve outcomes both for suppliers and their customers by smoothing the peaks and valleys that raise cost and waste. A triaging process that prioritizes customers by strategic importance, margin, and revenue will also help in safeguarding the continuity of commercial relationships.

### **Optimize production and distribution capacity**

Armed with a demand forecast, the S&OP process should next optimize production and distribution capacity. Scenario analysis can be used to test different capacity and production scenarios to understand their financial and operational implications.

Optimizing production begins with ensuring employee safety. This includes sourcing and engaging with crisis-communication teams to communicate clearly with employees about infection-risk concerns and options for remote and home working.

The next step is to conduct scenario planning to project the financial and operational implications of a prolonged shutdown, assessing impact based on available capacity (including inventory already in the system). To plan on how to use available

capacity, the S&OP process should determine which products offer the highest strategic value, considering the importance to health and human safety and the earnings potential, both today and during the future recovery. The analysis will draw on a cross-functional team that includes marketing and sales, operations, and strategy staff, including individuals who can tailor updated macroeconomic forecasts to the expected impact on the business. Where possible, a digital, end-to-end S&OP platform can better match production and supply-chain planning with the expected demand in a variety of circumstances.

#### **Identify and secure logistics capacity**

In a time of crisis, understanding current and future logistics capacity by mode—and their associated trade-offs—will be even more essential than usual, as will prioritizing logistics needs in required capacity and time sensitivity of product delivery. Consequently, even as companies look to ramp up production and make up time in their value chains, they should prebook logistics capacity to minimize exposure to potential cost increases. Collaborating with partners can be an effective strategy to gain priority and increase capacity on more favorable terms.

To improve contingency planning under rapidly evolving circumstances, real-time visibility will depend not only on tracking the on-time status of freight in transit but also on monitoring broader changes, such as airport congestion and border closings. Maintaining a nimble approach to logistics management will be imperative in rapidly adapting to any situational or environmental changes.

#### **Manage cash and net working capital**

As the crisis takes its course, constrained supply chains, slow sales, and reduced margins will combine to add even more pressure on earnings and liquidity. Businesses have a habit of projecting optimism; now they will need a strong dose of realism so that they can free up cash. Companies will need all available internal forecasting capabilities to stress test their capital requirements on weekly and monthly bases.

As the finance function works on accounts payable and receivable, supply-chain leaders can focus on freeing up cash locked in other parts of the value chain. Reducing finished-goods inventory, with thoughtful, ambitious targets supported by strong governance, can contribute substantial savings. Likewise, improved logistics, such as through smarter fleet management, can allow companies to defer significant capital costs at no impact on customer service. Pressure testing each supplier's purchase order and minimizing or eliminating purchases of nonessential supplies can yield immediate cash infusions. Supply-chain leaders should analyze the root causes of suppliers' nonessential purchases, mitigating them through adherence to consumption-based stock and manufacturing models and through negotiations of supplier contracts to seek more favorable terms.

#### **Building resilience for the future**

Once the immediate risks to a supply chain have been identified, leaders must then design a resilient supply chain for the future. This begins with establishing a supply-chain-risk function tasked with assessing risk, continually updating risk-impact estimates and remediation strategies, and overseeing risk governance. Processes and tools created during the crisis-management period should be codified into formal documentation, and the nerve center should become a permanent fixture to monitor supply-chain vulnerabilities continuously and reliably. Over time, stronger supplier collaboration can likewise reinforce an entire supplier ecosystem for greater resilience.

During this process, digitizing supply-chain management improves the speed, accuracy, and flexibility of supply-risk management. By building and reinforcing a single source of truth, a digitized supply chain strengthens capabilities in anticipating risk, achieving greater visibility and coordination across the supply chain, and managing issues that arise from growing product complexity. For example, Exhibit 3 shows how a digitally enabled clustering of potential suppliers shows the capabilities they have in common.

Exhibit 3

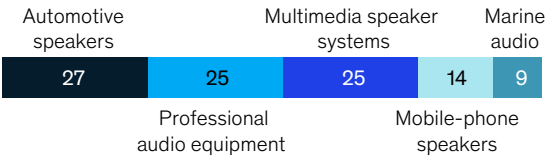
**Cluster maps reveal alternative sourcing options for all the materials affected.**

**Cluster map, durable speaker suppliers, illustrative (n = 87 suppliers)**

● Company — Common capabilities



**Cluster characteristics, %**



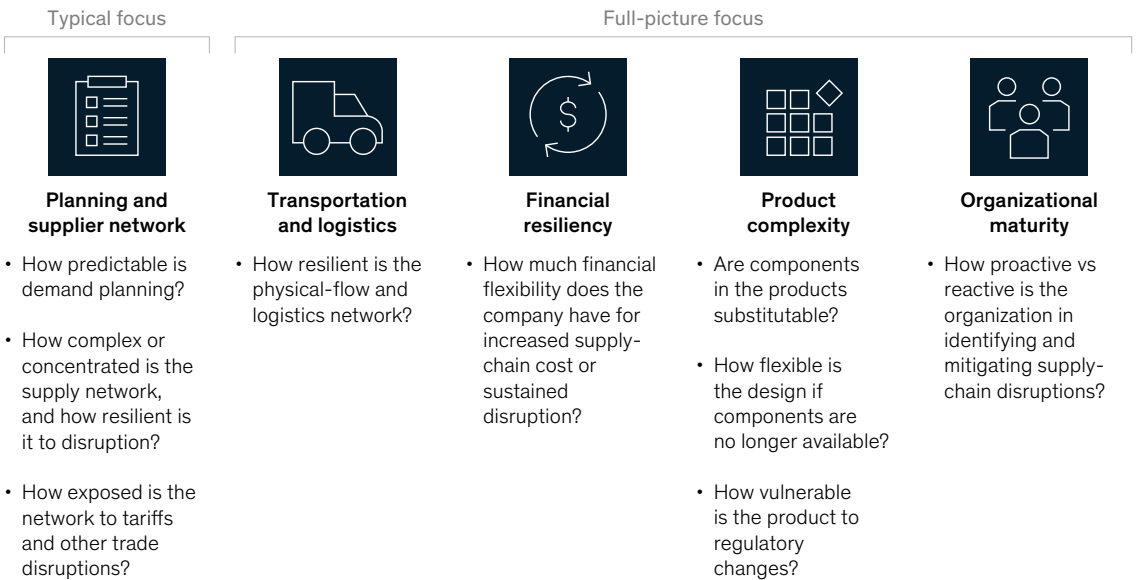
Estimating a medtech company’s degree of connectiveness helped it expand its supplier base by 600 percent, while an industrial-tools maker identified request-for-qualifications-ready suppliers for highly complex parts that it had been previously unable to source.

Finally, when coming out of the crisis, companies and governments should take a complete look at their supply-chain vulnerabilities and the shocks that could expose them much as the coronavirus has. Exhibit 4 describes the major sources of vulnerability. The detailed responses can reveal major opportunities—for example, using scenario analyses to review the structural resilience of critical logistics nodes, routes, and transportation modes can reveal weakness even when individual components, such as important airports or rail hubs, may appear resilient.

Exhibit 4

**Supply-chain vulnerability occurs across five dimensions.**

**Drivers of potential vulnerability**



Organizations should build financial models that size the impact of various shock scenarios and decide how much “insurance” to buy through the mitigation of specific gaps, such as by establishing dual supply sources or relocating production. The analytical underpinnings of this risk analysis are well understood in other domains, such as the financial sector—now is the time to apply them to supply chains.

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Triaging the human issues facing companies and governments today and addressing them must be the number-one priority, especially for goods that are critical to maintain health and safety during the crisis. As the coronavirus pandemic subsides, the tasks will center on improving and strengthening supply-chain capabilities to prepare for the inevitable next shock. By acting intentionally today and over the next several months, companies and governments can emerge from this crisis better prepared for the next one.

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