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# Course for Change: Building resilient automotive supply chains for an unconventional world

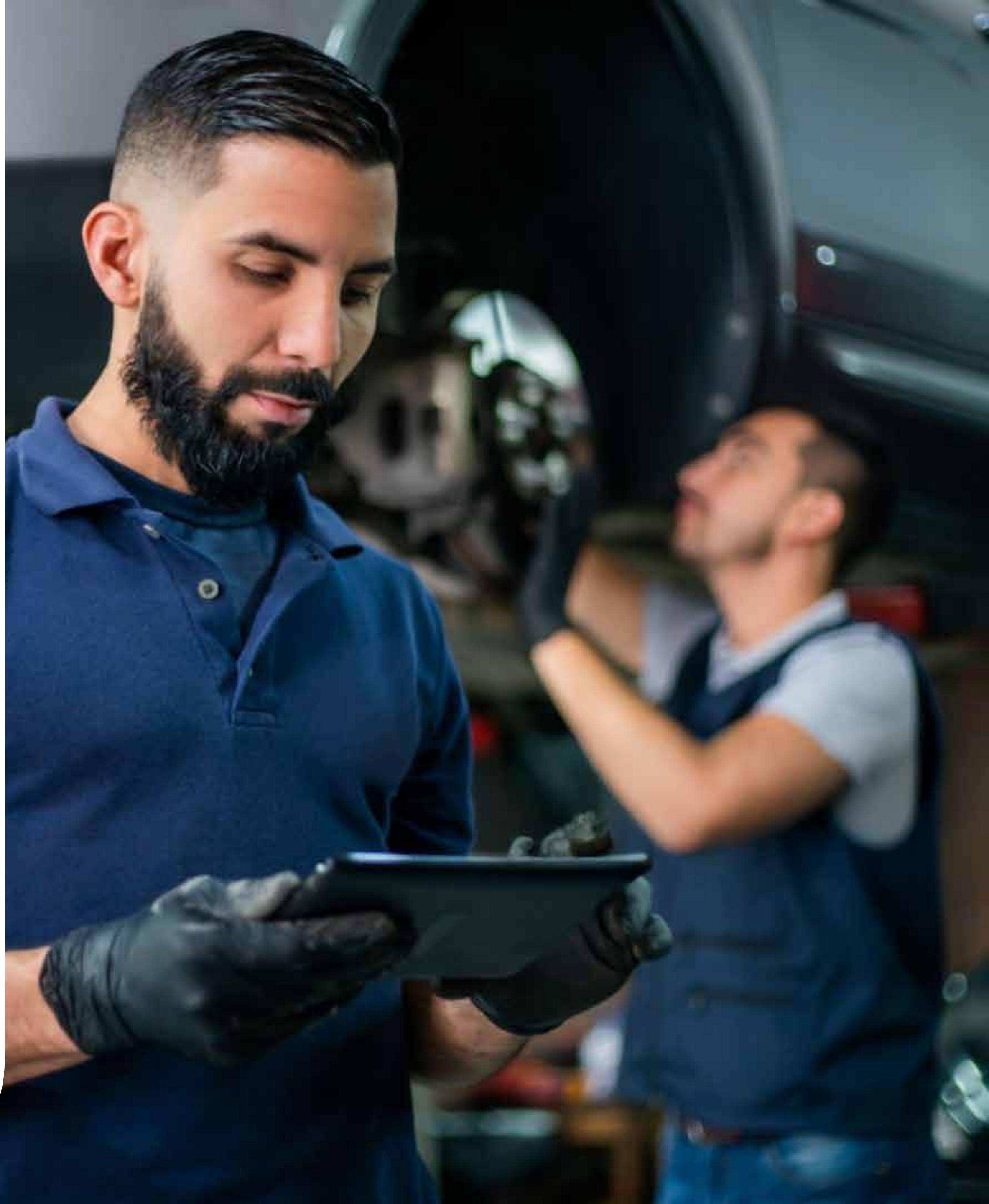


**MAERSK**

**ALL THE WAY**

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# 01. Executive summary

Uncertainty, volatility and complexity have become the new normal for supply chains. Disruption – whether it's geopolitical, related to climate change, or for plenty of other reasons – has affected every industry.

For the automotive sector, these challenges have been compounded by the speed and scale of digital transformation and electrification. A standardised, vertically integrated ecosystem has evolved into a sprawling global network that meshes mechanics, electronics and advanced digital technologies. Disruption has highlighted the interconnectivity of these supply chains, uncovering just how impactful one delay can be to the entire network.

That's why supply chain resilience is more important than ever. But it's also more complicated. Kersten Janik, COO at tier 1 supplier WITTE Automotive, says the sector is being revolutionised, making resilience all the more important. "If you're not resilient in that revolution, you're going to get eaten," he says.

What are the biggest challenges? And what can businesses do to make their supply chains more resilient? To find out, we surveyed 950 senior supply chain, logistics and operations professionals, including 190 from the automotive sector. The findings reveal that a small number of best-in-class automotive businesses are withstanding disturbances and uncertainty by building robust supply chains.

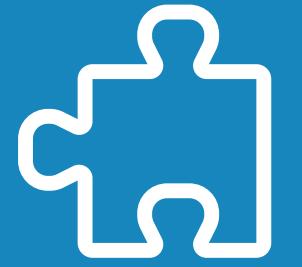


# What we found out

Automotive companies lost an average of 4.7% revenue to supply chain disruptions, the highest across sectors.



95% of resilience leaders see logistics and procurement as keys to strategic success.



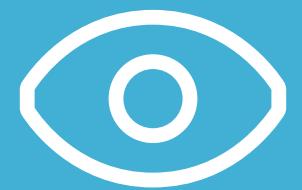
55% of frontrunners are upskilling teams and offering cross-functional training to bridge skills gaps.



77% rate digital twins as crucial for resilience today, rising to 95% in the next 2-3 years.



Half of the resilience leaders invest in tools for real-time supply chain visibility and decision-making.



Collaboration and data-sharing with logistics service providers (LSPs) is key for success.



## 02. Introduction

Automotive supply chains are vast, complex and some of the most vulnerable to disruption. A typical passenger vehicle is made from tens of thousands of components sourced from a diverse range of suppliers from around the world. A single disruption has the power to delay production and negatively impact the company's revenue.

Between 2020 and 2025, the global automotive industry has faced unprecedented supply chain disruptions, primarily driven by the COVID-19 pandemic, semiconductor shortages, and ongoing geopolitical and logistical challenges. During the most acute phase, from the start of the pandemic through to early 2022, these disruptions resulted in losses of over \$500 billion in revenue for automakers worldwide.<sup>1</sup>



Digitalisation and electrification, meanwhile, have added new threats, while introducing new suppliers and competitors into an already complex ecosystem. This is changing the previously transactional relationship between original equipment manufacturers (OEMs) and suppliers. They're increasingly collaborating to reinforce their supply chains through shared mapping, forecasting and insights, and to develop advanced technologies such as battery storage.

Electrification has also increased the sector's vulnerability to trade tensions. Electric vehicle production depends on access to rare earth metals and magnets – most of which are sourced and processed in a small number of countries. With inventories stretched and reserves of these elements limited, growing export restrictions could further complicate the electric vehicle supply chain. At the same time, closer links between automotive manufacturers and upstream mining operations are exposing OEMs to heightened ESG risks – including

concerns around labour conditions, child labour and human trafficking in parts of the raw materials supply chain. Customisable vehicles are becoming a point of difference for many manufacturers, which means they have to pivot from build-to-stock to build-to-order supply models. This demands new skills, greater agility and closer internal and external collaboration – as well as the digital platforms and tools that help to manage a more dynamic supply chain.



## A small group of companies is leading the way on resilience – and feeling the benefits

The 'resilience frontrunners' in our research are defined by their ability to minimise the impact of supply chain disruption on their revenues. The automotive sector as a whole has the highest level of disruption-related losses of all the sectors we surveyed: 4.7%, compared with an overall average of 3.9%. The frontrunners report losses of less than 1%.

In the last fiscal year, the average automotive company incurred disruption-related losses equal to 4.7% of revenues

They're ahead in other ways, too. The frontrunners are better at anticipating disruption, faster to respond to it and more financially resilient. And they're more likely to say that financial metrics are in their top three successes from balancing cost-efficiency with supply chain resilience (see Chart 1).

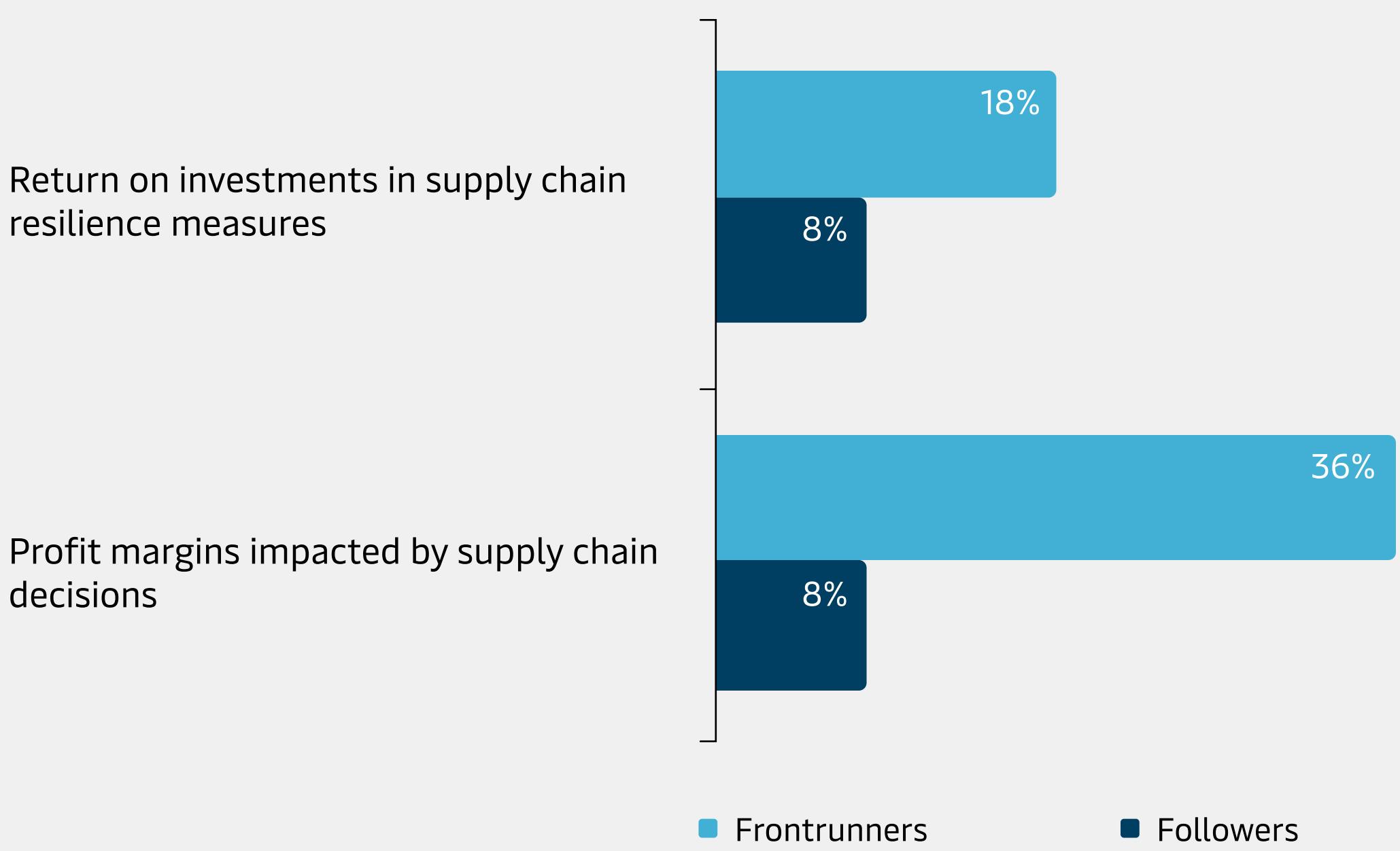
Unlike the frontrunners, many other businesses within the sector still have a long way to go. But do they know it? Sixty-three percent of automotive businesses say they're more resilient than their peers, which means a significant number must be overestimating their competence. This can lead to complacency, and this could leave their supply chains more susceptible to disruption.

Here, we look at what the resilience frontrunners are doing differently to see what less resilient businesses can do to cope with disruption.

### We find out:

- How the frontrunners count on leadership, people and skills to maximise resilience
- How they make the most out of technology and data
- How they share responsibility to drive supply chain resilience

Chart 1: The resilience frontrunners are feeling the benefits of their stronger supply chains

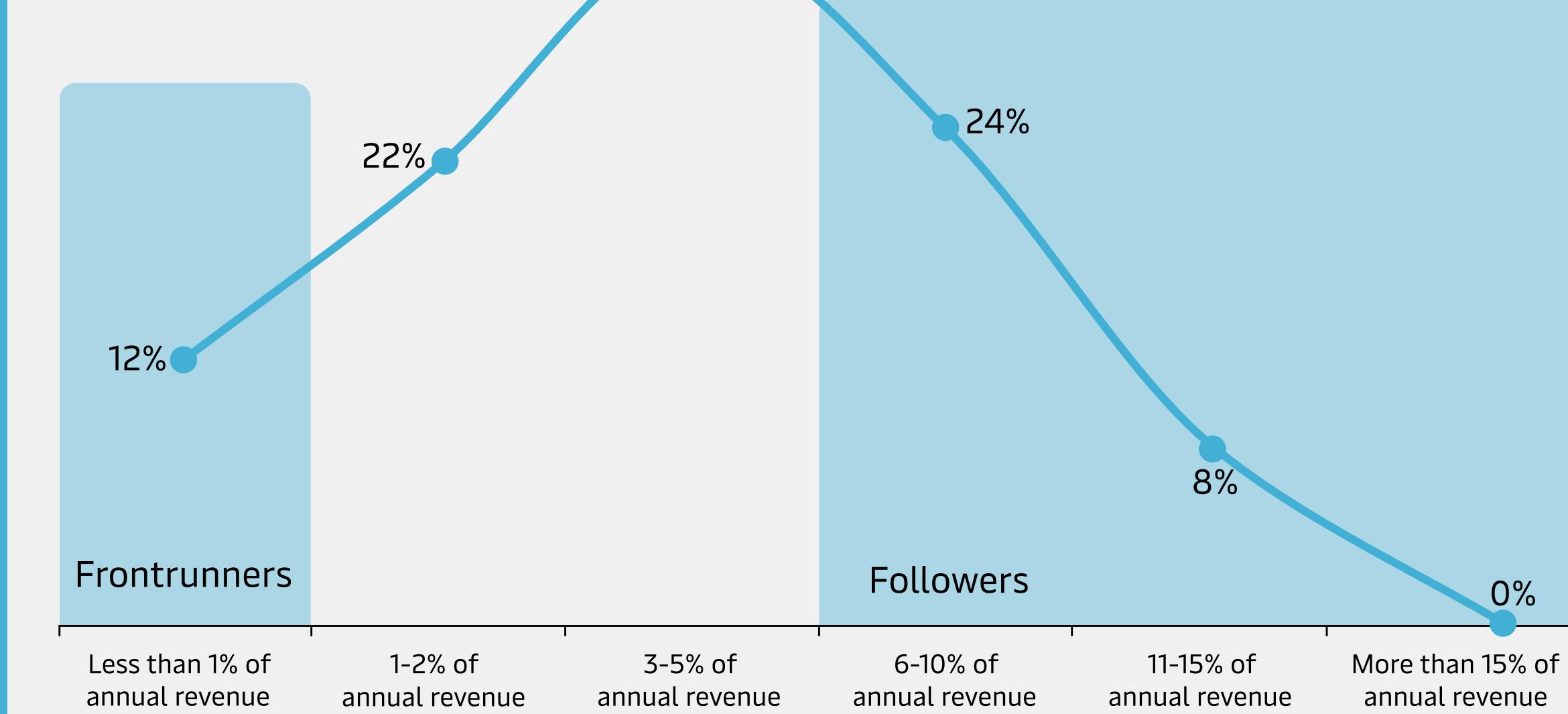


## A closer look at the resilience frontrunners

The resilience frontrunners, which make up 12% of the automotive companies in our research, lost less than 1% of their annual revenue in the last fiscal year because of supply chain disruption. Thirty-two percent, meanwhile, suffered losses of at least 5%. We call these companies the 'resilience followers'.



Chart 2: In the past year, the frontrunners lost less than 1% of their revenues because of supply chain disruption



## 03. How the frontrunners count on leadership, people and skills to maximise resilience

Frequent disruption is making supply chain resilience a strategic imperative for the automotive sector. But three-quarters of its businesses say their supply chain function is seen as a necessary cost centre instead of as a pillar of strategic growth.

The frontrunners know that this damages business resilience: almost all of them (95%) believe the supply chain function needs to evolve to become a central pillar of strategic thinking.

According to Jenny Zhang, Head of Automotive Supply Chain Management, APAC, at Continental, integration is central to this. "These days everyone is talking about the supply chain, but many companies don't give it enough strategic importance," says Zhang. "At Continental, the CEO places great emphasis on end-to-end integration to ensure supply chain leaders are better integrated with other key strategic functions. During crises we now work very closely with a common goal. You can't fight alone."



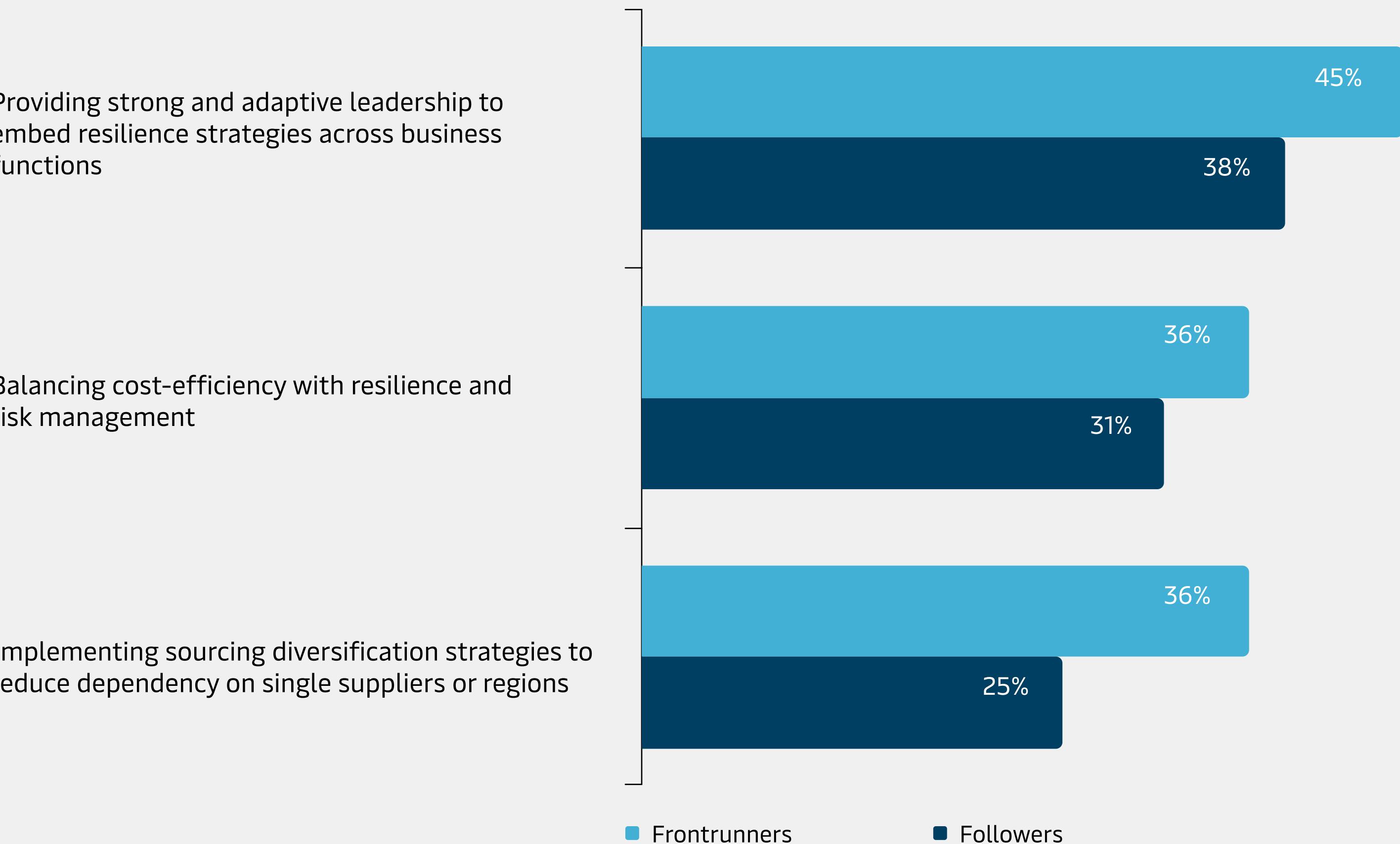
## Supply chain resilience needs a strong leader

The most resilient businesses position the chief supply chain officer (CSCO) as a strategic leader who's critical to supporting this shift. The frontrunners' top priority for the CSCO to maximise supply chain resilience is strong and adaptive leadership that can embed resilience strategies across business functions (see Chart 3).

*“These days everyone is talking about the supply chain, but many companies don't give it enough strategic importance.”*

**Jenny Zhang,**  
Head of Automotive  
Supply Chain Management  
Continental

Chart 3: Embedding resilience across the business is the top strategic priority for frontrunners



The supply chain function isn't just changing at the leadership level. As the automotive sector has evolved, so too have the skills needed for a strong and adaptable supply chain.

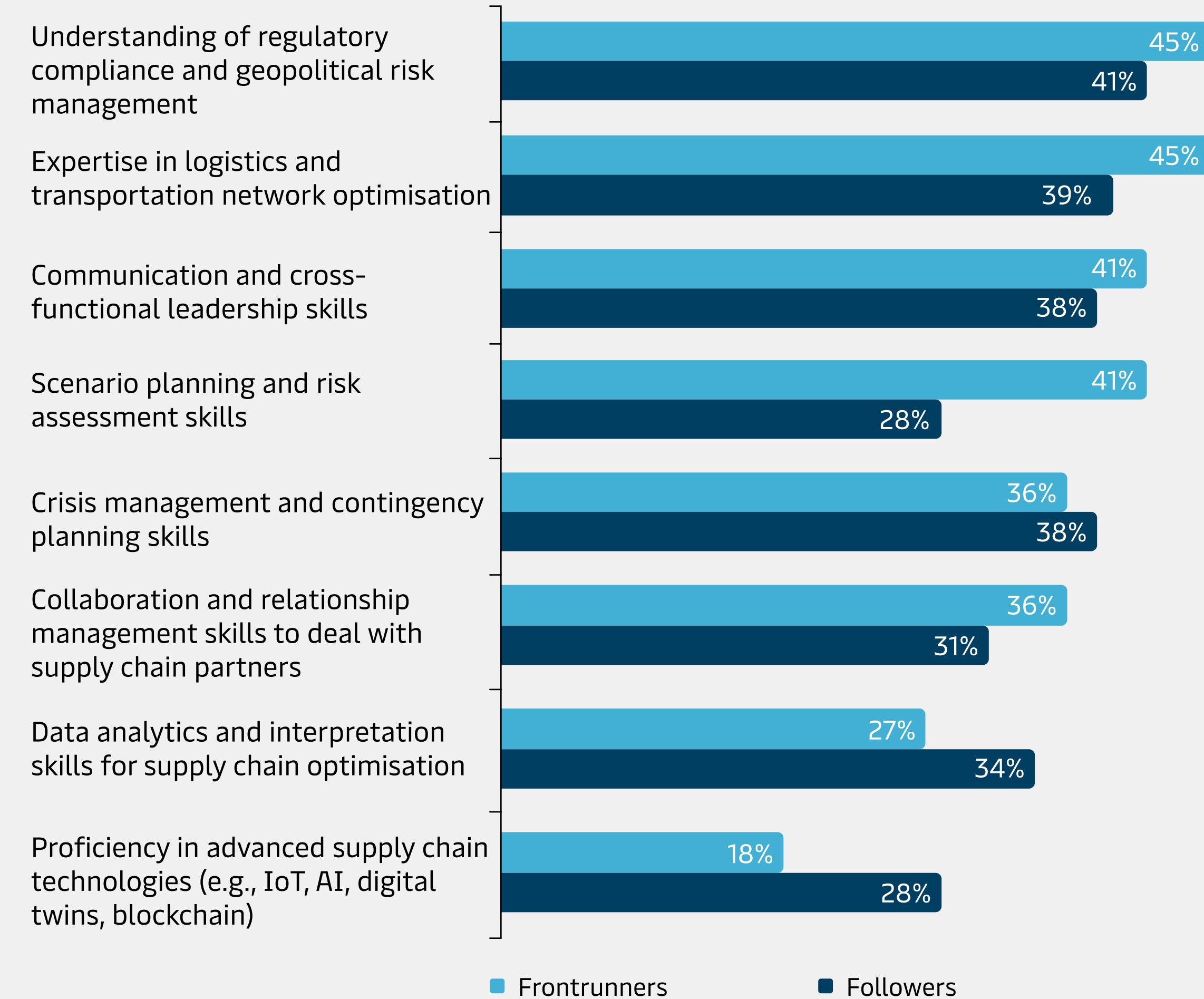
It's a diverse and growing list of competencies, and some of them fall outside the traditional supply chain remit. Understanding of regulatory compliance and risk management, for instance, is highlighted as a top three priority by the frontrunners, which reflects the increasingly complex operating environment. And for both the frontrunners and the followers, the importance of proficiency in supply chain technologies demonstrates the sector's systemic shift to digital (see Chart 4).

To fulfil these requirements, the frontrunners are more likely to focus on internal skill building. They are nearly three times more likely than the followers to launch targeted upskilling and reskilling programmes to address changing workplace needs.

Amit Pursooth, Head of Vehicle Supply Chain, Toyota Motor Europe, says it's important to have an agile team. "The automotive industry is often described as one of the fastest-moving sectors – driven by ever-changing customer expectations, technology shifts and regulations," he says. "What enables us to stay resilient is the agility of our people. At every level, we invest in problem-solving capability and a continuous improvement mind-set. This shared skillset empowers our teams not just to respond to change, but to lead through it – even in times of crisis."

Continental takes a similar approach. "The skills needed for a strong supply chain function have changed a lot; people now need multiple skills to succeed," says Zhang. "At Continental, we have an excellent training programme to support this. Digital and software training is a particular focus."

Chart 4: Skills automotive organisations need most for supply chain resilience: collaboration, technology and data



## Resilience is everyone's business

For the frontrunners, building resilience isn't solely the responsibility of the supply chain team – it's a group effort. These companies recognise the importance of cross-team collaboration: they're nearly twice as likely as the followers to offer cross-functional training to equip employees with both technical and supply chain-specific expertise.

And it's not just about building skills. The resilience frontrunners are more than twice as likely than the followers to say they're investing in culture to foster a resilience mindset. This is particularly important in automotive because of how much change the sector is going through. We're engaging our teams in a company-wide initiative to reflect on and strengthen their connection to Toyota's core values," says Pursooth.

"This helps build confidence that, even as the industry evolves, our guiding principles remain steadfast – and it's this foundation that continues to shape our direction and sustain us through change."

**Key takeaways:**  
How to use leadership, people and skills like a resilience frontrunner

-  Integrate the supply chain into core business planning to support growth and resilience – it's not just an operational cost centre.
-  Position the CSCO as a strategic decision maker to improve cost efficiency, adaptability and innovation.
-  Upskill your supply chain team to equip it with the regulatory, technological and digital skills it needs to keep pace with change.
-  Supply chain stability isn't just the responsibility of the supply chain team. Prioritise cross-functional collaboration and training to foster a resilience mindset.
-  Change can be disruptive: invest in training and in empowering teams to deal confidently with uncertainty.



## 04. Making the most of technology and data

Automotive's emphasis on technology and data skills (see Chart 4) reflects the seismic impact of electrification and digitalisation on the sector's supply chains. Increasingly sophisticated technology is helping OEMs to build stability by enhancing tracking, improving efficiency and supporting decision making.

"The transition to electric vehicles has made it much harder to predict the market," says Continental's Jenny Zhang. "Smart tools and AI are helping us to navigate this challenge – especially when it comes to forecasting."



## Technology is now mission critical

Our data shows that automotive companies are already using advanced technology such as digital twins, predictive analytics and real-time risk visibility tools – and their reliance on these technologies is expected to grow.

Digital twins, which use real-time data and simulations to predict performance, are particularly useful. BMW Group, for example, has rolled out digital twins across its business through its iFACTORY initiative, which allows it to recreate production lines and identify where actions or improvements are needed.<sup>2</sup> The frontrunners in our research are more likely than the followers to be using the technology to optimise their processes.

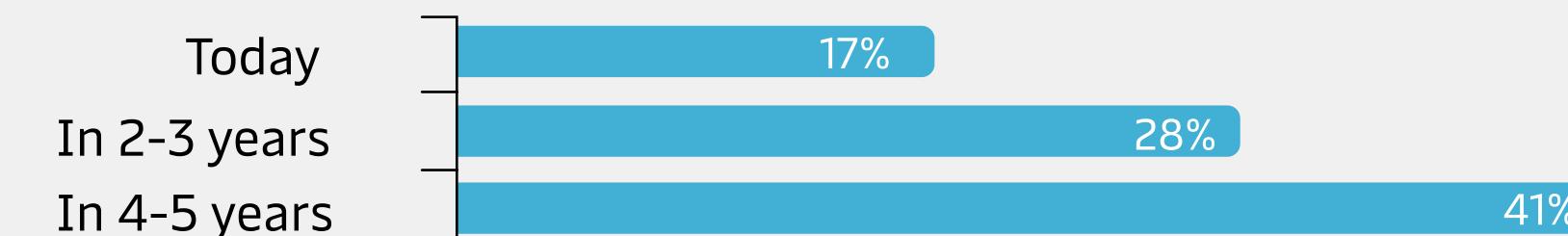
77% of frontrunners say digital twin technology is already highly important to improving resilience, compared to 54% of followers.

Artificial intelligence (AI) is also having a big impact, with automotive manufacturers increasingly investing in advanced capabilities to increase their resilience. WITTE Automotive, for instance, is using AI for early detection of malfunctions in its manufacturing process. “We’re using AI not to replace scheduled maintenance, but to see trouble coming and act before it happens,” says Janik. This reduces the potential for disruption and enables the company to intervene before production comes to a halt.

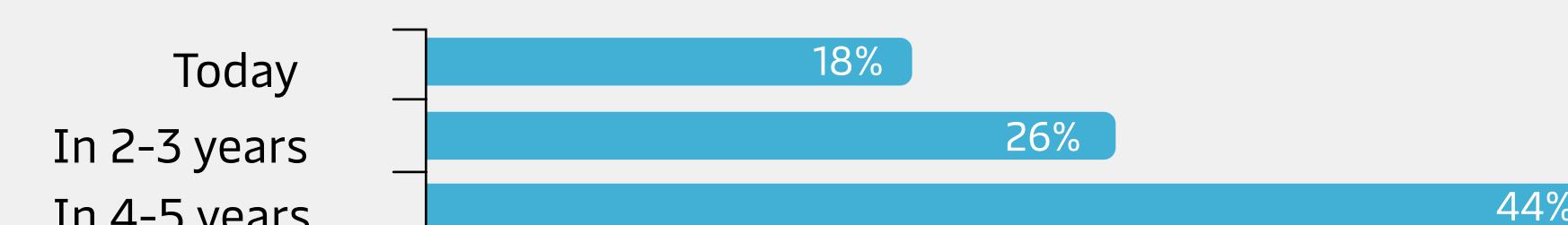
As AI continues to advance, businesses expect it to increasingly take the lead on resilience – minimising the need for human input and supporting faster, more autonomous responses to emerging risks.

Chart 5: For automotive companies, the growth of advanced technologies is inexorable

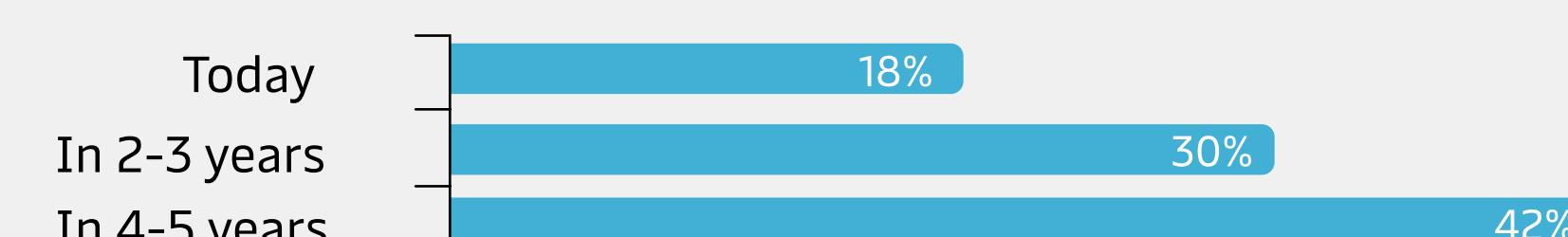
**Real-time risk visibility and actionable insights** for proactive disruption management



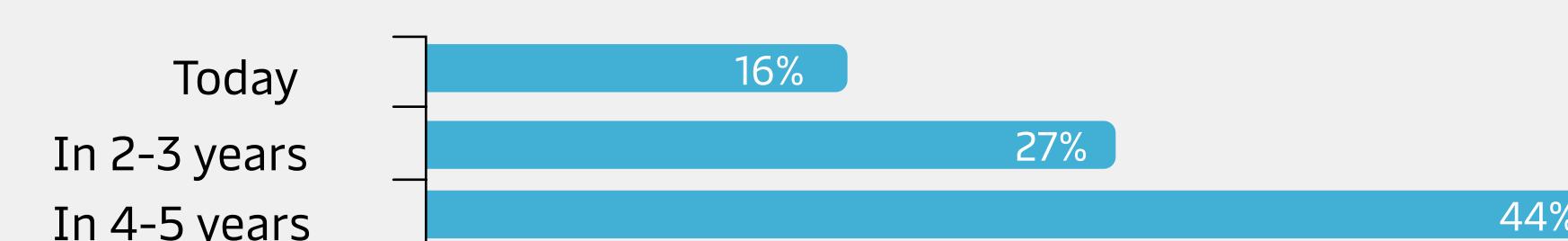
**Multi-tier supplier mapping** to enhance transparency and ensure regulatory compliance



**Digital twin technology** for real-time visibility, crisis scenario simulations, and decision-making support



**Predictive analytics** for supply chain planning to improve resilience



■ Mission-critical - Essential for achieving supply chain resilience; cannot operate effectively without it

## Approaches to implementation diverge

The frontrunners have moved beyond experimentation and are using these advanced technologies to enhance specific operational processes. The followers, on the other hand, are more likely to be in the early stages of adoption – they're exploring new technologies but are less likely to be applying them strategically (see Chart 6).

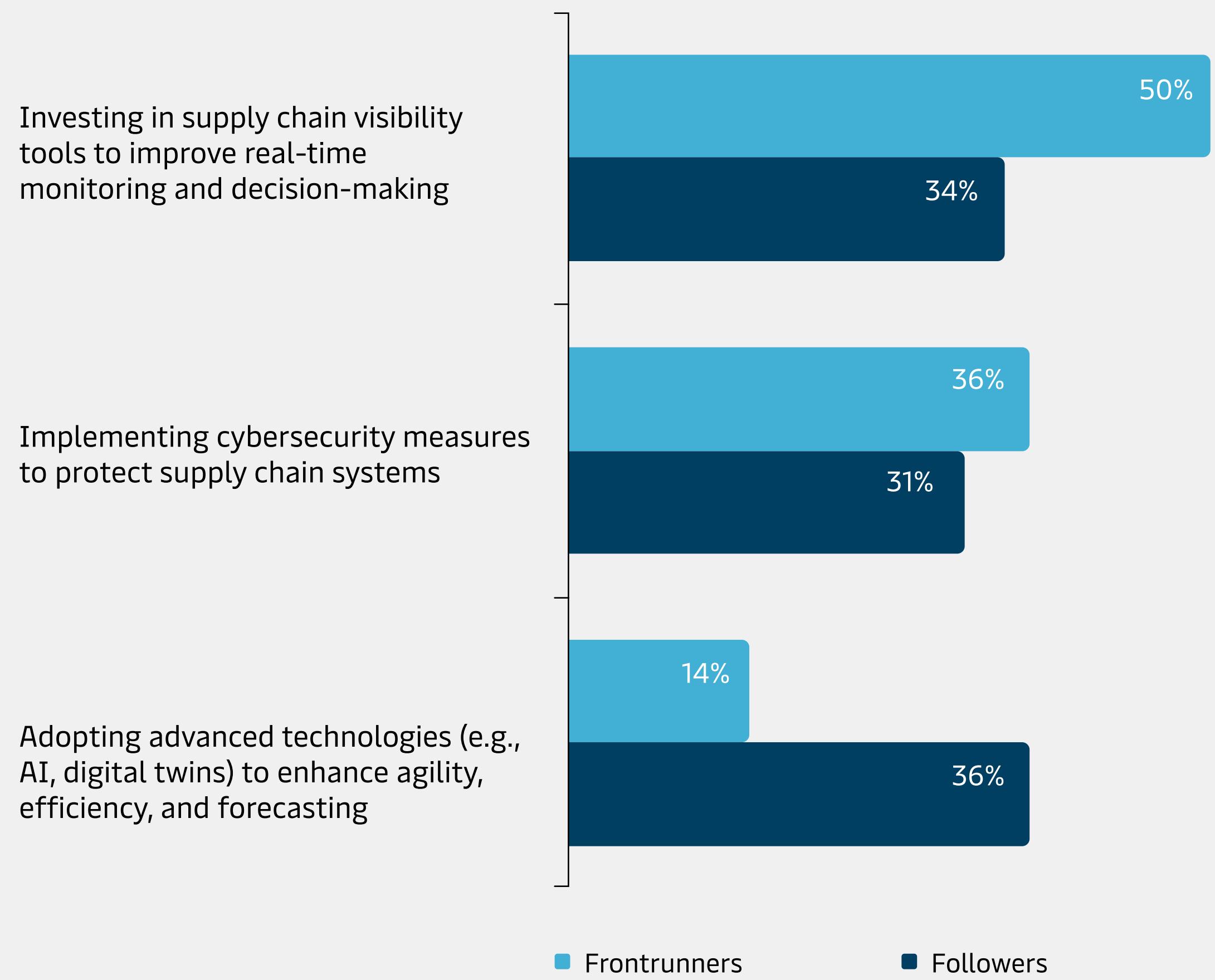
A big difference between automotive businesses is the way more resilient organisations are tackling risk detection. A lack of real-time visibility across the supply chain is identified as a top three barrier to balancing agility and stability by both the frontrunners (32%) and the followers (26%), but it's the technology frontrunners that are prioritising improvements that support real-time monitoring and decision making

"We use the term supply chain, but what we're describing isn't really a chain anymore – it's a network," Zhang explains. "In order to build resilience, you need visibility over that network."

And that doesn't just mean direct suppliers – you need to know what's happening at tier 2. Digital tools for end-to-end tracking and visibility have been instrumental in helping us to achieve this."

The frontrunners are also more likely to be investing in protecting their systems. This makes sense: Cyber risk is a growing threat to the automotive sector because of increasing automation, and increasing regulatory requirements – such as the UN's UNECE R155 – mean businesses could face serious reputational and financial consequences if they don't protect themselves. In 2024, for example, a cyberattack at CDK, a software provider for automobile dealers across North America cost car dealerships more than US\$1bn globally.<sup>3</sup>

Chart 6: The resilience frontrunners have gone further with technology



## Key takeaways:

How to optimise technology and data for supply chain resilience

-  Prioritise investment in a range of advanced technologies to build long-term, strategic, data-driven resilience.
-  Technology maturity is a clear differentiator for resilient businesses – invest in data-driven, AI-augmented systems to improve anticipation, planning, efficiency and crisis management.
-  Focus on advanced visibility tools for enhanced tracking and visibility over the entire supply chain – not just your direct suppliers.



## 05. Share responsibility to drive supply chain resilience

Digital tools are changing the way OEMs operate. But the rapid expansion of available tools can make it hard to keep up, which is where collaboration can help. Working with partners from across the supply chain builds resilience through joint problem solving and real-time information sharing.



The majority of automotive businesses (76%) say that collaborations and partnerships are increasingly crucial for preparing for disruption and developing alternative strategies and risk mitigation solutions. And both the frontrunners and the followers in our research say that enhanced data sharing with supply chain partners can help them to balance agility with long-term stability.

For 76% of automotive businesses collaborations and partnerships are increasingly crucial for preparing for disruption and developing alternative strategies and risk mitigation solutions.

But a lack of trust between supply chain partners and a reluctance to share confidential information is identified as one of the main barriers to increased collaboration with supply chain partners. This shows how important it is to find common ground and build stronger relationships – a top three skill for building and maintaining resilient supply chains, according to our survey.

Jenny Zhang says that closer relationships with suppliers have helped Continental to strengthen oversight of its supply chain. "Ongoing challenges have fundamentally changed the nature of the OEM-supplier relationship," she explains. "Where previously, communication was largely restricted to orders and feedback, the relationship is now much more dynamic. We communicate from inventory to capacity, and this gives us much greater visibility over potential risks."

WITTE COO Kersten Janik refers to Catena-X, a data ecosystem for the automotive industry, to improve collaboration, resilience and transparency in the supply chain. "With Catena-X, we gain visibility across the entire supply chain, down to the next level and beyond," he says.



## There's strength in numbers

The frontrunners are ahead on collaboration: 64% are already working with their suppliers and logistics service providers (LSPs) to exchange real-time data and insights about supply chain events, risks and performance. This compares with 48% of the followers.

And the most resilient businesses are more focused on creating open, frequent communication channels with their wider networks. The followers tend to focus instead on longer-term preparatory measures such as collaboration during crises and forecasting and capacity planning. Both of these approaches are helpful, but the frontrunners' rapid, proactive engagement enables faster response times, greater visibility and increased agility (see Chart 7).

At Toyota, timely communication is part of its 'bad news first' principle. "If we don't know what's happening, we can't do anything about it," says Amit Pursooth. "That's why we encourage our suppliers to lead with bad news –

real-time information enables real-time action."

This approach is crucial to improving reactivity in a crisis and has helped Toyota to minimise the impact of disruptive events. "One of our suppliers experienced a fire that damaged several tools," says Pursooth. "As soon as we were informed, we despatched a team to 'go and see' (genchi genbutsu) the situation first-hand, assess the risk, and align on recovery actions. In just four weeks, the supplier was back on track – far faster than anyone expected."

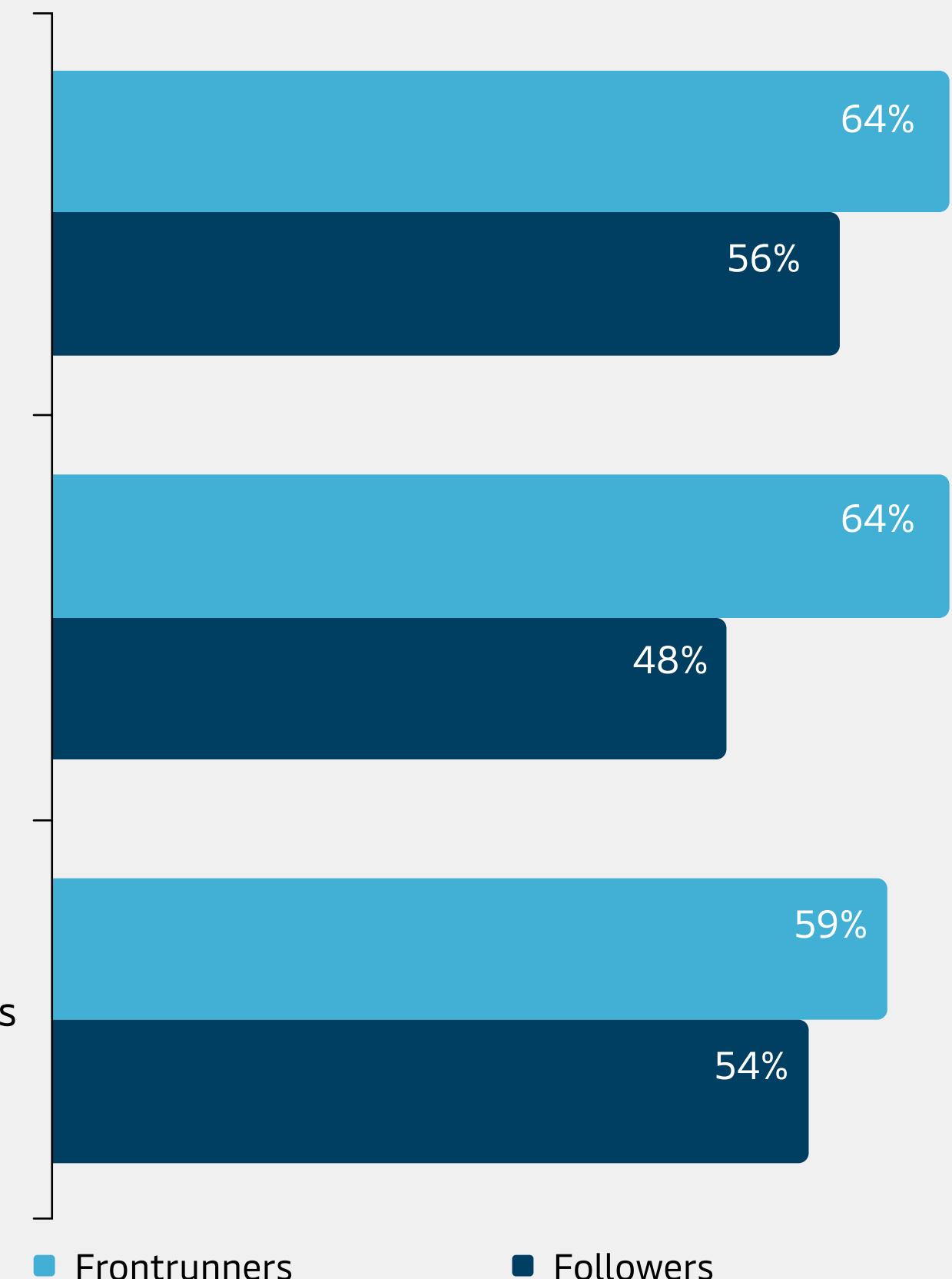
Pursooth says it's crucial to have a team mindset during an incident like this. "Our response was only possible because of transparent and open collaboration," he says. "Toyota has even lent staff with expertise to suppliers in past crises to accelerate recovery. And it's not just about us – in this case, other OEMs were also impacted. When we work as one team – in collaboration – we strengthen resilience across the supply chain."

Chart 7: The frontrunners and the followers are collaborating differently

Maintaining open and frequent communication channels for quick problem-solving during disruptions.

Exchanging real-time data and insights about supply chain events, risks, and performance metrics.

Sharing knowledge and best practices for risk management and resilience strategies



Key takeaways:  
How to collaborate for supply chain resilience

-  Strengthen your relationship and stakeholder management skills to foster mutual trust and establish open relationships across the supply chain.
-  Encourage early and honest communication with your partners – especially about disruption – to enable faster, more effective responses.
-  Make sure you have a team mindset. Supply chain resilience is a common goal and sharing responsibility during a crisis can strengthen your entire ecosystem.



## 06. How logistics service providers are critical to resilience

A growing focus on supply chain stability and control has meant that LSPs are going beyond their traditional remit and are playing an increasingly important role in supply chain resilience. In our survey, automotive organisations cited efficiency gains from optimised logistics and transportation services as a top three area of success over the past two years when it comes to balancing cost effectiveness with resilience.

Resilience frontrunners are more likely to use LSPs for services that fall outside their traditional scope. They still see value in services such as transportation and warehousing, but are much more likely than the followers to use services such as visibility tracking and compliance support (see Chart 8).

In addition, 45% of the frontrunners are taking advantage of supply chain finance solutions offered by LSPs – something that's becoming increasingly popular among OEMs as they try to optimise cashflows and reduce risk.

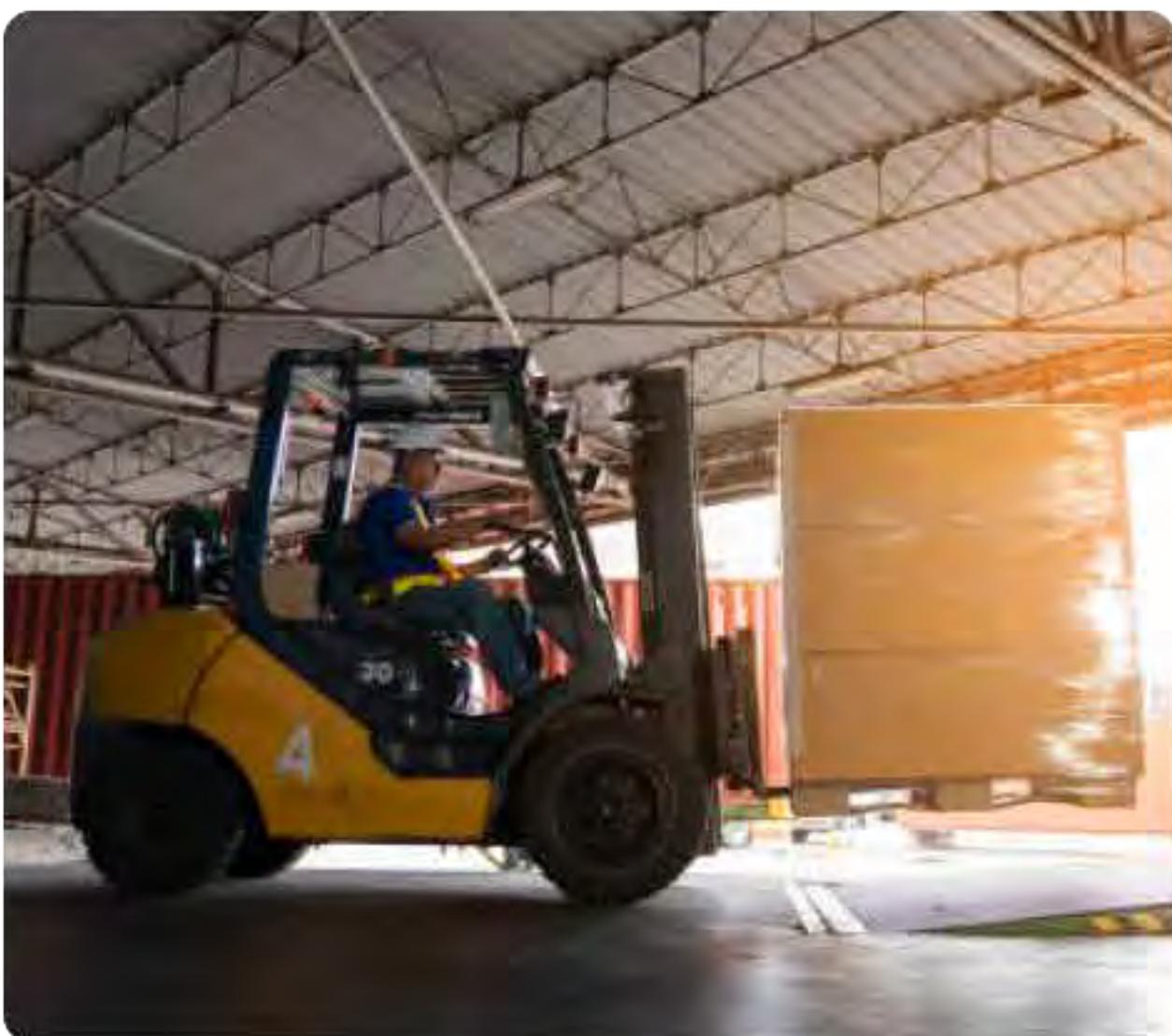
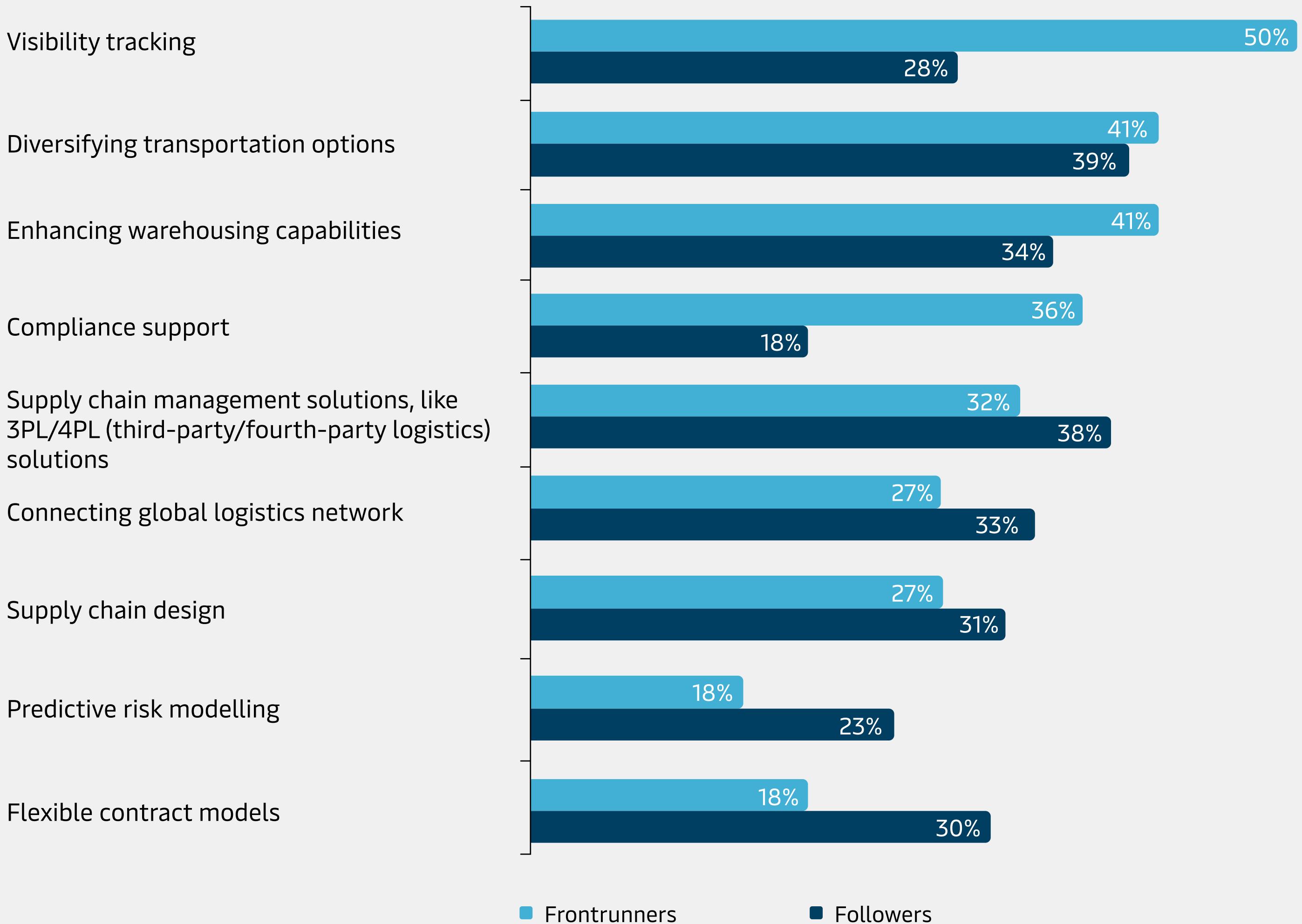


Chart 8: The frontrunners are more likely to use LSPs for visibility and compliance



## 07. Course for Change: Achieving supply chain resilience in an unconventional world

The automotive sector has been among the hardest hit by supply chain disruption and suffered the greatest average annual loss over the past year of any sector in our survey. Given the ongoing trade and geopolitical turmoil, the pace of transformation, and the evolving regulatory landscape, its challenges are not likely to go away.

Businesses know they have to adapt. But while many think their supply chain is strong, our data tells us that confidence doesn't mean resilience. Some are doing much better than the rest. The businesses in our research are all investing to strengthen their supply chains, but it's only the most resilient organisations that are successfully embedding these investments within their teams, operations and culture.



Most importantly, their priorities are strategic. These organisations:

- Position the CSCO and the supply chain function as drivers of growth, not just operational continuity.
- Invest in people, equipping their teams with the skills and knowledge they need to navigate complex challenges such as compliance and regulation.
- Embed a resilience mindset across their organisations by creating awareness and accountability across functions.
- Collaborate closely with their partners across the value chain to establish trust and make resilience a shared responsibility.
- Adopt and use advanced technologies to help them predict and respond to challenges, and are focused on real-time insights.
- Map their extended supplier networks, including their tier 2 and 3 suppliers, – in depth to identify hidden vulnerabilities.
- Approach logistics partnerships strategically and use tools and capabilities that go beyond their traditional remit.

Our frontrunners teach us that there's no single fix for vulnerable supply chains. True resilience needs a multifaceted approach, and in a rapidly evolving landscape businesses have to keep checking and improving their capabilities.

Crucially, the frontrunners demonstrate that resilience measures, when they're done properly, can increase competitive advantage and help businesses to thrive in an uncertain world.



# Appendix: About our research

This report is part of a broader series of reports covering five sectors: lifestyle, retail, fast-moving consumer goods, technology and auto. The survey took place in February and March 2025 and covered 19 countries, with 26% of respondents based in North America, 26% in Europe, 26% in Asia Pacific, 11% in India, the Middle East and Africa, and 11% in Latin America.

## **The automotive survey**

This report draws on the analysis of responses from 190 automotive industry experts who participated in the research. These experts are from automotive OEMs (57%) and the EV charging infrastructure sector (43%)

Respondents are C-level executives (17%) and senior supply chain, procurement and operations professionals.

- 14% represent companies with revenues between US\$500m and US\$1bn
- 54% have revenues of between US\$1bn and US\$10bn
- 32% have revenues above US\$10bn

We would like to thank everyone who took part in the research.





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