



SUPPLY-CHAIN EVOLUTION A STRATEGIC PERSPECTIVE

ABOUT THIS REPORT

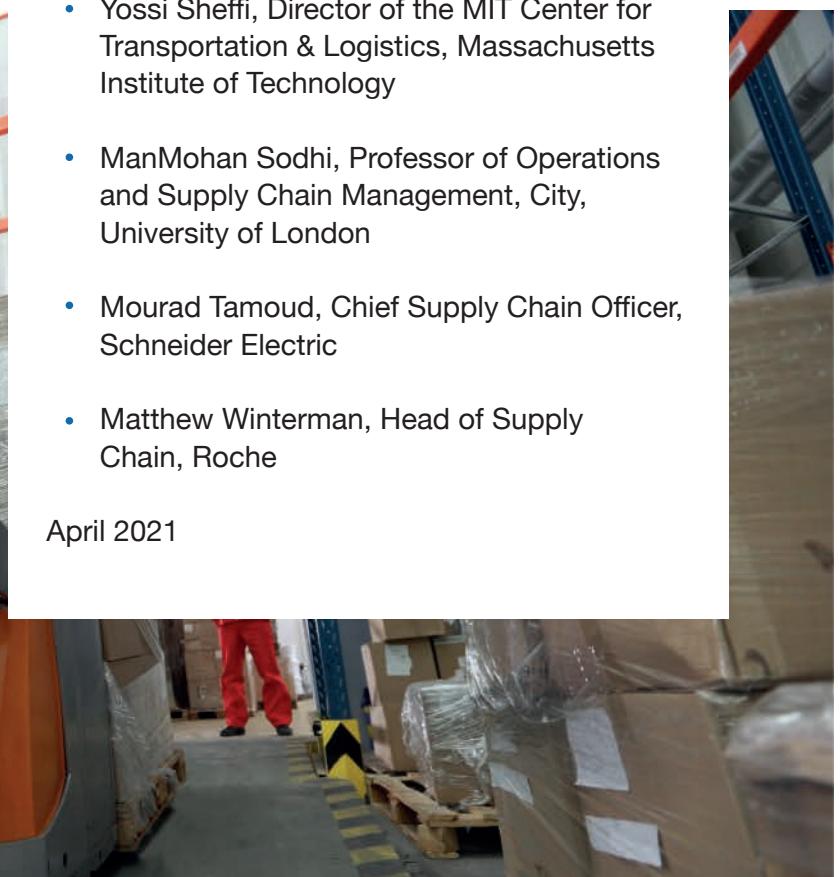
Supply-Chain Evolution: A Strategic Perspective is a report written by The Economist Intelligence Unit (The EIU) and commissioned by GEP. It explores how increased disruption, a push towards greater supply-chain sustainability and technological advances are changing the supply-chain function within organisations.

The report's findings are rooted in a survey of 400 senior supply-chain and procurement executives, conducted by The EIU in November and December 2020. The respondents represent five sectors (agriculture and food, industry,¹ consumer goods and retail, healthcare and pharmaceuticals, and energy and utilities) and eight countries across North America (the United States) and Europe (Belgium, France, Germany, Ireland, Luxembourg, Netherlands and the United Kingdom). Respondents work in senior roles in large organisations. Sixty percent are C-level executives, and the remainder work at the director level or above. Half of the respondents work in organisations with annual revenues of over US\$1bn.

The report supplements the survey findings with secondary research and in-depth interviews with experts. The EIU and GEP would like to thank participants for their time and insights, including the following interviewees:

- Terrance Brick, Vice President of Global Supply Chain, Boston Scientific
- Omera Khan, Professor of Supply Chain Management, Royal Holloway University
- Hau Lee, Thoma Professor of Operations, Information and Technology, Stanford Graduate School of Business
- David Paulson, Global Vice President, Avnet Inc
- Lutz Quietmeyer, Head of Transport and Logistics Operations, Airbus
- Leigh-Ann Russell, Senior Vice President of Procurement, BP
- Yossi Sheffi, Director of the MIT Center for Transportation & Logistics, Massachusetts Institute of Technology
- ManMohan Sodhi, Professor of Operations and Supply Chain Management, City, University of London
- Mourad Tamoud, Chief Supply Chain Officer, Schneider Electric
- Matthew Winterman, Head of Supply Chain, Roche

April 2021



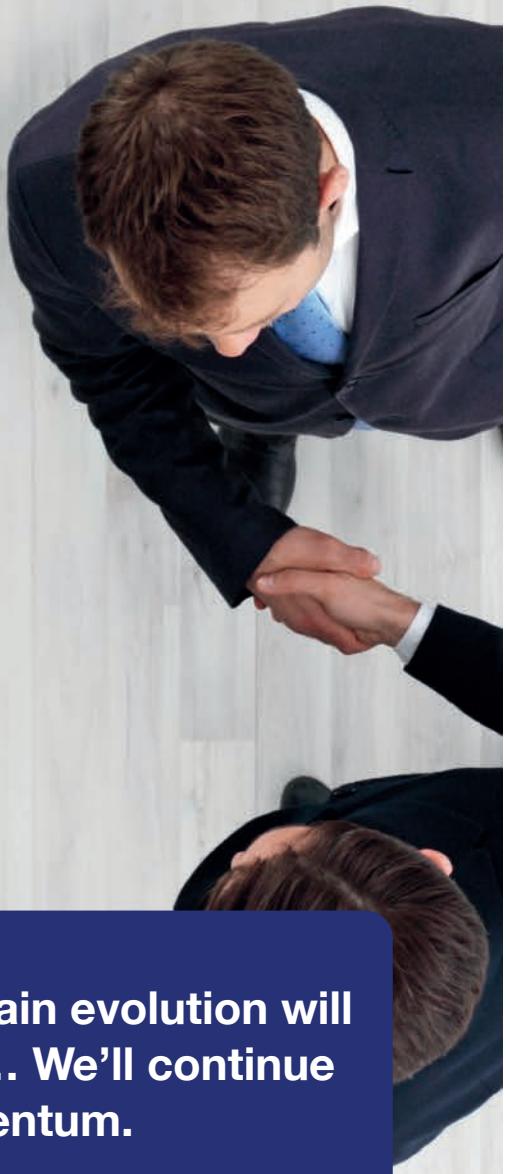
FOREWORD BY GEP

Supply chains have come a long way since the first industrial revolution. They've evolved through the decades, driven by globalisation, changing market dynamics and customer preferences. However, the evolution of supply-chain management has been slow and gradual, often limited by the technologies prevalent during that period.

But today, we're at a pivotal point in the history of supply chains. Recent global disruption, exacerbated by the covid-19 pandemic, has altered the supply-chain landscape, perhaps for the better.

There's increasing consensus that there is a pressing need for a step change in how supply chains should function. Indeed, as a recent study by The EIU shows, more than 50% of enterprises want to make significant changes to their supply chains in the next few years. This is telling, but not surprising as many enterprises had struggled to cope with the disruption.

This new and rapid wave of supply-chain evolution will be powered by digital transformation. Enterprises that had taken the lead in digital transformation, and the ones that hadn't, have experienced the impact it can have on their operations. The pandemic catalysed the digital transformation of supply chains. And we'll continue to see this digital evolution gain momentum in the foreseeable future.



“ This new and rapid wave of supply-chain evolution will be powered by digital transformation... We'll continue to see this digital evolution gain momentum.



Pramod Gupta
Vice President, Consulting
GEP

INTRODUCTION

This report is the second in a two-part series exploring the impacts of supply-chain disruption—a new normal for businesses. The first report, *The business costs of supply-chain disruption*,² explored how disruption has become more common and more costly than ever, in terms of both operational and reputational costs. Over half of the executives surveyed (54%) acknowledge that they must make significant changes in order to effectively manage supply-chain disruptions over the next five years. Fifty-one percent of executives also believe that they need greater visibility and control over their supply chains.

This report explores how these and accompanying trends—including a push towards greater supply-chain sustainability and transparency, and technological automation—are changing the supply-chain function within organisations. It unearths a strategic evolution that is underway in modern business, as supply-chain managers navigate evolving threats and opportunities.

The increased regularity and severity of disruptions have brought supply-chain operations to the top of the business agenda. With supply-chain management playing an expanded role in business, greater collaboration and strategic prioritisation are required.

KEY FINDINGS

- **Supply-chain leaders are seeking to become less siloed and more collaborative with other functions in the business, better integrating operations and decision-making.** More than 70% of supply-chain executives surveyed by The EIU have increased their level of collaboration with their organisations' strategy, operations, finance and information technology (IT) functions over the past three years, and expect this collaboration to continue increasing over the next three years.
- **Firms are working more closely with fewer suppliers, seeking high-quality and resilient relationships with key partners.** Just under a third of executives (31%) report that their companies are cutting back on the number of suppliers. This allows them to work more closely with the suppliers they retain, both to increase the security of supplies and to increase suppliers' involvement in meeting customer demands (for example, by involving them in product design).
- **Firms recognise the need for greater technical skills in their workforces in order to successfully digitise their supply chains.** A third of the surveyed executives report that an understanding of business strategy and operations, the ability to communicate effectively and digital savviness are the most important skills for a supply-chain executive of the future.

SUPPLY-CHAIN EVOLUTION

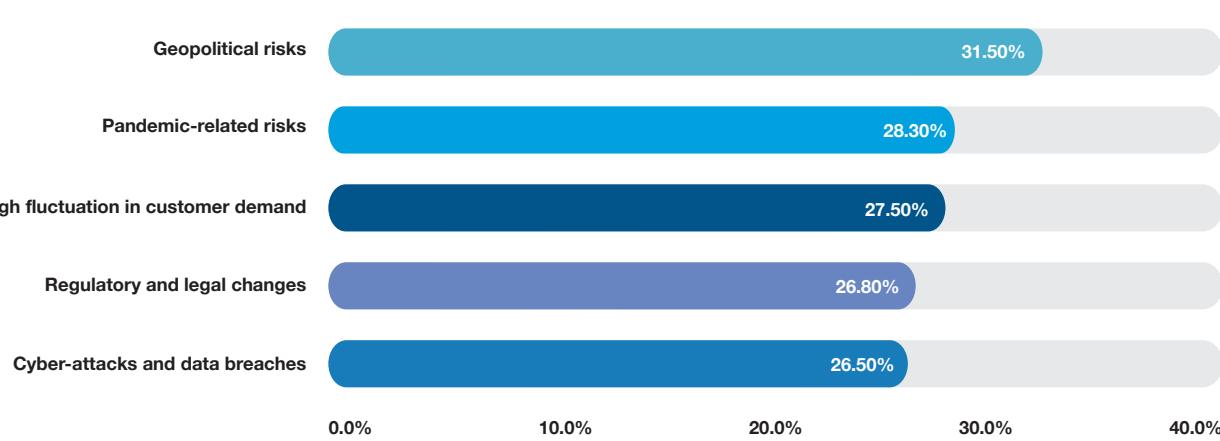
Increased disruption, a push towards greater supply-chain sustainability and technological advances are putting new demands on supply-chain and procurement executives.

The concurrence of a number of disruptive forces—including trade disputes and the increased frequency and severity of natural disasters—is testing the complexity and interdependence of the global supply chains that multinationals have built up over many years. Amid ongoing geopolitical tensions, businesses anticipate the possibility of a reversal of supply-chain globalisation (whether mild or severe) in favour of greater localism and regionalised supply chains. “Coming out of the pandemic there is a lot of talk about shifting from ‘just-in-time’ to ‘just-in-case’ inventory strategies,” explains David Paulson, global vice president at Avnet Inc. He notes that this reflects

The survey of senior executives conducted for this report confirms that companies expect supply-chain disruption to continue, and that they see uncertainty and threats extending well beyond the covid-19 pandemic. Executives’ greatest concerns are around geopolitical risk, including political instability, regional conflicts and changes in trade policies (see Figure 1).

Reflecting this uncertainty, The EIU downgraded the operational risk ratings of 41 countries in July 2020, and a further 55 countries between August and October 2020. These ratings—which encompass ten categories of risk, including political instability, macroeconomic risks and security risks—indicate that continued problems are highly likely. A technology cold war between the United States and China has reached new heights in recent years, with the Trump administration having blocked some large

Figure 1. The top five external risk factors most likely to impact supply chains up to 2025



Source: EIU survey

a shift in attention to safeguarding supplies, rather than maximising efficiency. Firms are also under greater pressure to account for the sustainability of their supply chains.

Chinese companies from the US market and restricted exports by US businesses to China. There are fears, too, that a dispute between Japan and China over maritime rights to the

Senkaku/Diaoyu Islands (1,600km off the Japanese coast) could escalate, with both countries claiming sovereignty. Tensions in the Middle East—including the Qatar embargo and the proxy war in Yemen between Saudi Arabia and Iran—have placed an essential supply route for oil and other cargo at high risk. The United States has also experienced social unrest, with racial tensions and a controversial election threatening instability.

Even in the absence of the pandemic, companies faced severe uncertainty stemming from these wider geopolitical problems. The US-China trade dispute, for example, led to tariffs that made it harder for US companies to source supplies from China, and nearly half of the surveyed US-based executives reported that the dispute had a significant to somewhat significant impact on their organisations' supply chains. The covid-19 pandemic has also led to severe problems, with intermittent national lockdowns shutting down factories and logistics operations, often unpredictably. Indeed, our survey found that executives identified the pandemic as the second biggest threat to their supply chains over the next five years. “The geopolitics of covid will not go away,” says Omara Khan, professor of supply chain management at Royal Holloway, University of London.

For the next year at least, many countries will continue to impose export restrictions on medicines that are in short supply. Some travel restrictions will also remain in place, and political and social instability will remain high as voters punish governments for their handling of the pandemic and for high unemployment rates associated with forced business closures. Tariffs could also increase as governments try to restore public finances that have funded support measures during the pandemic. “It’s not just the immediate impact of covid that hit supply chains,” says Hau Lee, professor of operations, information and technology at Stanford University. “It’s that it exacerbated existing trends towards neo-statism, leading to more trade barriers.”



REGULATORY SCHISMS ARE ENCOURAGING REGIONALISATION

Our survey found that ensuring suppliers comply with changing and diverging regulations had been one of supply-chain managers' greatest challenges over the past three years, particularly in European companies. However, regulatory changes seem to be less of a concern going forward. Little more than a quarter of respondents cited regulatory changes as a top concern in the next five years, well behind other worries such as geopolitics and the pandemic.

In reality, however, geopolitics is likely to lead to further regulatory changes, according to Mr Lee, with knock-on effects for supply managers who need to juggle suppliers to avoid problems associated with red tape and tariffs. Countries from India to Japan are trying to protect local industry during the pandemic and encourage companies to source supplies locally. The same is true of the United States and the European Union, both of which sound increasingly protectionist with regard to industry and the development of new technology such as semi-conductors, 5G and artificial intelligence (AI). At least 110 countries have announced industrial development strategies over the past decade, according to the United Nations Conference on Trade and Development (UNCTAD), with increased protectionism over home markets erecting new barriers to global trade.

Climate change policies will also increase supply-chain risks over the next few years. The European Union is pushing aggressively for emission-reduction measures, pledging to be carbon neutral by 2050. As part of this effort, it is pushing companies to reduce their pollution, and to report more fully on it. Other countries are also prioritising pollution reduction, from the United States to China.

The push towards greater sustainability is transforming supply-chain management as companies work to ensure that their suppliers—and their suppliers' suppliers—are minimising their environmental impact and acting

with greater social responsibility. This presents firms with sometimes dizzying challenges as they work to shed more light on and account for actions deep within complex supply chains. Some manufacturers are developing circular value chains. Overall, more than 60% of survey respondents said that tougher environmental regulation had upset supply-chain operations over the past three years, although this was slightly more marked in Europe than in the United States. Ensuring that suppliers meet fast-changing environmental and labour standards requires very close scrutiny of the entire supply chain, including second-tier suppliers.

Technological trends are also shifting supply chains. Ever more advanced robotics and manufacturing capabilities are enabling firms to rely less on low-skilled labour, and to return previously off-shored manufacturing to home markets or spread and localise operations around the globe. Firms are also increasingly using novel manufacturing techniques, such as 3D printing, to make new components on site and on demand, rather than stockpiling or shipping those components. In industries such as automotive and aerospace, these technologies are radically simplifying supply chains.³



³ https://eiuperspectives.economist.com/sites/default/files/Addingitup_WebVersion.pdf

FORGING NEW RELATIONSHIPS

Global shifts are changing the supply-chain function within organisations, calling for leaders to adopt a more strategic outlook, increase collaboration and build their technical capabilities.

Despite the outward-looking nature of supply-chain management, perhaps the biggest shift for companies in recent years has been internal. Supply-chain and procurement departments have found that they have to co-operate more closely with other parts of the business in order to keep sales and production rolling amid global disruption. “The pandemic has brought us together as a company,” says Lutz Quietmeyer, head of logistics at Airbus.

Our survey confirmed that there has been extensive cross-functional collaboration in recent years. Eighty percent of respondents reported that they had increased co-operation with their company’s finance and strategy departments over the past three years, and three-quarters of respondents reported that they had increased co-operation with operations departments (particularly in the food and agriculture sector). Similarly, most finance and technology executives reported that they have started to work more closely with the supply-chain function. Six in ten supply-chain executives also

report increased collaboration with their organisations’ marketing and sales functions, reflecting the fact that some of the most serious problems arising from recent supply-chain disruption have affected firms’ brands and reputations with customers. (For more details, see the first report in this series.)⁴

Interviewees echoed these survey findings. BP, the British energy giant, has restructured its teams in recent years, grouping supply-chain managers around particular customer segments and positioning them to work alongside finance and other parts of the business from which they were previously siloed. “The whole approach has become more customer-centric,” notes Leigh-Ann Russell, BP’s senior vice president in charge of procurement. Ms Russell explains that the supply-chain function needs to be integrated with other departments in order for the company to give customers what they want, when they want it (see the box titled “The BP Experience”). Matthew Winterman, head of supply at Roche, the Swiss healthcare giant, explains that “overall, global supply chains have proven resilient in our sector” but adds that this has required changes in how the company does business and closer collaboration between departments.

Strengthening internal ties may beget stronger supply chains. Certainly, the survey findings suggest that the covid-19 pandemic has had a less disruptive impact on firms that have higher levels of cross-functional collaboration.



⁴ <https://eiuperspectives.economist.com/sustainability/business-costs-supply-chain-disruption-1>

THE BP EXPERIENCE

In February last year BP announced that it was reinventing itself. This involved a shift away from its traditional business in oil and gas to become a company more focused on delivering energy solutions to customers (including renewables), with a pledge to become a net zero producer by 2050. BP has also rejigged its supply-chain management, centralising operations at the start of 2021 and working increasingly closely with core suppliers as the company enters new markets. “It’s a fundamental change,” says Leigh-Ann Russell, BP’s senior vice president in charge of procurement.

Previously BP had run four separate supply chains revolving around the very different parts of its business, which span everything from retail stores attached to its petrol stations to vast drilling and exploration activities. “That means we source a very wide range of goods, from coffee cups to oil rigs,” says Ms Russell. Around 80% of its transactions are for goods accounting for just 20% of its spend. Conversely, 80% of its spend comes from just 20% of transactions, revolving around expensive items such as oil rigs.

While there may appear to be limited overlap between the various parts of the BP business, Ms Russell explains that centralising supply-chain management can save money nonetheless. “It gives us scale on the market and in fact there is often overlap between the different businesses,” she says. She points to valves as an example. Previously these would have been sourced separately by different parts of the business (because different types of installation use different types of valve), “but from a procurement point of view they often come from the same suppliers, so we can work more closely with them by centralising things,” she explains.

BP is effectively splitting its 5,000 suppliers into two groups so that it can work more closely with its key suppliers. There are many different suppliers of small items, and Ms Russell notes that this is where technology becomes useful. BP has introduced a new digital platform for all of its

suppliers, at a cost of “millions”, according to Ms Russell (not a huge amount when it handles supplies worth billions of pounds each year). It has also formed strategic partnerships with Amazon and Microsoft, exchanging their technology for renewable energy supplies. Amazon has provided a good avenue for sourcing small supplies cheaply, and it has provided BP with data centre and cloud services since 2019. Microsoft has provided BP with cloud services since September 2020.

“We’re looking to work in partnership with our core suppliers,” says Ms Russell. This includes the likes of Amazon, which can help keep the small items flowing. In particular, however, this involves working with a small group of companies supplying really critical items and services, described by Ms Russell as “a few hundred suppliers out of tens of thousands”. Close co-operation with these companies is not new, as many critical items and services are developed by suppliers, who continue to own the asset while in use. The big shift in approach is that BP now works in partnership with these suppliers to meet customer demands, rather than simply ordering things from them.

“That’s one of the big changes from BP’s transformation,” says Ms Russell. “Everything now starts with the customer.” That goes for supply-chain managers, too, who are now integrated within the wider company rather than operating in a separate silo. “They’ll be grouped around a customer segment and work in a team together with people from finance and other areas,” she says.

“The way we managed to survive the pandemic with little supply-chain disruption was through our partnership approach,” says Ms Russell. “We know our suppliers, so we could spot any gaps and fill them. And in particular we stood by them, and didn’t demand discounts during the crisis. That made our suppliers loyal, and meant they prioritised our orders.”

KEEPING SUPPLIERS CLOSE

As the BP case study suggests, another clear trend is for firms to work more closely with suppliers, and often with fewer of them. Similar to the push for technological solutions to monitor supply-chain activity, this trend has been motivated not just by a need to manage disruption, but also by firms' need to be more on top of the environmental impact of their supply-chain and labour practices. Often this can only be achieved by really getting to know each other. Firms that work more closely and collaboratively with their suppliers also exact efficiency gains.⁵

Schneider Electric has embraced this trend, launching a programme to cut its number of suppliers from 12,000 to 5,000 by 2022-23, and investing heavily in technology to increase supplier and subcontractor visibility. "We've expanded through acquisition and now want to halve our number of suppliers to make them easier to manage and allow us to work in close partnership with key suppliers over areas such as product development," explains Mourad Tamoud, chief supply-chain officer at Schneider Electric. "We're cutting back on our number of suppliers to avoid too much duplication, but also so that we can get closer to our strategic partners, and work more closely with our suppliers in general."

Working closely with suppliers also enables firms to identify possible gaps in the supply chain and find alternative suppliers if necessary, notes Mr Tamoud. Indeed, Airbus, which relies heavily upon a network of suppliers close to its four European plants, found that close supplier relationships were critical to maintaining production during the pandemic (see the box titled "A Specialist Problem" for more details).

Thirty percent of our survey respondents reported that they would work more closely with their suppliers, perhaps even cutting the number of suppliers now that alternative suppliers are in place following previous crises. Strengthening relationships with existing suppliers was identified as the top priority in our survey, with close to a third of companies reporting that they

have started to source supplies more locally and have simplified their supply chains by working with fewer suppliers. This is especially true for food and agriculture companies that need to ensure a supply of fresh goods.

This reflects a basic change in approach towards suppliers, explains Ms Russell at BP. Previously, the company would simply tell many of its suppliers what it wanted. Now, the emphasis is on forming strategic partnerships with outside companies to give BP's own customers what they want. "I almost hesitate to say it but we were able to weather the covid crisis with few supply problems," she says. "We worked with our suppliers and supported them, and they repaid us by prioritising our orders when some things were in huge demand."

"Integration is key" to these efforts, says Ms Russell. BP is working increasingly closely with suppliers as it enters new markets such as renewable energy and electric vehicles, drawing on their expertise to help develop new products. It has also centralised procurement and set up teams around its various target customers, with supply-chain managers working hand in hand with people from other departments such as finance and operations, rather than being separated into their own silo (see the box titled "The BP Experience").

Terrance Brick, vice president of global supply chain at Boston Scientific, echoes this sentiment. Boston Scientific makes specialist medical equipment for endoscopy and interventional cardiology, using around 13,000 suppliers to maintain its position among the top two suppliers for this equipment. "It can take months to get regulatory approval for a product [which typically includes a review of the specific materials and suppliers involved]," says Mr Brick, "so just having multiple suppliers for some products isn't an option—each alternative supplier would need approval so it's hard to switch. That means we're in it for the long term with our suppliers, and we very much see them as partners."

⁵ <https://www.bethebusiness.com/wp-content/uploads/2018/04/how-good-is-your-business-really.pdf>

Closer supplier relationships can also involve closer physical proximity. Localisation and regionalisation are well-established, long-term supply-chain trends, but pursuit of this approach is not universal. A third of our survey respondents report that they are sourcing suppliers more locally or on a regionalised basis,

although adoption is lower in certain sectors. Consumer goods and retail companies (21%), for instance, continue to follow markets of cheaper labour in Asia. However, the need to be more responsive has seen some firms in this sector source locally, such as Zara and Boohoo.

A SPECIALIST PROBLEM

Airbus had to step in and rescue some suppliers that had been badly affected by the pandemic.

In many ways, ensuring supply-chain resilience is a simple matter: rather than relying on a single company for supplies of a particular component, a firm can use several different suppliers so that if one stops production, it can simply switch to another. This does not hold true for Airbus, however; the aircraft maker relies on a global network of 8,000 direct and 18,000 indirect suppliers for the 4m components that go into something like the A380, the world's largest airliner.

To ensure continued supplies, Airbus has pooled suppliers between its various production sites, and even with rival manufacturers, so that scarce components can be allocated to areas of strategic importance to the company. "Many of our suppliers are very small companies employing less than 100 people," says Lutz Quietmeyer, Airbus's head of logistics and transport operations. "They're often the only company that can make our very specialised components, and so during the pandemic we've often had to step in and give suppliers financial support. There's no alternative."

To complicate matters further, Airbus found itself locked into deals set with suppliers at the start of 2020, before the pandemic affected demand. "Orders are often set eight years in advance, making demand very predictable," says Mr Quietmeyer. "But then the pandemic hit, and airlines started to renegotiate orders. We ended up with supplies for aircraft we were no longer making, and had to find extra warehousing to store them because we were bound by the contracts." Airbus was forced to cut production by a third in April 2020.

A revival in demand later in the year meant that Airbus was able to use up its stock, Mr Quietmeyer says, although, like some automakers, it found it hard to source some electronics components. "We're not a large-scale customer, and so we weren't a priority for some large supply companies, in contrast to the small specialists."

With many small suppliers struggling to survive, and with larger suppliers concentrating on other sectors, Airbus had to scramble to ensure that its supply of vital components did not dry up. It co-operated with US rival Boeing to maintain a European supply base, pooling information on relevant suppliers so that both companies could use them. Crucially, the firm also increased co-operation between its four big European factories in France, Germany, the United Kingdom and Spain. These had acted relatively independently of one another previously as they concentrated on making different parts of the aircraft, with the UK factory focused on wings, for example, while the German factory focused on fuselages.

Now Mr Quietmeyer says he is in constant contact with the various different factories as they pool suppliers to ensure continued deliveries. He also speaks much more frequently to other parts of Airbus, such as operations and finance. To streamline things, some parts of transportation have been brought in house, such as the trucks used to transport component supplies (all of which were previously outsourced). "Sometimes drivers were stranded during the pandemic and had to sleep in their cabs," Mr Quietmeyer says, "but we never failed to get things delivered."

A TECHNOLOGY GAP

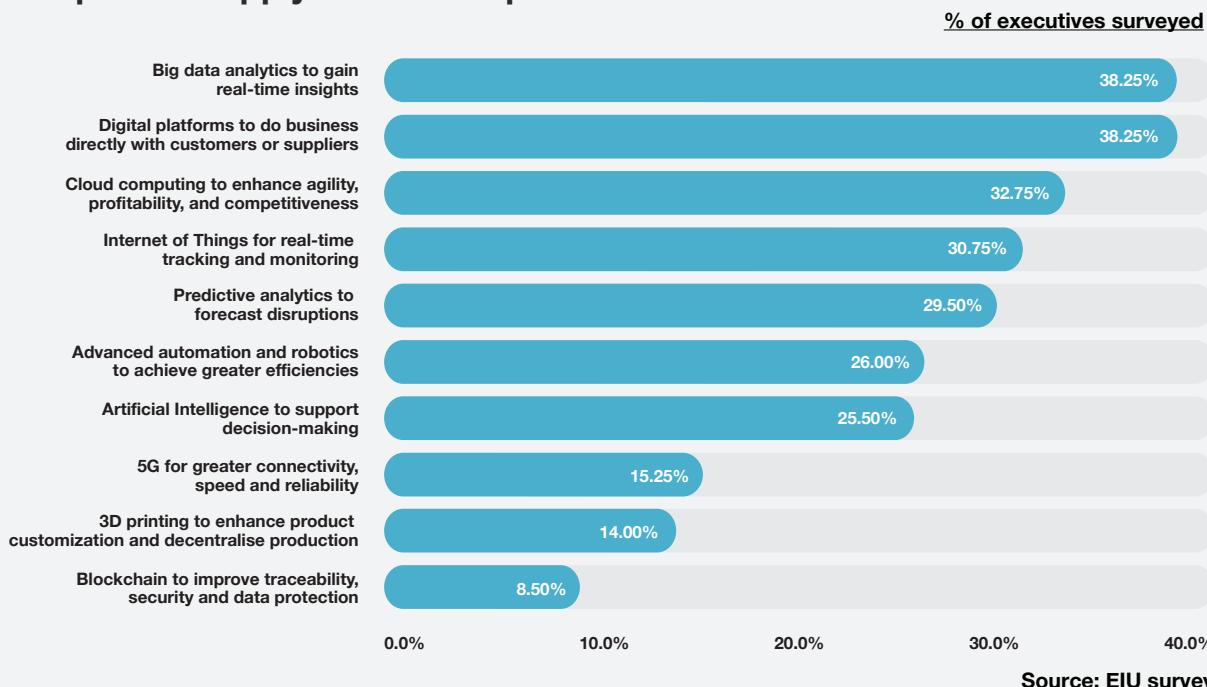
Some of the supply-chain evolution we are witnessing today is a direct result of the pandemic. National lockdowns—put in place to curb the spread of covid-19—disrupted supply-chain networks and shuttered retail stores. In response, companies accelerated their use of technology, not just to facilitate remote working but also to sell their products online, direct to the consumer. For example, fast-fashion chain Zara spent heavily on technology to double its online sales while its stores were forced to shut.

Importantly, supply disruptions also meant that companies had to rapidly reconfigure networks in response. “The pandemic disrupted existing supply chains and forced companies to find replacement sources as plants were forced to shut or transport was interrupted,” says Stanford’s Mr Lee. “They needed to do that quickly and that highlighted the usefulness of technology. [Technologies such as] blockchain and AI increase supply-chain visibility and allow companies to spot possible gaps, among second-tier suppliers as well as major ones. Technology’s usefulness has become more obvious, and it allows companies to fix things much more quickly as well as spotting problems in advance.”

Despite this, our research reveals that supply-chain executives are yet to fully make use of advanced technologies when responding to supply-chain disruptions. “Companies are not up to speed on spotting possible disruptions to their supply chains, even though it’s feasible technologically,” says Yossi Sheffi, professor of engineering systems at the Massachusetts Institute of Technology. Less than 40% of supply managers said that they had worked with the IT function to address supply-chain disruptions, whereas almost all (98%) of the surveyed IT executives said that they had worked with supply-chain managers. This is surprising given the substantial digitisation of global supply chains and the skills gaps recognised by supply-chain executives (discussed in more detail later in this section).

As a result, take-up of advanced technologies remains limited. For example, very few survey respondents are looking at emerging technologies such as 5G and blockchain (just 15% and 9% of respondents, respectively; see Figure 2). However, a significantly higher proportion of respondents—close to 40%—have introduced digital platforms, allowing them to do business directly with customers or suppliers; and are using big data analytics, allowing them to gain real-time insights into their suppliers.

Figure 2. Technologies implemented over the past three years to minimise the impact of supply-chain disruptions



Digital platforms allow firms to spot possible disruptions much more quickly. "We have to be very careful [that] our suppliers meet environmental standards," says Mr Brick of Boston Scientific. A digital control tower allows him to monitor not just direct suppliers but also the tier 2 suppliers who provide goods to Boston Scientific's own suppliers.

Mr Brick notes that digital platforms have also played a crucial role in building closer relationships with suppliers and customers. He was able to use cloud-based technology to access the supply records of some of the hospitals he works with, for example, without having to access sensitive medical information. This allowed him to predict, with greater accuracy, hospital demand for specialist medical products that need to be kept in stock. He foresees the system being rolled out to include Boston Scientific's own suppliers: "We can integrate our suppliers into a system based on our own customers' demands."

Mr Sheffi says that more widespread adoption of digital platforms could also feed the adoption of newer technologies. Internet of Things technology could be used to monitor suppliers' machinery, for instance, spotting a breakdown in real time and giving companies an opportunity to find alternative suppliers. Artificial intelligence and machine learning will allow better data collection and analytics, while blockchain will allow more transparent and accurate end-to-end tracking in the supply chain. "As these technologies become more widely used on digital platforms, so more companies will find themselves using them," Mr Sheffi explains.

Consumer-goods manufacturer Unilever is already using digital modelling, having set up digital twins of its various factories around the world, enabling it to monitor everything from temperature to production times. It also uses analytics and machine-learning algorithms to track logistics conditions, test changes to operations and predict outcomes, thus improving overall efficiency.⁶

The semi-conductor maker Infineon has made use of digital modelling to assess the cost-effectiveness of shifting production to alternative sites in the case of short-term supply disruption (for example, following a cyber-attack). Based on this modelling, Infineon ultimately decided that the cost of shifting equipment and technology to a new site was too high to be worthwhile, saving the company a great deal of time, effort and investment.⁷ Other companies are also testing these technologies, although not within the supply-chain function. Ms Russell notes that BP has used digital modelling in other parts of the business: "We are trialling all of the new technology, from blockchain to artificial intelligence."



⁶ <https://searcherp.techtarget.com/feature/Early-days-for-digital-twins-in-the-supply-chain>

⁷ <https://scms-summit.com/media/9417/managing-risks-in-supply-chains-with-digital-twins-and-simulation.pdf>

The success of these advanced technologies relies not only on their technical sophistication but also on employees' ability to use them effectively. According to the surveyed executives, the top challenge associated with new technology adoption is a lack of employees with advanced digital and analytical skills (cited by 53% of respondents; see Figure 3). Executives also highlighted other challenges, including efficiently analysing the mass of data collected (52%), and a lack of uptake among staff and suppliers (51%). These findings suggest that ensuring the usability of these sophisticated systems may be critical to the next phase of growth for advanced technology adoption.

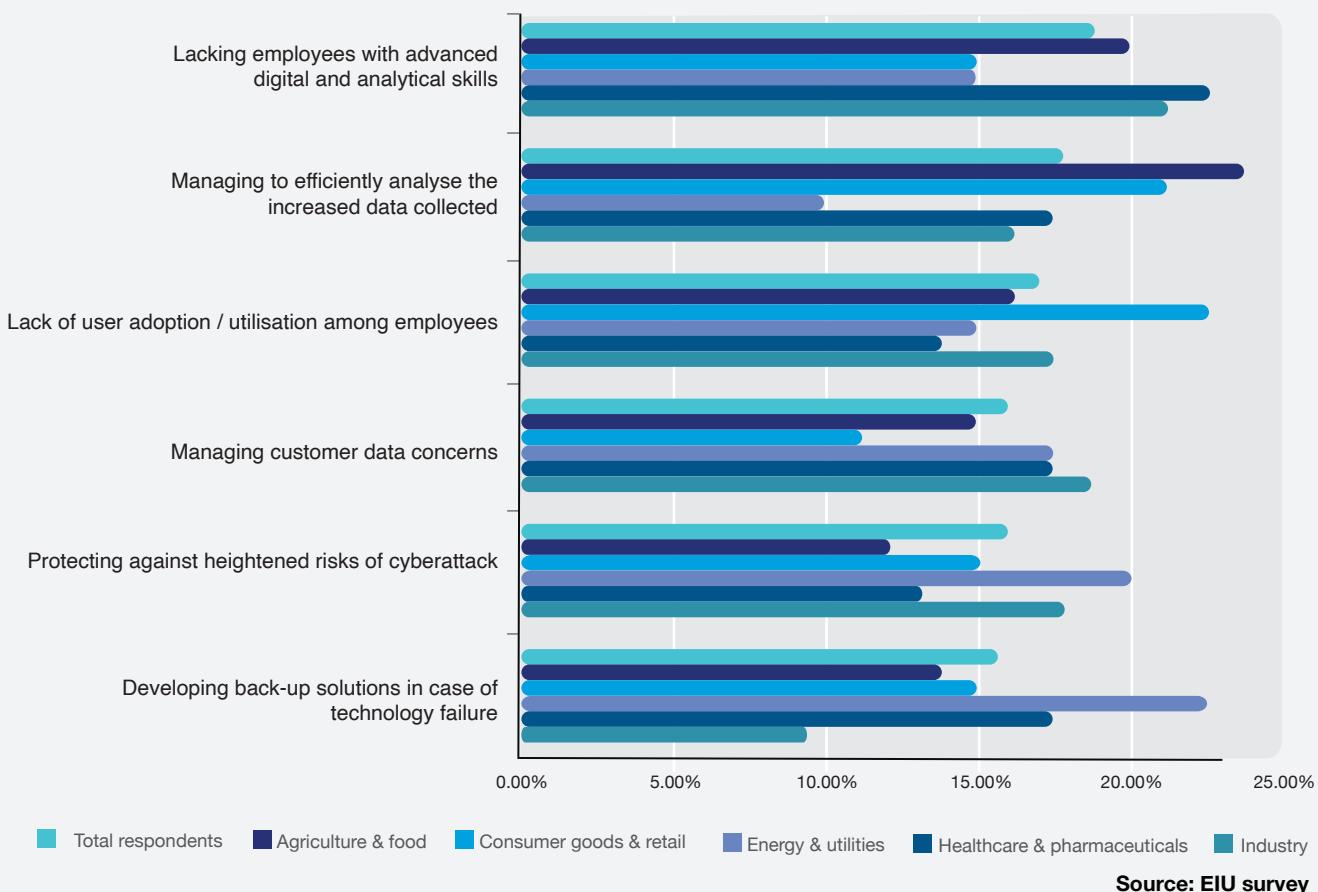
"We need people with digital skills," says Schneider Electric's Mr Tamoud, adding that "data is king" for companies that have digitised their supply chains. When asked to identify the most important skills for supply-chain executives of the future, demand for digital skills varies widely by sector. Digital savviness and technological

proficiency are certainly regarded as the top requirements for executives in industrial sectors such as automotive, machinery, chemicals, aerospace and telecommunications (identified as priority skills by just under four in ten survey respondents), where more connected supply chains are under development.

Demand for digital savviness and tech proficiency



Figure 3. Most significant challenges faced by organisations over the past three years as a result of the adoption of technologies to minimise supply-chain disruptions

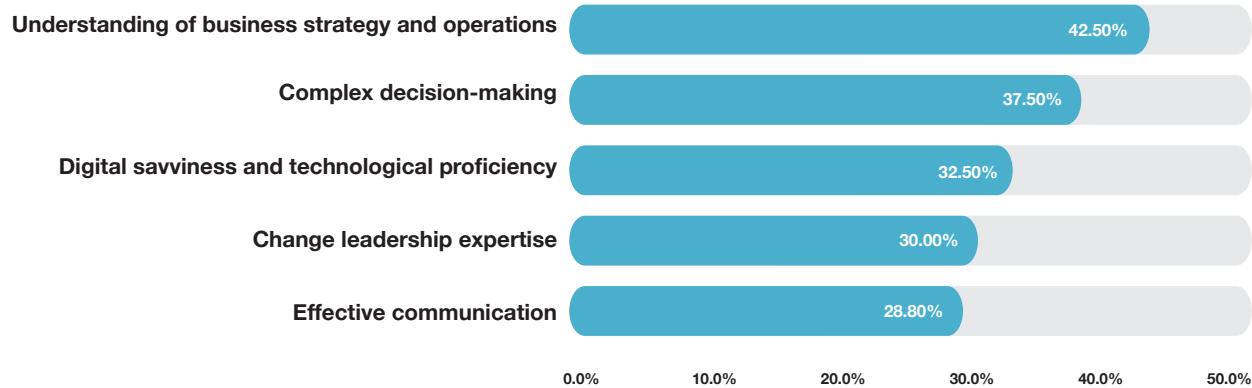


The same skills rank relatively low for consumer goods and retail firms, however (see Figure 4). In addition to training existing supply-chain staff in data and technology skills, Mr Tamoud acknowledges that Schneider Electric will need to hire supply-chain staff with more skills in data analytics than previously required. "They need to be able to use the technology," he explains.

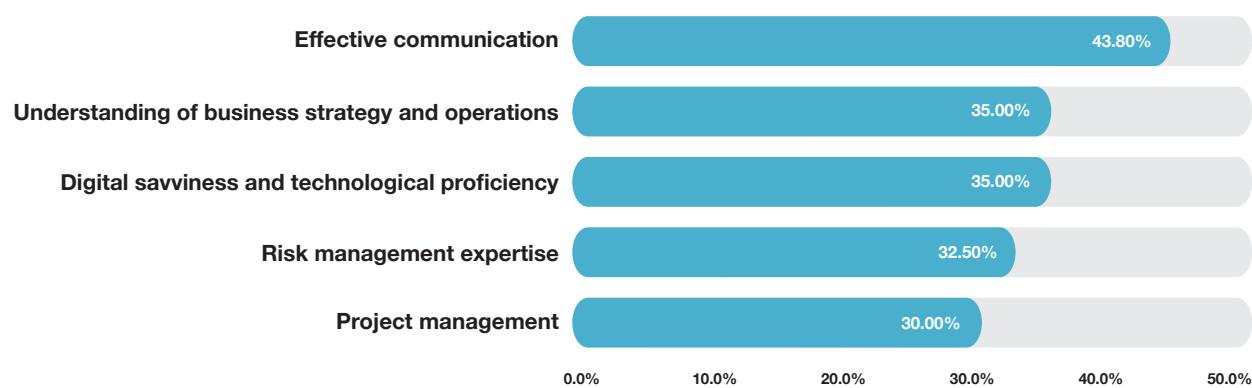
Overall, digital savviness ranked third in the list of priority skills for the supply-chain executive of the future (cited by 33% of respondents). This was preceded by an understanding of business strategy and operations (36%) and the ability to communicate effectively (34%), indicating that the capacity to play a more strategic and collaborative role with other parts of the business will also be important for tomorrow's supply-chain executive.

Figure 4. Top skills for the supply-chain executive of the future, by industry

Agriculture and food



Energy and utilities

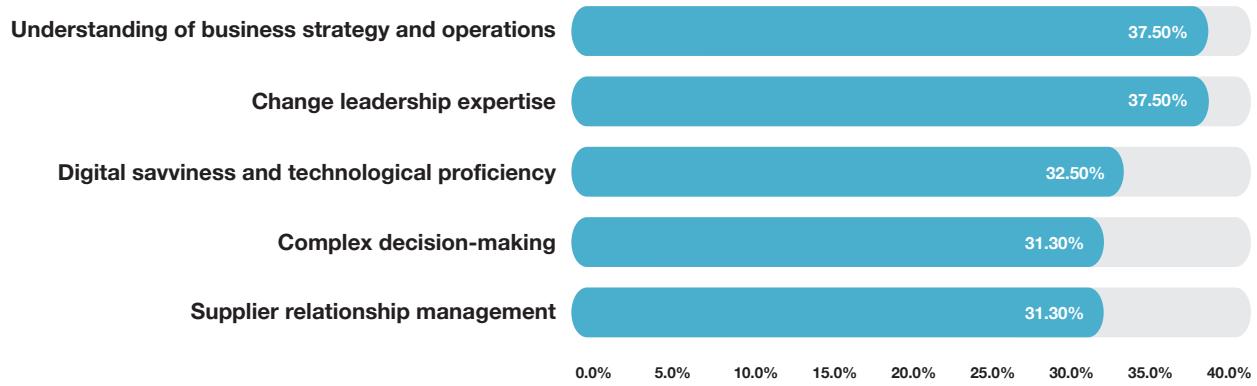


Source: EIU survey

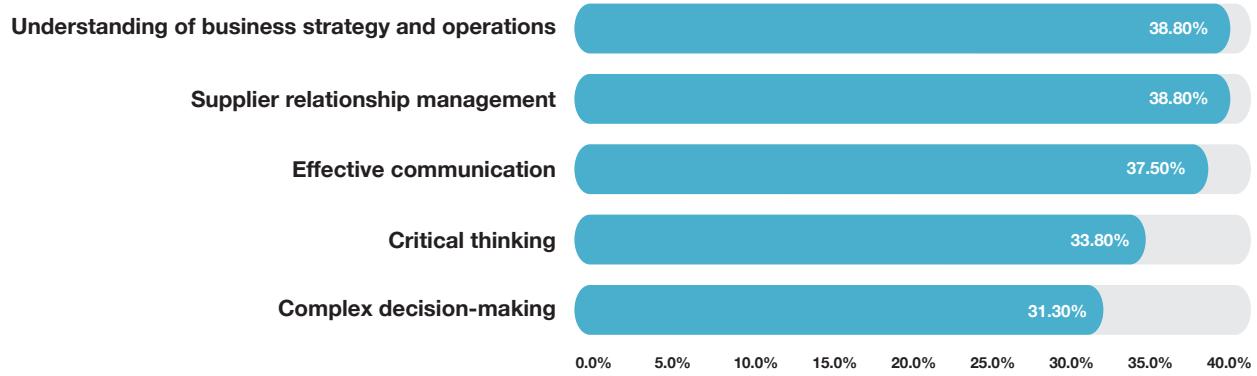
Industry



Healthcare and pharmaceuticals



Consumer goods and retail



Source: EIU survey

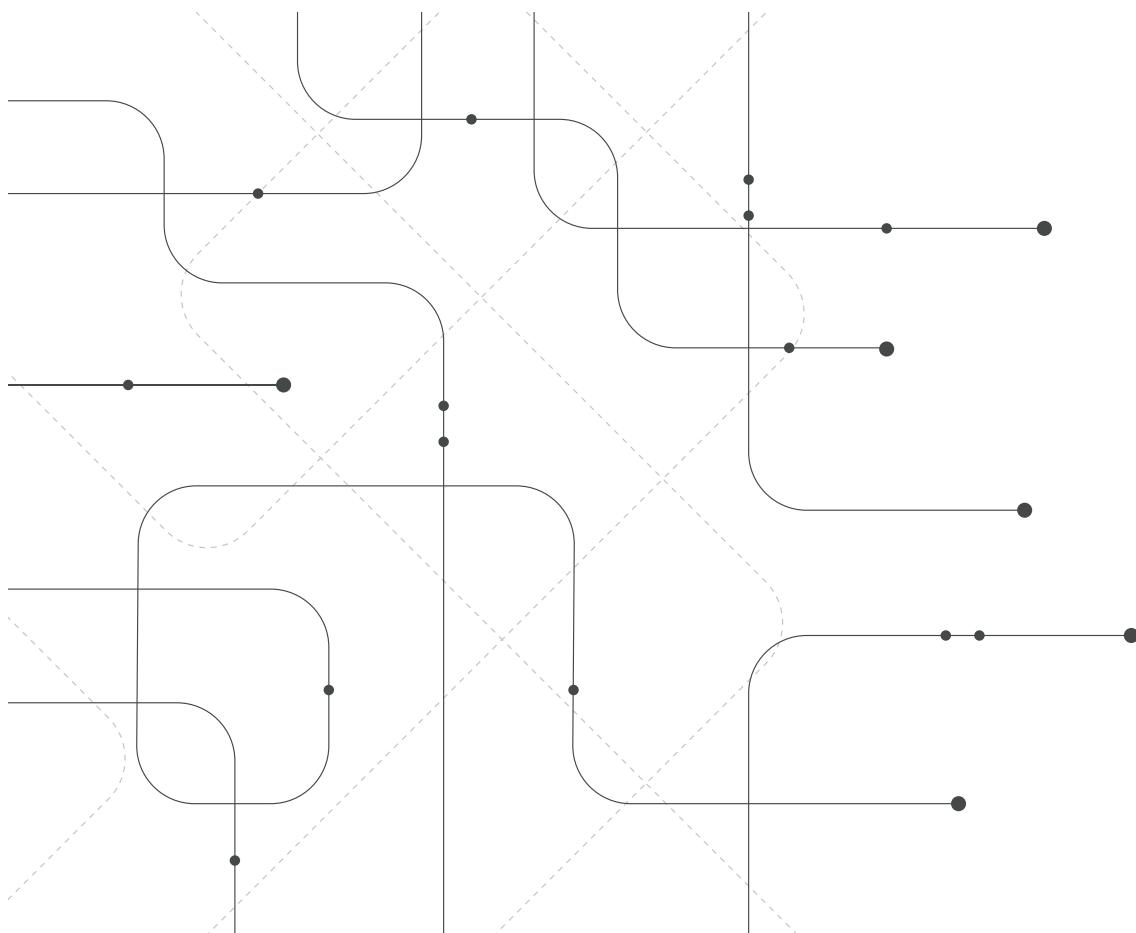
CONCLUSION

Ongoing supply-chain disruption is a cost of doing business today, and the senior executives surveyed for this report anticipate uncertainty and disruption to continue. In addition to external risks, the push for greater supply-chain sustainability and the pull of automation and technological capabilities increasingly demand supply chains that are resilient, flexible, relatively simple and transparent.

These demands are reshaping the supply-chain function. A few leading firms are navigating this change with clear strategies. Effective supply-chain leaders are better integrating operations and decision-making with the rest of the business, and firms are opting to work more closely with a smaller number of select suppliers, often on a more regional basis.

In terms of technology adoption, the covid-19 pandemic has been an inflection point. Firms are now using technology both to gain greater visibility across their supply-chain networks and to drive adaptability. However, as firms adopt advanced technologies, supply-chain managers will need to address a shortage of adequate skills in their workforces. Firms recognise the need for greater digital savviness and technological proficiency in order to successfully digitise their supply chain—a skill most in demand in industrial sectors. Ensuring that supply-chain teams have these skills will ensure that technology is used effectively, ultimately enabling intelligent, agile and resilient networks.

Together, these shifts call for leaders to adopt a more strategic outlook, increase collaboration and build their technical capabilities.





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