

White Paper

How to rebound stronger from COVID-19

Resilience in manufacturing and supply systems

In collaboration with Kearney

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Contents

Executive Summary	4
From a Regional Supply to a Global Demand Crisis	6
Ensuring Business Continuity and Protecting Employees – Immediate Actions to Take	10
Preparing for Recovery and Increasing Resilience – Initiatives to Accelerate	14
Adopting the overall supply chain set-up	14
Doubling down on investments in advanced manufacturing technologies	15
Adjusting the operating model	17
Redefining external relationships	18
Reviewing and challenging the portfolio	19
Roadblocks	19
Adapting to Potential “Forever” Changes – Key Imperatives for Global Value Chains	22
Call for Action	24
Acknowledgements	25
Study Methodology	27

Executive Summary

The COVID-19 global crisis continues to disrupt manufacturing and global supply chains with severe consequences for society, businesses, consumers and the global economy. Since the start of the outbreak, the global production system has been challenged by factory shutdowns, demand surges for essential goods, stockpiling and panic-buying, as well as shifting consumer preferences (e.g. online over physical). This has raised new and unprecedented questions on the level of resilience of global value chains and the overall approach to manufacturing.

Facing up to these disruptions requires new forms of collaboration across companies and industries to ensure business continuity while protecting employees and improving supply systems resilience for the future. As global value chains have traditionally been optimized for cost-competitiveness reasons, the COVID-19 pandemic proves that companies need to reorient towards new approaches, which are prone to “risk competitiveness”. They also need to build new strategies in collaboration with governments to be able to adapt and respond to future shocks.

Recognizing this need, the World Economic Forum, in collaboration with Kearney, brought together C-level executives from different industry sectors to identify best responses to the current COVID-19 crisis, in the short-term, and help build resilience across manufacturing and supply systems by incubating new business partnerships and public-private cooperation.

The findings and conclusions presented in this paper are the result of a consultation carried out with 400+ senior executives in operations and supply chain management from different industry sectors. In particular, the paper presents best practices in terms of immediate actions taken by manufacturing companies to ensure business continuity and protect employees, outlines major initiatives aimed at accelerating the transformation of manufacturing and supply systems by increasing resilience, and proposes key imperatives for both business leaders and policy-makers to future-proof their organizations against “forever changes” in global value chains.

Ensuring business continuity and protecting employees – immediate actions to take

Leaders are proactively taking action to protect employees, ensure supply security, mitigate financial impact and navigate continued market uncertainty as demand drops. Companies have moved quickly to support suppliers (e.g. access to advanced network simulations), ensure cash liquidity and mitigate the impact on customers (e.g. extended payment terms, shifting freight modes) while contributing their part to society (e.g. repurposing manufacturing to produce essential goods).

Preparing for recovery and increasing resilience – initiatives to accelerate

Companies are already focused on preparing for the post COVID-19 scenario while drawing key learnings from this pandemic and its impact on global businesses. Leading multinational companies have already launched strategic initiatives to create more resilient supply chains before the on-going crisis and are now seeing an acceleration of the speed and determination of implementation.

Senior operations and supply chain executives are focusing on five key areas to increase the resilience of their manufacturing and supply systems:

1. Adopting the overall supply chain set-up by carefully managing interdependent levers such as dual sourcing, complexity reduction and localizing
2. Doubling down on investments in advanced manufacturing technologies that were attributed an essential role in ensuring a quick reaction to the crisis
3. Adjusting the operating model to allow for a more flexible and decentralized manufacturing organization with a consistent risk management system in place
4. Redefining external relationships and capturing new opportunities from cross-industry collaboration models
5. Reviewing and challenging the product portfolio to reduce complexity and refocus on key strategic directions

Adapting to potential “forever” changes – key imperatives for global value chains

The long-ranging impact of the COVID-19 pandemic is yet to be understood. A number of industry sectors have been severely impacted and there are changes to daily life, accelerated by the pandemic and supported by technology and innovation, which companies will need to adapt to.

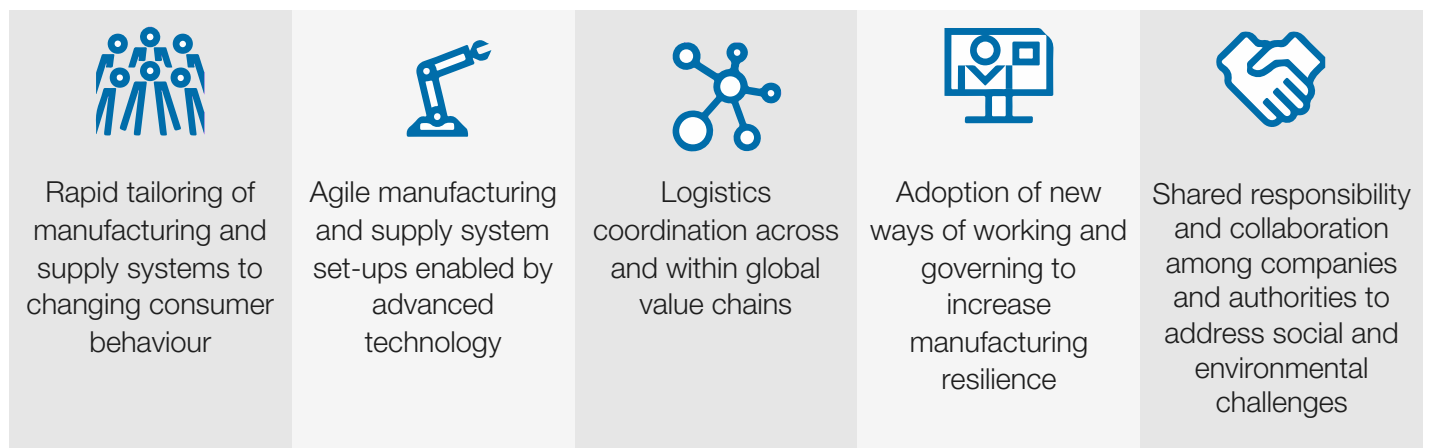
Five consistent key imperatives emerged for leaders to ensure the long-term success of manufacturing and supply systems:

Way forward

The impact of COVID-19 on global value chains requires strengthened global cooperation. The World Economic Forum’s Platform for Shaping the Future of Advanced Manufacturing and Production, in collaboration with Kearney, will continue engaging leaders across different industry sectors – from healthcare and automotive, to consumer goods and transportation and logistics – as well as governments, academia and civil society to understand industry-specific needs and develop collective action plans aimed at strengthening manufacturing and supply chains resilience. In particular, the Platform will continue its ongoing work, which includes:

- Collaborating with the Forum’s Industry communities (such as automotive, health, transport and logistics, consumer), and translating the five key imperatives presented above into specific actions tailored to the need of each industry sector
- Supporting businesses and governments to upgrade manufacturing and investment strategies, and updating industrial policies
- Providing a platform for discussion and knowledge sharing among leaders in manufacturing and supply systems
- Integrating, aggregating and amplifying existing collaborations and global initiatives that support the reconfiguration of global value chains while delivering value to businesses, society and the environment

Figure 1: Key imperatives for global value chains



From a Regional Supply to a Global Demand Crisis

The COVID-19 outbreak has disrupted manufacturing and global value chains, posing severe challenges to businesses all over the world. The world has seen similar disasters – SARS crisis in 2003, tsunami disaster of 2004, Global Financial Crisis in 2008 – but COVID-19 is different. Here is why:¹

- **It is a global crisis:** The virus spread to all continents in a few short months, creating a shockwave of disruption that left little time for preventative or remedial action by local economies and societies
- **All major economies are affected:** Previous crises have typically been concentrated in one sector, or one region, but COVID-19 is a global crisis that has impacted over 75% of the world's global manufacturing outputs
- **High interdependency in global trade:** The increased globalization of value chains means that any disruption is amplified, and recovery is more prolonged

Mitigating the impact of COVID-19 on global supply chains is too big and too urgent for any single entity to address alone. Manufacturing and supply systems are challenged by factory shutdowns and difficulties with logistics, while customer demand surges for essential goods amidst mass stockpiling and a dramatic shift away from in-store shopping to online home deliveries. This rapid disruption to both supply and demand requires new approaches, knowledge-sharing and collaboration across

industries to ensure business continuity, protect employees and improve resilience of supply systems for the future.

Optimizing for cost-competitiveness is no longer enough and companies will need to reorient towards new approaches, such as “risk competitiveness”, in the future. This is why the World Economic Forum's Platform for Shaping the Future of Advanced Manufacturing and Production, in collaboration with Kearney, has gathered senior operations and supply chain executives and other top leaders from government, academia and civil society to:

- Understand the impact of COVID-19 on global value chains
- Share best practice examples of how leaders are reacting to current disruptions to mitigate risks and build resilience in the long term
- Explore potential collaboration opportunities across industries and value chains (in a pre-competitive space) and new public-private partnerships to jointly address current and future disruptions

The companies that will prosper in a post-COVID-19 world are those that are already preparing for recovery, by drawing key learnings from this pandemic and its impact on global businesses and strengthening their supply chains accordingly. For better or worse, COVID-19 is accelerating the evolution of manufacturing and this paper aims to inform a better transition.

¹ The following logic of the three-point reasoning is inspired by the chapter “Thinking ahead about the trade impact of COVID-19” by Richard Baldwin and Eiichi Tomiura in *Economics in the Time of COVID-19*, <https://voxeu.org/content/economics-time-covid-19>.

Methodology

The World Economic Forum, in collaboration with Kearney, has conducted structured interviews with more than 30 senior executives across industries. In addition, 400+ senior supply chain executives from across Asia, Europe and US – between 30 March and 17 April 2020 – were surveyed to understand the actions taken to mitigate the COVID-19 crisis, their level of preparedness for recovery and perspectives on how the crisis will permanently affect the industry.

The state of COVID-19 disruption on global value chains

While global multinationals started sensing the disruption on the supply side with the emergence of the crisis in China in early January, most executives surveyed indicated that they were slow to respond to initial supply side disruptions, but the impact has been thorough. When asked, global respondents rated their businesses an average of 7 out of 10 in terms of how the crisis is disrupting their companies' supply network,

Figure 2: State of COVID-19 disruption

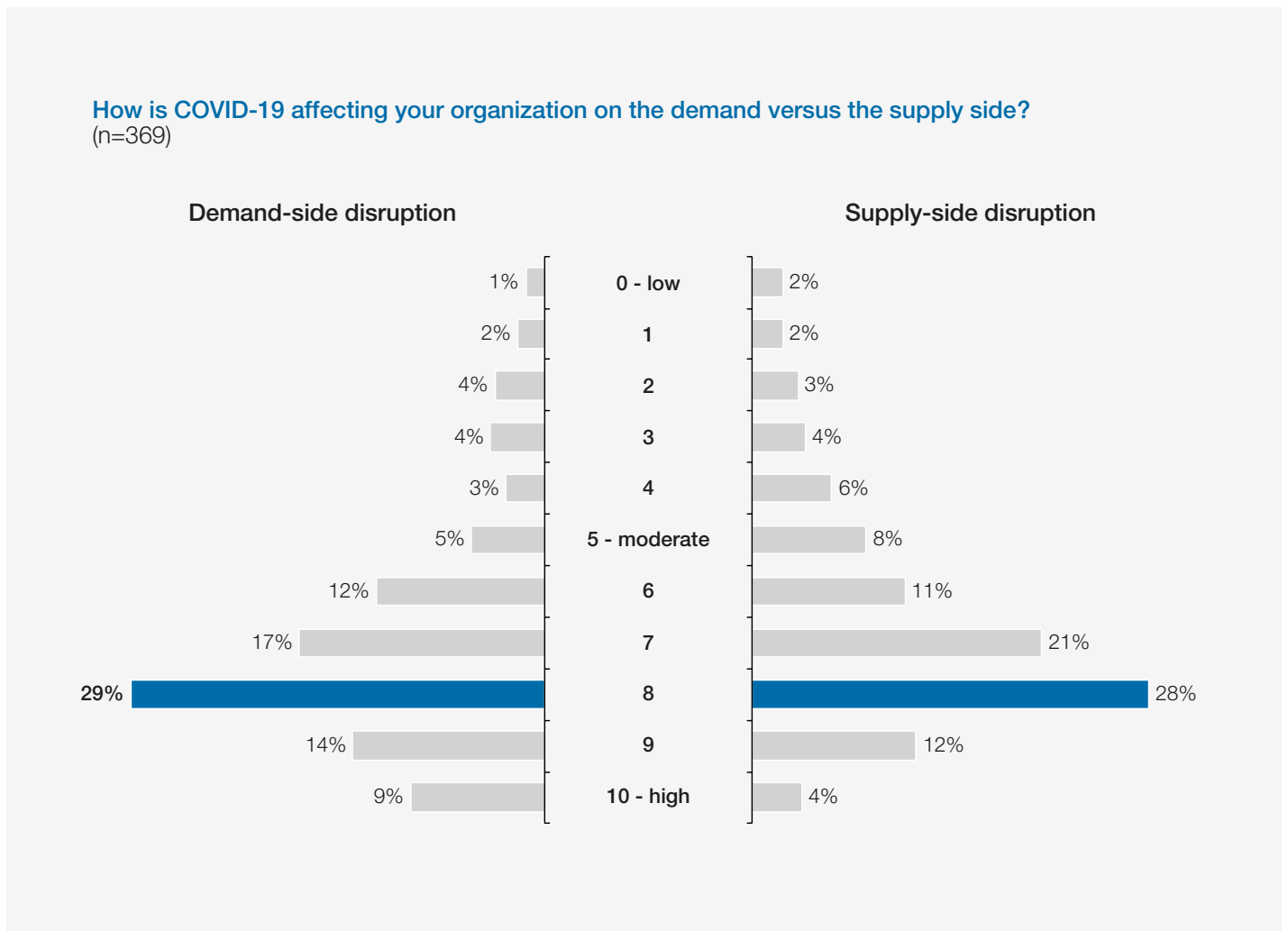
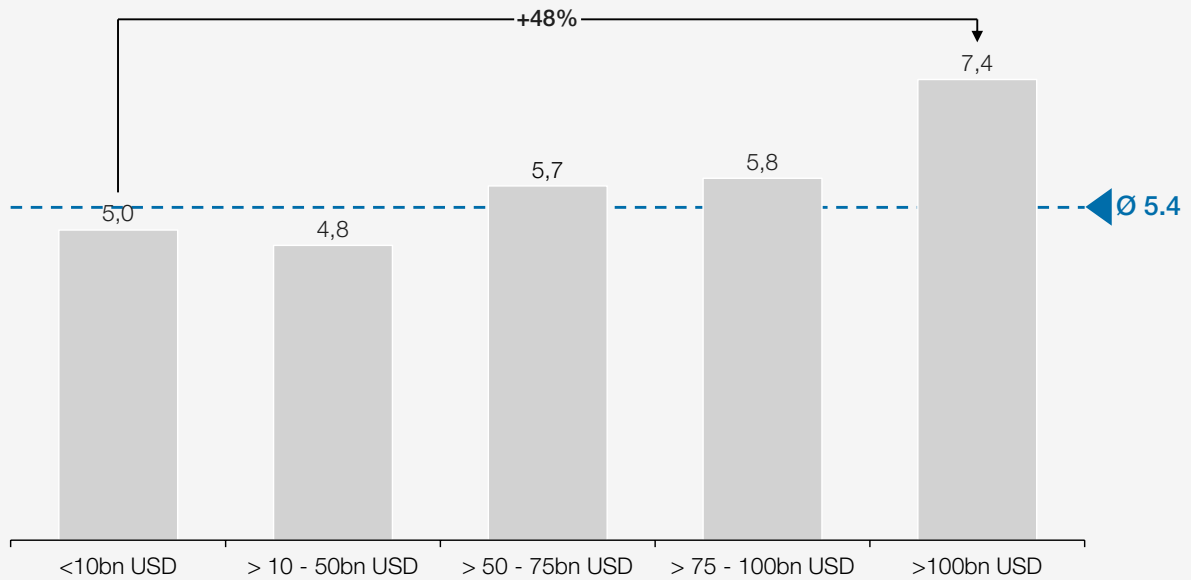


Figure 3: Adaption to COVID-19

My supply chain network and organization has adapted well to the impact of COVID-19
(1 – low, 5 – moderate, 10 – high; n=369)



including suppliers and manufacturing centres. Furthermore, the respondents scored their businesses an average of 5 out of 10 when asked how well they had adapted to the impact of COVID-19.

The much more severe disruption resulted from the demand side with European and North American countries enforcing strict measures to contain the virus. Enforcing policies to shutdown manufacturing of a lot of non-essential product subsequently also increased the supply-side shock. The severity of the impact is reflected in the survey results where more than 80% of survey companies are indicating a moderate to high impact on both either demand or supply side.

While companies overall felt their supply chain network and organization adapted moderately well to the crisis, smaller companies scored

the response of their supply chain network and organization 48% lower than did large companies. This echoes statements from our structured interviews where large companies were able to leverage their investments in supply chain visibility processes to mitigate some negative impacts. Additionally, several executives mentioned that size matters in negotiating for scarce supply.

From an industry perspective, the automobile industry appears to be one of the most impacted by COVID-19 on both the demand side (respondents in this industry felt a high impact – 7.9 out of 10) and the most disruption to their supply network (7.3 out of 10; 6.6 average) and were the one of the least likely to think they have adapted well to COVID-19, scoring themselves only 4.3 out of 10.

Firms in the auto industry are far more likely to have enforced mandatory working from home, with 61% already remote working, compared to the 40% industry average. In the event of a prolonged crisis, and likely due to existing home working, they are nearly twice as likely to close offices and other facilities (33% compared to 18% average).

By contract, communications, media and technology firms are the most likely to consider themselves well-adapted to the COVID-19 crisis, with firms scoring themselves an average of 6.2 out of 10, compared to the wider industry average of 5.4. Perhaps unsurprisingly, these firms are the most likely to be using new generation data and technologies to support their supply chains, with firms scoring themselves 7.7 out of 10, compared to the wider industry average of 6.1. That said, almost 40% (39.5%) think that adapting to and embracing new technologies is their biggest challenge in transforming their operations.

Unsurprisingly, consumer industry-related firms are more likely than average to enforce the mandatory wearing of COVID-19 protective clothing (57% compared to 51% average). They are also one of the least likely sectors to offer their employees advice or support on managing their mental health, at 11% less than the wider industry average (only 36% of firms are compared to 47%). When it comes to working with suppliers, over half (51%) of consumer and retail firms are advancing payment to their suppliers to ease pressure and facilitate upstream production, and a similar number (47%) are guaranteeing purchase of supply to mitigate the immediate impact down the supply chain.

Only one in five (20%) consumer industry firms believe that their demand planning is currently effective and dealing with the challenges of COVID-19, and over a third (38%) want to leverage new technologies such as the Internet of Things (IoT) and artificial intelligence (AI) differently to better prepare for future supply chain disruption. Despite this, one in eight (12.5%) firms is not planning on taking any additional actions in the event of a prolonged crisis.

Finally, health is one of the sectors that considers itself best adapted to COVID-19, with firms scoring themselves 6.1 out of 10 compared to the wider industry average of 5.4. When it comes to their workforce, almost half (45%) of health firms have offered their staff voluntary unpaid leave. Unsurprisingly, health firms are the least likely to close their premises in the event of a prolonged crisis, due to the critical nature of their work at this time (only 9% agreed). Survey results indicate that supply chain management has been a clear hurdle for healthcare firms. Half (50%) intend to change the suppliers they work with in the event of a prolonged crisis, and over a third (35%) agree that they would fundamentally change their supplier management to better prepare for future supply chain disruption. A quarter (26%) are struggling with the design of their supply chain processes/networks during the current crisis.

Ensuring Business Continuity and Protecting Employees – Immediate Actions to Take

In the immediate response to the crisis, leaders have been taking proactive and urgent actions to protect employees, ensure supply security, mitigate financial impact and navigate continued market uncertainty driving down demand. Leading companies have acted quickly to ensure business continuity and protect employees while at the same time trying to stay agile to daily changes. In addition, companies have moved to support suppliers (e.g. access to advanced network simulations), ensure cash liquidity and mitigate the impact on customers (e.g. extended payment terms, shifting freight modes) while contributing their part to society (e.g. repurposing manufacturing to produce essential goods).

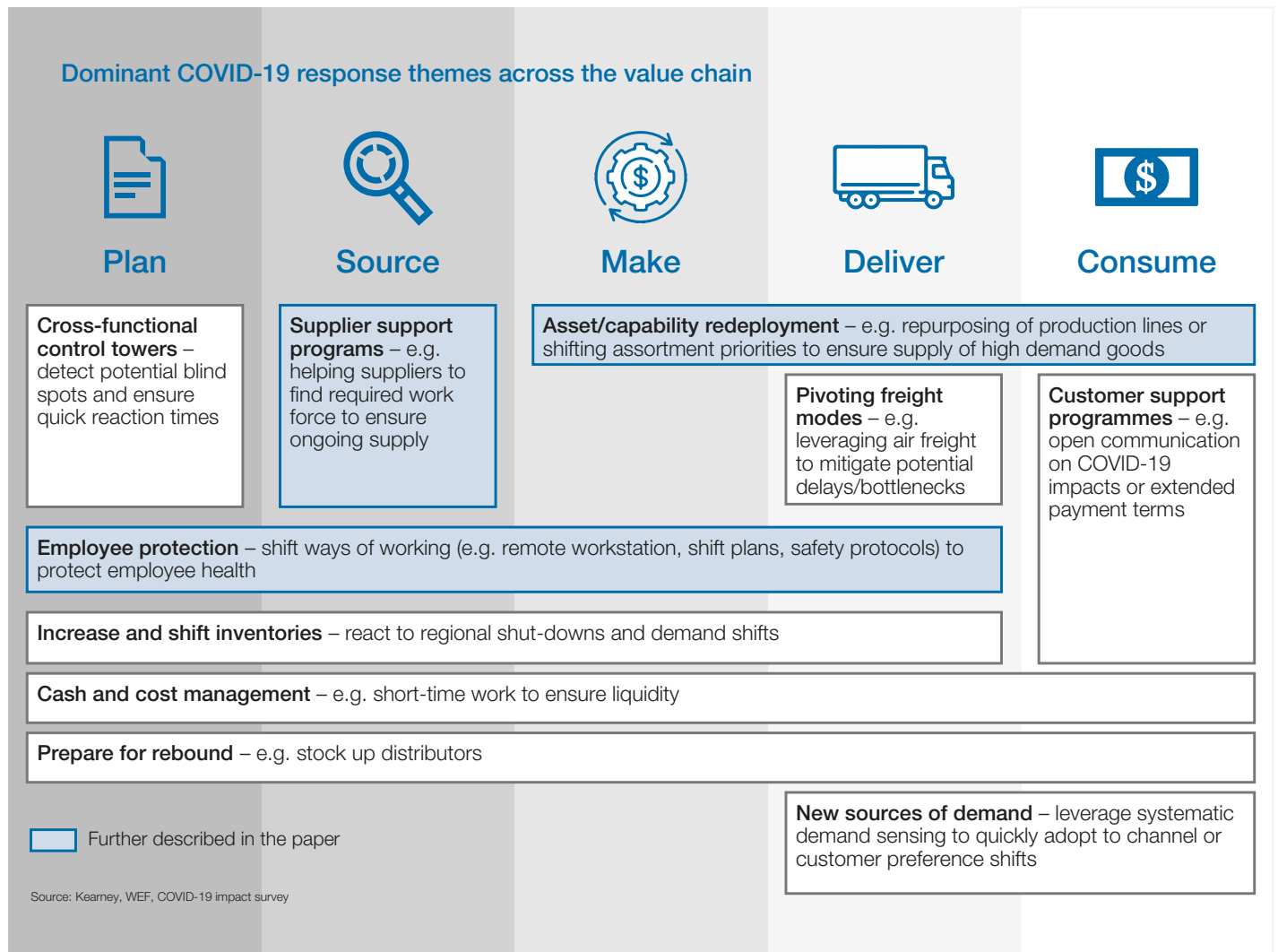
As outlined in the previous section, companies perceived the initial supply disruption triggered by COVID-19 as severe, but most of them were able to handle it. However, there are larger concerns around the demand shock; companies are still not certain about how severe the shock will be and how long it will prevail. Despite this uncertainty, senior operations leaders have clear priorities and action plans to respond to this global value chain disruption.

Our study revealed a set of responses to the COVID-19 outbreak, which mitigates risks and potential bottlenecks along the entire value chain, as displayed in (See Figure 4).

A company's number one priority is to protect its workforce, which is reflected by all surveyed companies indicating taking actions as displayed in Figure 5. To ensure this, they are taking various measures such as executing strict security protocols (e.g. health screening forms, temperature checks), implementing home-working policies, rigorously pushing travel restrictions and visitor bans, making wearing of protective gear mandatory, or providing shuttle services for employees. Key success factors for all these measures are clear communication, providing required infrastructure and related trainings, and consistent policies across the organization, which all still leave room for regional adjustments.

In the survey results, differences across how country organizations have responded are evident. For example, 60% of UK firms have mandated the use of COVID-19 protective workwear while only 25% in Germany and 44% in France have. With increased public discussion around well-being, firms seem to be also putting more emphasis on mental health. Again, country differences are stark with sizeable majority (73%) of Indian respondents said their companies had offered advice on mental health during the crisis, considerably more than the Australian respondents at just 20%.

Figure 4: Immediate actions to respond to COVID-19



A second stream of measures can be summarized under supplier support programmes (depicted in Figure 6). Especially large companies are proactively supporting their suppliers by providing required protective gears, extending payment terms, providing required workforce, or shifting materials between suppliers. Close collaboration with the suppliers is key to ensure the taken measures meet suppliers' actual needs.

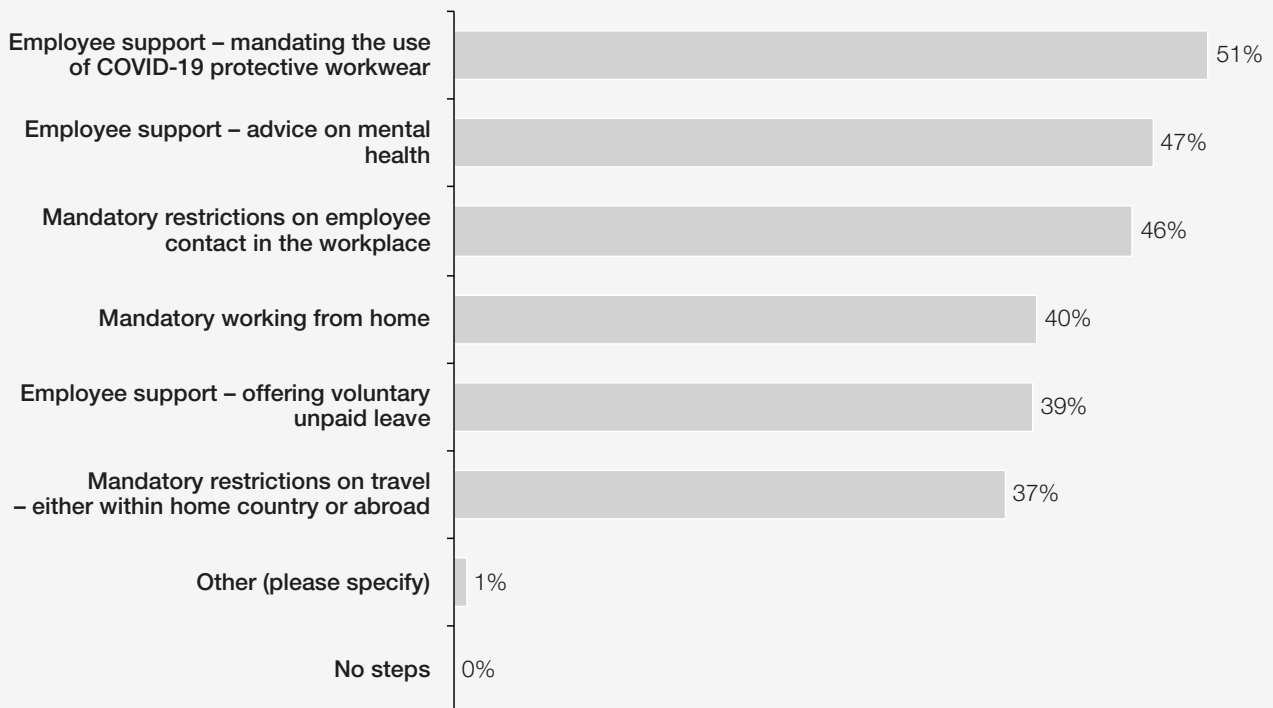
But companies do not limit their support to their own workforce and supplier – 99% of business leaders indicated that their companies had been making a contribution of some kind to help society deal with the impact of COVID-19. For 37%, this involved shutting down non-essential

facilities to free up national energy or infrastructure resources. Similarly, 38% have redeployed assets and capabilities to provide urgently needed goods, especially medical equipment. In this context, repurposing of manufacturing capacities is the most popular example; various manufacturers are using idle capacities to produce face masks, disinfectants and ventilators. Most popular, however, was donating funds, which 43% of those surveyed had done.

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Figure 5: Actions to protect employees

What steps, if any, have you taken to protect your employees from the impact of COVID-19?
(multiple answers possible, n=369)



37%, this involved shutting down non-essential facilities to free up national energy or infrastructure resources. Similarly, 38% have redeployed assets and capabilities to provide urgently needed goods, especially medical equipment. In this context, repurposing of manufacturing capacities is the most popular example; various manufacturers are using idle capacities to produce face masks, disinfectants and ventilators. Most popular, however, was donating funds, which 43% of those surveyed had done.

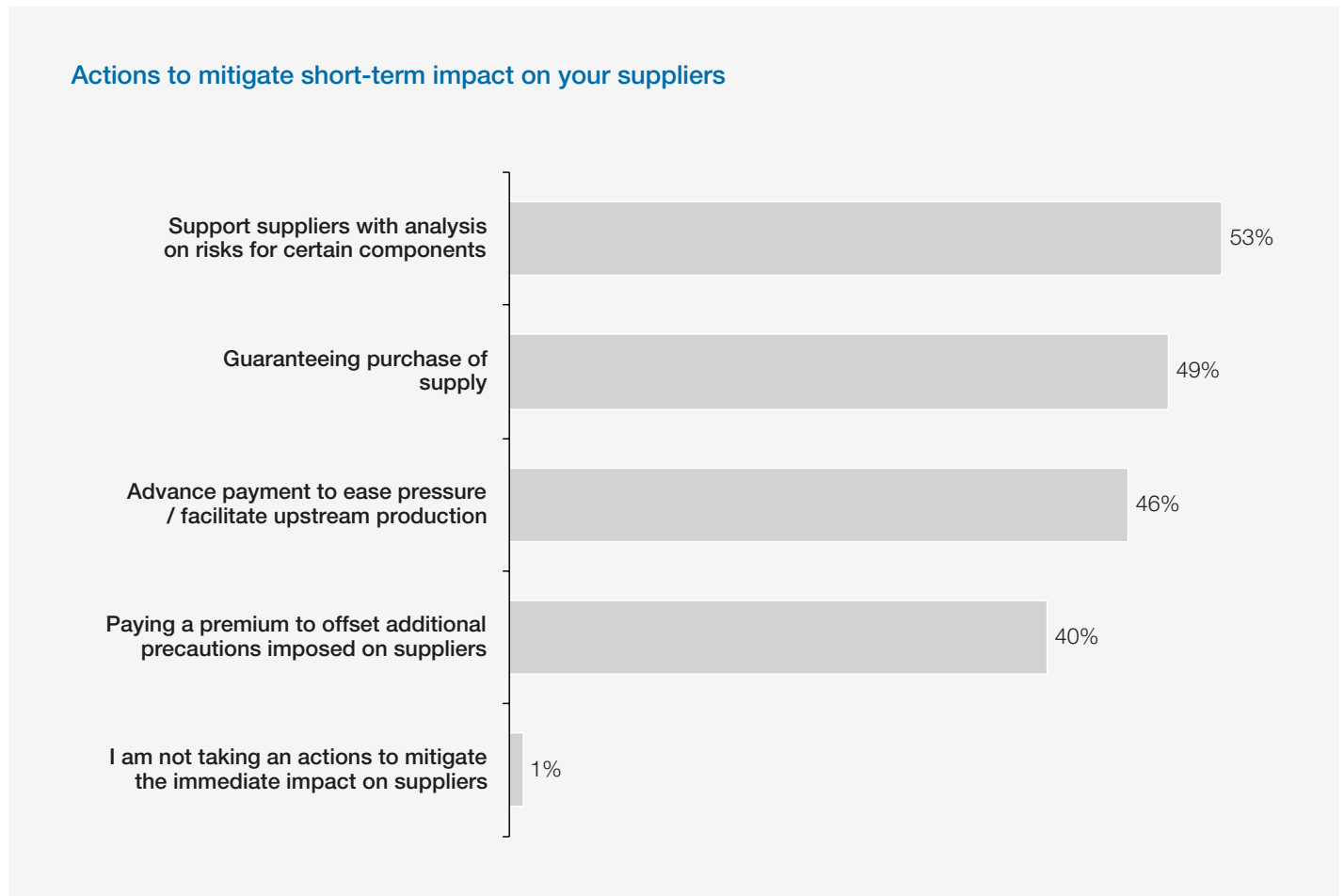
Apart from the already mentioned measure, companies are taking multiple other measures to ensure business continuity, working to:

- Establish **cross-functional control towers** to coordinate responses to COVID-19 on a global and regional level
- **Increase safety stocks** and **shift inventories** between sites when needed

- Proactively **manage costs and cash** to ensure liquidity
- **Pivot freight models** (e.g. from sea to air freight) to deal with potential bottlenecks
- Offer **customer support programmes** to keep customers up to date and provide remote customer support
- **Prepare for rebound** when demand returns, as markets will most likely be overwhelmed
- Quickly react and adopt to **new/changing sources of demand** to meet customer preferences and secure revenue streams

Finally, in terms of capabilities in the supply chain, a consistent topic is the role of advanced manufacturing and production technologies. Many interview and survey respondents attributed their ability to quickly react to the crisis to recent investments in digitization across their supply chains, especially investments which enable real-time availability of data/information.

Figure 6: Actions to mitigate short-term impact on suppliers



Repurposing of manufacturing

- Companies are repurposing their production lines to join the fight against COVID-19
- Examples include LVMH switching from producing perfume to making hand sanitizer, industrial companies Foxconn or ZF Friedrichshafen making face masks, and luxury hotels becoming quarantine centres
- Companies must overcome different levels of complexity involved as they make these shifts

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Preparing for Recovery and Increasing Resilience – Initiatives to Accelerate

Companies are already focused on preparing for a rapid recovery, drawing key learnings from the pandemic and its impact on the global business world. Leading institutions already had resilient supply chains and others are now catching up as the crisis forces them to improve and strengthen their operations.

Our survey shows that senior executives – across all industries – have witnessed first-hand what capabilities and requirements in the supply chain were crucial during the crisis. Increasing visibility, improving risk assessments and increasing flexibility to a changing demand were consistently ranked as top three priorities coming out of the crisis.

Traditional supply chains have been designed around optimizing for cost competitiveness and the COVID-19 pandemic underlines the need for companies to now shift their strategy to toward “risk competitiveness”. While the COVID-19 crisis is more dramatic in terms of length and geographical reach, global companies have faced other supply chain disruptions in recent times and are noticing a general uptick from a wide range of sources (e.g. natural disasters, geopolitical tensions). These companies are now focusing on accelerating their implementation as well as complementing initiatives with new elements that have emerged from the crisis. Among the companies interviewed, five distinct strategies towards more resilient supply systems emerged:

1. **Adopting the overall supply chain set-up** by carefully managing interdependent levers such as dual sourcing, complexity reduction and localizing
2. **Doubling down on investments in advanced manufacturing technologies** that were attributed an essential role in ensuring a quick reaction to the crisis
3. **Adjusting the operating model** to allow for a more flexible and decentralized manufacturing organization with a consistent risk management system in place
4. **Redefining external relationships** and capturing new opportunities from cross-industry collaboration models
5. **Reviewing and challenging the product portfolio** to reduce complexity and refocus on key strategic directions

Adopting the overall supply chain set-up

Supply chain set-ups have gone through a number of paradigm changes in the past and evolved as a consequence – COVID-19 accelerates a potentially ongoing new paradigm change. In the 1970s, supply chains were built to ensure supply continuity and security above else. In the 1980s and 1990s, companies started focusing on reducing costs to boost shareholder value – the supply chain set-up was no exception and shifting manufacturing to low-cost country became the norm.

During the past 10 to 20 years, the paradigm shifted again away from cost to value. While cost effectiveness was still important, companies started adding other dimensions to assess the overall value, such as levels of innovation and importance of strategic relationships. Against the background of the current crisis and the already mentioned set of global mega trends, shifting from cost to risk competitiveness is likely the next paradigm in supply chain set-ups and will transform the industry.



One of the lessons learned is the importance of developing stronger business continuity plans and operating shorter, regional supply chains oriented closer to the point of demand.



Mourad Tamoud, Executive Vice President, Global Supply Chain, Schneider Electric

A move towards risk competitiveness will require some immediate changes to supply chain set-ups, such as increased resources in supply chain management and overall increased safety stock levels. Looking more at the mid- to long-term, companies indicated that they will push for ruthless multi-sourcing across regions, reduced complexity across the supply chain and a more local supply chain set-up. While complexity reduction and localization can go hand-in-hand, multi-sourcing usually increases complexity and implies a regional diversification of the supply base. Hence, there is no “one-size-fits-all” solution, but companies have to carefully calibrate to find the right balance between these conflicting priorities.

Most interviewed companies already have existing initiatives in all areas and are carefully calibrating the trade-offs between maximizing risk resilience and managing complexity levels.

- With respect to **multi-sourcing**, companies target consistent multi-sourcing from different regions/continents to decrease risk exposure to single regions. They also try to have second source qualifications (e.g. included registration

dossiers wherever possible in the case of pharmaceutical companies) and keep hold of IP ownership for component designs and production processes to be able to switch suppliers when needed.

- With respect to **complexity reduction**, companies reduce the global span of their supply chains (e.g. by focusing supply chain on a select set of regions) to have a more condensed set-up and insource core business priorities (e.g. battery production in automotive) to increase the direct control span on their supply chains.
- With respect to **localizing**, companies increase the use of local suppliers and manufacturing capacities to decrease exposure to global trade flow disruptions, allow for lower safety stocks and decrease exposure to strongly increasing transportation costs in case of disruptions.

While these initiatives will increase risk resilience if executed correctly, the costs for this updated supply chain set-up will increase. Companies are more than willing to invest in a more resilient supply chain and consider it as a necessity in the aftermath of the crisis. However, customers will also be expected to pay for a proportion of the increased cost base.

Doubling down on investments in advanced manufacturing technologies

The amount of potential technological innovations in the manufacturing and supply ecosystem is daunting – from blockchain and the Internet of Things (IoT), to additive manufacturing or artificial intelligence (AI). Against this overflow of options and potential use cases, it is not surprising that especially in smaller companies (revenues below \$10 billion) about a half of the surveyed executives indicated that their organization is only low to moderate in leveraging advanced technologies effectively to quickly adapt to new challenges. However, during the COVID-19 crisis, senior executives have regularly stressed that their past investments in new technologies are paying off now. Two regularly mentioned benefits

involve increased supply chain visibility as well as the ability to quickly simulate alternatives for quicker and data-backed decisions. This is supported by results from the survey showcasing that companies which effectively leverage new technologies feel that their supply chains are well capable to deal with COVID-19, whereas companies which do not effectively leverage new technologies feel a lot less well-prepared.

Companies aiming to double down or start leveraging technologies better need to start evaluating what capabilities they would like to build and where technologies can help them to achieve it. In other words, companies need a vision. Hence, advanced manufacturing technologies are only the enablers and not a means in itself. Distilling the cross-industry themes around leveraging advanced manufacturing technologies resulted in four different visions, leading companies follow to make their supply chain systems more resilient.

1. Embracing full supply chain visibility
2. Making data backed decisions and predictions
3. Increasing agility in production processes
4. Leveraging automated processes

Full supply chain visibility is key in supply chain management, especially in times of crises. The following numbers underline why. Some companies have to manage up to 1 million raw materials, components and finished goods spread across up to 100,000 suppliers. These inputs are transformed into finished products in thousands of manufacturing steps across hundreds of manufacturing sites and eventually delivered to up to 10,000 different customers. The bottom line is this: supply chains are highly complex.



Technology and digitalization enable end-to-end visibility across the supply chain. Having this visibility – ideally in real-time – is key to proactively run risk analyses and react fast when a crisis hit.



Joachim Christ, Head of Procurement, Merck

In the early days of the COVID-19 outbreak, where the impact was mostly felt in China, companies were trying to predict how their supply chain will be affected by this outbreak and what they can do to mitigate its impact. Key to that assessment is an overview of which suppliers will be disrupted (not only tier 1 suppliers, but also tier 2 and 3 suppliers), how that will impact their production and what potential alternatives exist. Without having instant visibility across the entire supply chain, running this risk analysis and identifying mitigation options is hard at best, impossible at worst. To achieve this visibility, companies are leveraging technologies such as big data platforms and IoT as powerful tools to gather large quantities of data, or advanced analytics to generate required insights.

Once companies have access to a large pool of data on their supply chain (sometimes referred to as a digital twin of a supply chain), the next step is to use this data to **make data-backed decisions and predictions**. Multiple companies are already using scenario or complex risk analyses tools, which draw data from a single “data lake”, to quickly evaluate options enabling companies to take fact-based decisions. However, the application of AI/complex algorithms which identify patterns in large samples to make predictions is still at the very beginning. It exists to predict certain demand trends or changes in prices, but is not yet broadly leveraged to, for example, proactively identify and manage risk.

In contrast to AI, **increasing agility in production processes** is already used on a broader scale. The technology behind it (3D printing) is currently proving itself as a big problem solver to certain shortages resulting from COVID-19. Multiple companies and institutions are using 3D printers to quickly develop and ramp up the production of urgently needed medical supplies (e.g. PPE, parts for ventilators, or entire ventilators). As an example, a leading company in the space of 3D printing was able offer an essential part required for artificial ventilation. The part got FDA approval and production was ramped up to 100,000 pieces per day. All this took only 10 days. This example

underlines how 3D printing can make supply chains more resilient. Not only does 3D printing allow companies to insource the manufacturing of critical components, but it also provides them with an alternative in case a supplier is no longer able to supply a certain component.

“

This is a watershed moment for the industry. 3D printing and digital manufacturing help bridge supply chain gaps, accelerate design-to-production, and enable localized manufacturing of critical parts when and where they're needed. We're collectively doing all we can to activate our 3D printing technology, expertise, ecosystem, and production capacity to help front line medical personnel in the battle against COVID-19.

”

Christoph Schell, Chief Commercial Officer, HP

The fourth large area of technological innovation to make supply chains more resilient is around **leveraging automated processes**. This area encompasses technologies such as advanced robotics/ HMI, wearables/augmented reality and automation software. The general idea is to use technologies such as robots or software solutions to handle shipping transactions, manipulating data and triggering actions, or take over physical tasks which were previously done by humans. Apart from significantly lower error rates, the higher the level of automation within a supply chain, the higher the degree of agility and flexibility. This allows for quick responses in times of disruptions, which makes supply chains more robust.

“

The degree of automation and digitalization is a big advantage in such a crisis. In one of our factories that is around 80% automated we only faced minor capacity losses.

”

Gunter Beitinger, Vice President of Manufacturing, Siemens

Adjusting the operating model

Many of the already discussed changes to the overall supply chain set-up and the application of new technologies will impact and be reflected in the operating model. Apart from these, there will be additional changes specific to operating models, which some companies are already piloting as part of their response to the COVID-19 crisis. Such changes can be clustered into four categories: people, processes, organization and technology.

When it comes to **people**, one key capability in times of crisis is agility to proactively explore and adapt to new realities. Agility in this context requires two things: having the right skill set and having an agile mindset. One methodology that received a lot of attention in this context in recent years is Agile. Companies that have implemented Agile as a methodology for collaboration in the past found it highly useful in the current crisis.

“

We have introduced Agile as our new collaboration standard and invested in training our people accordingly, already before COVID-19. Having this agile mindset and the required skills to act upon it really payed off when the outbreak hit our supply chain and we needed to quickly react.

”

Steve Dichter, Chief Operations Officer, Agility Logistics

The importance of risk management has already increased over the past few years against the background of multiple disruptions (e.g. the 2011 Tsunami in Japan). Companies faced the reality of dramatic and rapid impacts with devastating potential. This awareness has further accelerated with the emergence of COVID-19. Risk management, therefore, will strongly shape process landscapes across the entire value chain and companies will develop dedicated playbooks which can be quickly kicked into action.

“

Based on various crises in recent years, we have developed playbooks defining actions and measures to take in times of disruption. When COVID-19 hit we kicked these playbooks into action allowing us to follow pre-defined processes to efficiently deal with the situation.

”

Tristian Kanwar, Vice-President, Manufacturing Operations, Rockwell Automation

Apart from risk management, there will be a push for processes to be even more tailored towards enabling remote working. This will enable companies to move towards more decentralized organizational set-ups, allowing for quick adaptations to regional disruptions and less exposure to regional lockdowns. A key enabler in this context will be technology. Digital collaboration (video conferencing) tools, mobile hardware (laptops) and related training are required for employees to embrace this trend. Moreover, new leadership skills and new governance models will emerge as part of this development.

Redefining external relationships

The impact of COVID-19 on global value chains demands global cooperation in a scale that is too big and too urgent for any single entity to address by themselves. Against this background, multiple companies are currently cooperating across industries to provide urgently needed medical supplies or support each other. However, these collaborations are not only a necessity in the short term, but also a great opportunity for the future. Leaders see three key opportunities emerging from the current crisis when it comes to building and intensifying relationships with external partners:

1. Intensify collaboration with suppliers
2. Foster strategic partnerships with peers and across industries
3. Explore M&A opportunities

In the late 1990s, supply chain management shifted towards extracting more value from supplier relationships instead of focusing heavily on price negotiations. Not all companies and industries followed this shift to the same extent, but those who did have not only benefitted in recent years, but also during the current crisis.

The key to ensuring steady prices and supply are good relationships, according to the chief executive of an Indian medtech company, accurately sums this up. COVID-19 is therefore seen as a great opportunity to **intensify collaboration with suppliers**. Suppliers will remember which companies supported them and customers will also remember which suppliers were transparent and maintained supply. This trend also includes certain industries (such as automotive) to rethink their supplier management. Our research shows that smaller suppliers have very small margins due to price pressure from large OEMs to build in any resilience in their supply systems and being able to deal with disruptions and ensuring supply.

Apart from supplier relationships, COVID-19 also **fosters strategic partnerships between peers** within and across industries. The already mentioned partnerships between companies in the automotive industry with medtech companies are only one example in this context. Such strategic alliances will allow for cross-industry learnings, sharing supply chain capacities (supplier, manufacturing and supplier capacities), and jointly pushing innovation, for example, in logistics. All of these will increase supply chain resilience, agility and efficiency at the same time.

Not all companies will survive the COVID-19 crisis. There are a number of tier 2 and 3 suppliers, which are already struggling. Companies recovering quickly from the crisis will scan the market for **M&A opportunities** and multiple leaders expect market consolidations in hard hit industries (e.g. travel and logistics, or automotive). Companies can and will use this opportunity to pursue vertical integrations of critically hit suppliers to increase control over their supply chain. Moreover, horizontal integration of competitors will be used to increase scale and gain a stronger position in the market.

Reviewing and challenging the portfolio

As portfolios evolve to fit the needs of rapidly changing markets, expanding geographic footprints, new regulatory requirements and the latest technology, production is becoming much more sophisticated. However, the resulting complexity can be a major obstacle to agility and superior service while also creating a heavy cost burden. In many cases, complexity does not refer to substantially different products, but rather to multiple variations of more or less the same product – having 15 different fragrances for the same conditioner or offering the same product in 10 different sizes. In pharma, typically as few as 10 products sold in fewer than 10 markets account for up to 90% of a company's growth potential. However, the average company sells more than 150 products in markets all over the world, despite the return on investment being low or even resulting in a loss, especially for products with low revenues. Independent of the question to what extent this reflects customer preferences, it certainly adds to complexity in supply chains.

At the beginning of this section, the topic around complexity reduction in supply chain was discussed as one key lever to have a more resilient supply chain set-up. The level of potential complexity reduction is strongly connected to the product portfolio. During the COVID-19 crisis, perceptive operations leaders can increasingly see where product priorities lie. These insights can be used to critically **challenge the portfolios** and remove complexity.

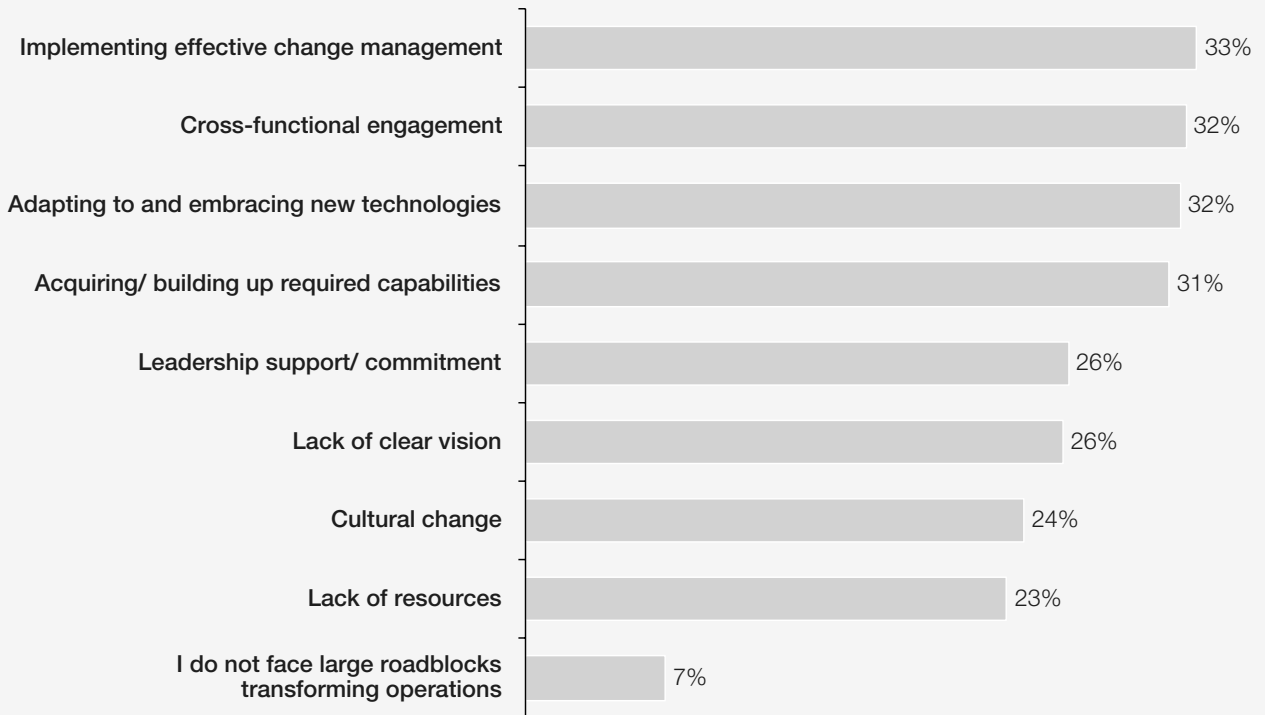
Roadblocks

When thinking about how to transform supply chain towards more resilience and to close the identified gaps, operations leaders need to consider potential roadblocks. Only 7% of surveyed operations executives are not anticipating roadblocks in transforming operations (as depicted in Figure 7). Of key concern is the difficulty in acquiring or building up the required capabilities to make the change. In addition, the cross-functional engagement often required in such strategic initiatives that span across departments is seen as a challenge.

Being aware of what roadblocks are to be expected within the organization is a key first step to prepare and tackle these challenges head on. Carefully managing the change process will be crucial.

Figure 7: Roadblocks to transforming operations

What, if anything, are the biggest challenges you face when it comes to transforming operations?
(multiple answers possible, n=369)



Perspectives from the International Finance Corporation (IFC), member of the World Bank Group

Liquidity challenges in the manufacturing ecosystem

A number of industry sectors have been severely impacted by the COVID-19 crisis. To gain further insight in the subsequent financing needs and liquidity challenges in the manufacturing ecosystem, the International Finance Corporation (IFC), member of the World Bank Group, contributed questions that were administered through structured interviews to 22 of the senior executives from different industries. Answers showed that the COVID-19 pandemic has led to broad-based liquidity constraints for manufacturing companies. Overall, half of the executives interviewed indicated their company is facing liquidity problems triggered by the COVID-19 crisis, and roughly two-thirds indicated that one or more companies within their supply chains are facing such liquidity issues triggered by the crisis. Manufacturing firms have been subject to both supply and demand shocks as a result of COVID-19, with substantial implications for their liquidity and potentially their solvency. These are reflected in reduced revenue as a result of subdued demand, as well as the lockdowns around the world, delayed settlements of receivables, disruptions in production related to labour force availability, delays in project implementation, and higher costs related to transportation. For companies in sectors that have been confronted with surging demand, increased working capital needs have also resulted in liquidity constraints.

How are institutions like the IFC responding to the liquidity crisis?

The IFC has an important role to play in support of the real sector, both by providing much needed liquidity and financing to sustain existing operations and employment, ensuring access to key goods and services, and scaling up operations to address shortages and meet demand in response to the pandemic. The IFC has created an envelope for the Real Sector Crisis Response Facility of up to \$2 billion for existing IFC infrastructure and manufacturing, agribusiness and services clients experiencing or vulnerable to the economic impacts of COVID-19.

A coordinated policy response

The survey responses indicate that executives are anticipating and planning, among others, for: increased transparency across value chains, improved trade logistics across supply chains, additional focus on sustainability, increased automation and digitization, investments in IoT and data analytics, bankruptcies and consolidation (M&A) and localizing some production (near or reshoring), to name a few. While the survey did not focus on policy, successful realization of and investments in these priorities will require policy response and coordination between industry and policy-makers in a post-COVID world. This will be even more important in supplier countries where policies may need significant revamp to adjust to the new realities in the global supply chains. The World Bank Group is working with national governments to provide financial assistance and develop appropriate policy responses to remain competitive in a post-COVID world. Further analysis is needed to understand the appropriate policy responses and coordination between industry, policy makers and development institutions will be critical and will be the focus of future work in the coming months.

Adapting to Potential “Forever” Changes – Key Imperatives for Global Value Chains

Without question, the long-ranging impact of the COVID-19 pandemic is yet to be understood and a number of sectors will be severely impacted through changes to daily life, accelerated by the pandemic and supported by technology and innovation, which companies will need to adapt to. Consumer demand and consumption are changing – new ways of working and governing are likely here to stay. Throughout the study, senior executives revealed that most uncertainty for them lies in this potential long-term change and its implication on global value chains.

As stated in our previous report [Reshaping Global Value](#), emerging technologies, climate change and geopolitical tensions have already disrupted how value is created and distributed along global value chains, affecting how businesses define their strategies and nations advance sustainable development. COVID-19 is proving to be an accelerator, combining key imperatives from the mega trend impact and updating it with new insights and approaches is crucial.

As a result, five consistent imperatives emerged which leaders need to consider in order to prepare for long-term business success:



Rapid tailoring of manufacturing and supply systems to changing consumer behaviour



Agile manufacturing and supply system set-ups enabled by advanced technology



Logistics coordination across and within global value chains



Adoption of new ways of working and governing to increase manufacturing resilience



Shared responsibility and collaboration among companies and authorities to address social and environmental challenges

Rapid tailoring of manufacturing and supply systems to changing consumer behaviour:

The crisis has forced consumers to change their preferences, whether by embracing digital channels, cash-free transactions or more. It is too early to say what customer behaviour changes will persist, but given that changing customer habits, such as customization and eco-friendly shopping was already influencing global value chains, it is likely that the manufacturing and supply system will need to increasingly be able to rapidly tailor to changing consumer behaviour. Increasing demand-sensing capabilities by deepening sources and utilization of demand data and leveraging digital technologies to more closely integrate customers into manufacturing process will be crucial.

Agile manufacturing and supply system set-ups enabled by advanced technology: During the crisis, companies that were able to respond quickly due to a flexible and agile set-up had a clear advantage. Advanced manufacturing technologies, such as additive manufacturing, can bring this to a new level; for example, by producing goods directly in a hospital setting and dramatically altering traditional value delivery models in the process. Other technologies associated with the Fourth Industrial Revolution, such as automation and advanced robotics, are increasing flexibility within production lines, but also simplifying the process of switching products across manufacturing locations. Overall, executives are envisioning a trend away from manufacturing and distribution towards distribution and manufacture.

Logistics coordination across and within global value chains: A key element in increasing the resilient of overall systems is the logistics that connect the different nodes. During the crisis, capacity limitations were sometimes the reason for supply shortages. Logistics coordination across and within global value chains will be driven by new technologies enabling unprecedented levels of visibility. In addition, blockchain enabled applications connected with IoT sensors can reduce further roadblocks (e.g. custom clearances) to accelerate connections.

Adoption of new ways of working and governing to increase manufacturing resilience:

The unprecedented level of home offices will change ways of working. Several executives indicated that they are closely following what happens to productivity levels. Several recently published surveys indicate that this trend could be here to stay, since employees seem to be embracing the change. However, within manufacturing, executives report a cultural resistance for remote work. While of course there are some aspects that will require a physical presence in the manufacturing setting for the foreseeable future, a resilient system also needs to enable key tasks for remote working. Companies are also looking into leveraging virtual and augmented reality for repair and maintenance, or enable remote trainings or remote operational excellence activities.

Shared responsibility and collaboration among companies and authorities to address social and environmental challenges:

Companies have worked together in new ways with government bodies and other companies in their wider manufacturing ecosystem. The collaboration has often proven fruitful and has accelerated progress in certain areas; more digital processes with regulatory agencies, for example. Experiences from the crisis on how efficiently the wider ecosystem can be leveraged for societal impact could be used and adapted to suit other societal challenges, such as climate change. In addition, technology is enabling new ways of collaboration that can start to get traction, such as through shared production facilities.

Call for Action

The impact of COVID-19 on global value chains requires strengthened global cooperation. The World Economic Forum's Platform for Shaping the Future of Advanced Manufacturing and Production, in collaboration with Kearney, will continue engaging leaders across different industry sectors – from healthcare and automotive, to consumer goods and transportation and logistics – as well as governments, academia and civil society to understand industry-specific needs and develop collective action plans aimed at strengthening manufacturing and supply chains resilience.

In particular, the Platform will continue its ongoing work:

- Collaborate with the Industry constituents base of the Forum (such as automotive, health, transport and logistics, consumer), and translate the five key imperatives presented above into specific actions tailored to the need of each industry sector
- Support businesses and governments to upgrade manufacturing and investment strategies, and update industrial policies
- Provide a platform for discussion and knowledge sharing among leaders in manufacturing and supply systems
- Integrate, aggregate and amplify existing collaborations and global initiatives that support the reconfiguration of global value chains while delivering value to businesses, society and the environment

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Study Methodology

The World Economic Forum, in collaboration with Kearney, has conducted virtual, structured 45-minute interviews with more than 30 senior executives across industries between 12 March and 22 April 2020.

In addition, we surveyed 400+ senior supply chain executives from Asia, Europe and the US, between 30 March and 17 April 2020, to understand the actions taken to mitigate the COVID-19 crisis, their level of preparedness for recovery and perspectives on how the crisis will permanently affect the industry.

Criteria for selection of the anonymous survey were director level or above working in operations, supply chain or procurement departments of companies based in the UK (9%), France (10%), Germany (9%), India (9%), China (9%), Australia (9%), the Netherlands (16%) and the US (27%).

Respondents are representing all relevant industries: aerospace and defence (2%), automobiles and parts (18%), chemicals and industrial (14%), communications, media, and technology (10%), consumer and retail, including food (20%), health (18%), professional and business support services (5%), transportation and travel (8%), utilities, oil and gas (5%) and others (1%).



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