



# Navigating Supply Chain Resilience – Towards a Management Dashboard

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Whitepaper by The Procurement Initiative

In association with



[procurementinitiative.org](https://procurementinitiative.org)



## Foreword Martina Buchhauser

Procurement has always been one of the most important business functions of any company but is often misunderstood as a service provider instead of an integral part of the value chain ("the old purpose"). With its responsibility for up to 70% of the value chain and thus a substantial amount of the company's spend, Procurement has an immediate impact on the continuous availability of materials and parts and the revenue and cost competitiveness of the company.

The past two years have put Procurement into a constant task force mode, prompting many companies to reshape their supply chain processes and structures. This much-needed adaption of global supply chains pushed Procurement from the periphery into the spotlight.

No – we are not there yet. Individual companies will not solve the significant challenges in Procurement. A joint effort of focal companies and suppliers, scientists, and practitioners is necessary to research, discuss and shape the future of Procurement. There are fundamental conflicts of interest between individuals, organizations, and even countries that cannot be solved by individual companies (short-term interests vs. long-term interests/personal interests vs. societal interests).

Yes – Procurement must reinvent itself, take on even more responsibility, and has a unique opportunity to act as an "orchestrator" to create a balanced value proposition for the company – far beyond making decisions based on price alone. Suppliers must be seen as partners at eye level. By engaging with stakeholders and forging coalitions across the supply network, Procurement is uniquely positioned to accelerate change, deliver on ESG commitments, and create more excellent (business) value.

To do so, the Procurement Initiative's Resilience Survey provides a tool for mapping the key challenges and capabilities in building supply chain resilience. The insights offer a starting point to move from managing disruptions to rethinking supply chain operations.

With over 100 participants, this whitepaper represents a snapshot of the current state of supply chain resilience among European companies.

Best,

Martina Buchhauser



**Martina Buchhauser**

Founder – The Procurement Initiative

# INTRODUCTION TO THE PROCUREMENT INITIATIVE'S RESILIENCE SURVEY 2022



## Research approach:

To improve our understanding of the current state of supply chain resilience, we captured viewpoints regarding company-specific capabilities and vulnerabilities. Overall, 286 procurement professionals participated in our survey, and we analyzed 102 completed responses for this summary. Survey responses are fully anonymous – neither the participants' nor their employers' identities are disclosed in this report.

After the survey was closed, we conducted a Cronbach's alpha test for all gathered survey responses to test our survey constructs for statistical reliability. We found the survey results statistically reliable, with a Cronbach's alpha score of .7 or higher. We provide a summary of the data analysis and a description of the used constructs for resilience vulnerabilities and capabilities in the Appendix.

## Key facts:



### 102 Participants

30 small and medium-sized enterprises (SMEs) and large companies with up to 1000 employees  
72 very large companies with more than 1000 employees



### 13 Industries

are represented in this sample with a strong focus on Mechanical engineering, Healthcare, and Automotive



### 20% of companies

are in a state of excessive risk, meaning that they have a significantly higher likelihood of being negatively impacted by supply chain disruptions



### 59% of companies

report resource limits as their biggest vulnerability. In particular, recruiting and retaining highly skilled workers and securing raw materials remain the top-ranking challenges



### 68% of companies

rank financial stability (e.g., financial reserves, high margins) as the most important capability to weather the stormy market conditions

# RESILIENCE SURVEY 2022 – STRUCTURAL PARAMETERS

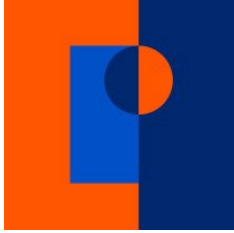
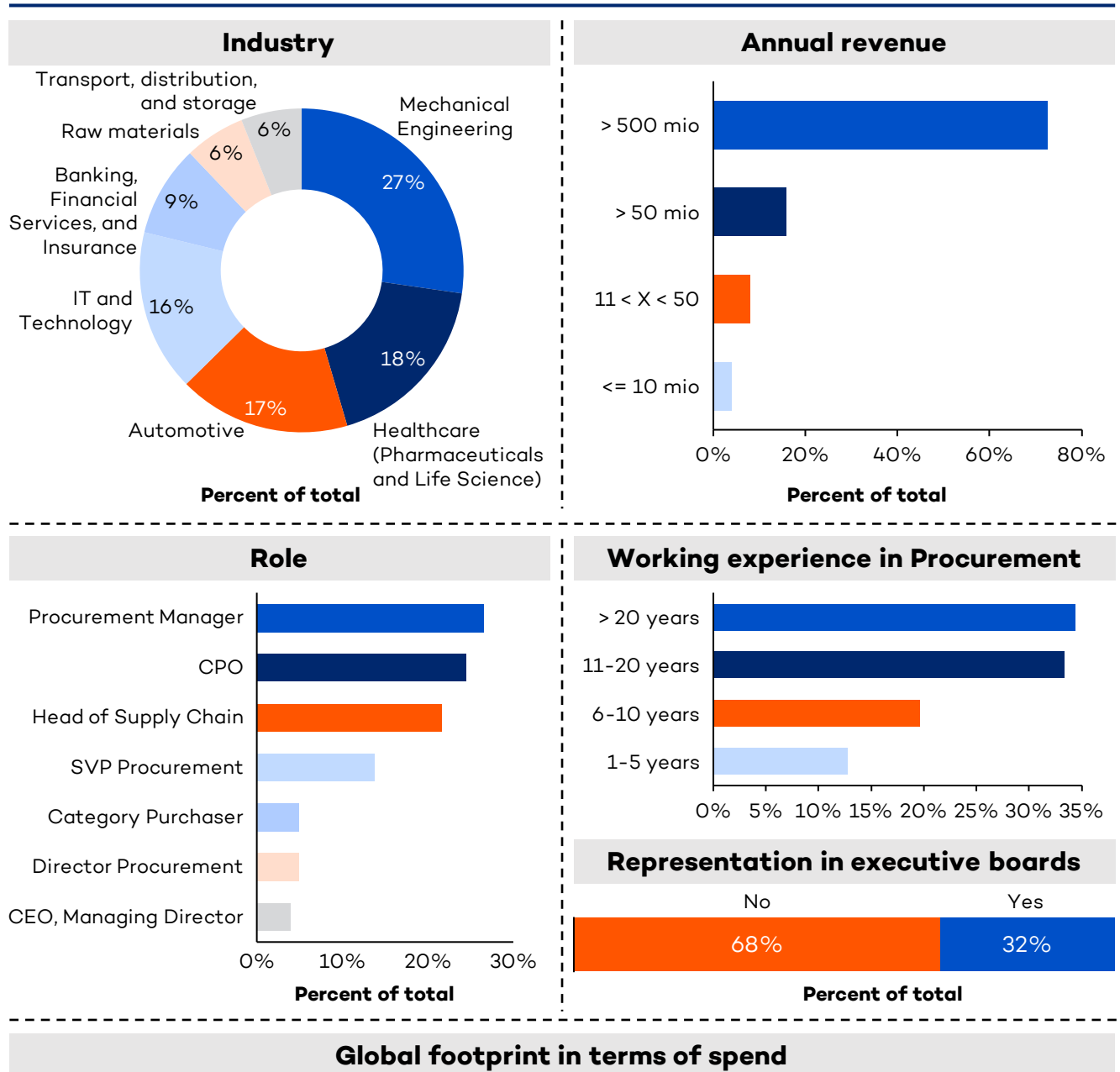


Exhibit 1

## Structural parameters of the Resilience Survey 2022 (n=102)



# THE RISE OF SUPPLY CHAIN RESILIENCE – MOVING FROM SUPPLIER-INDUCED TO SUPPLIER-INDEPENDENT RISKS

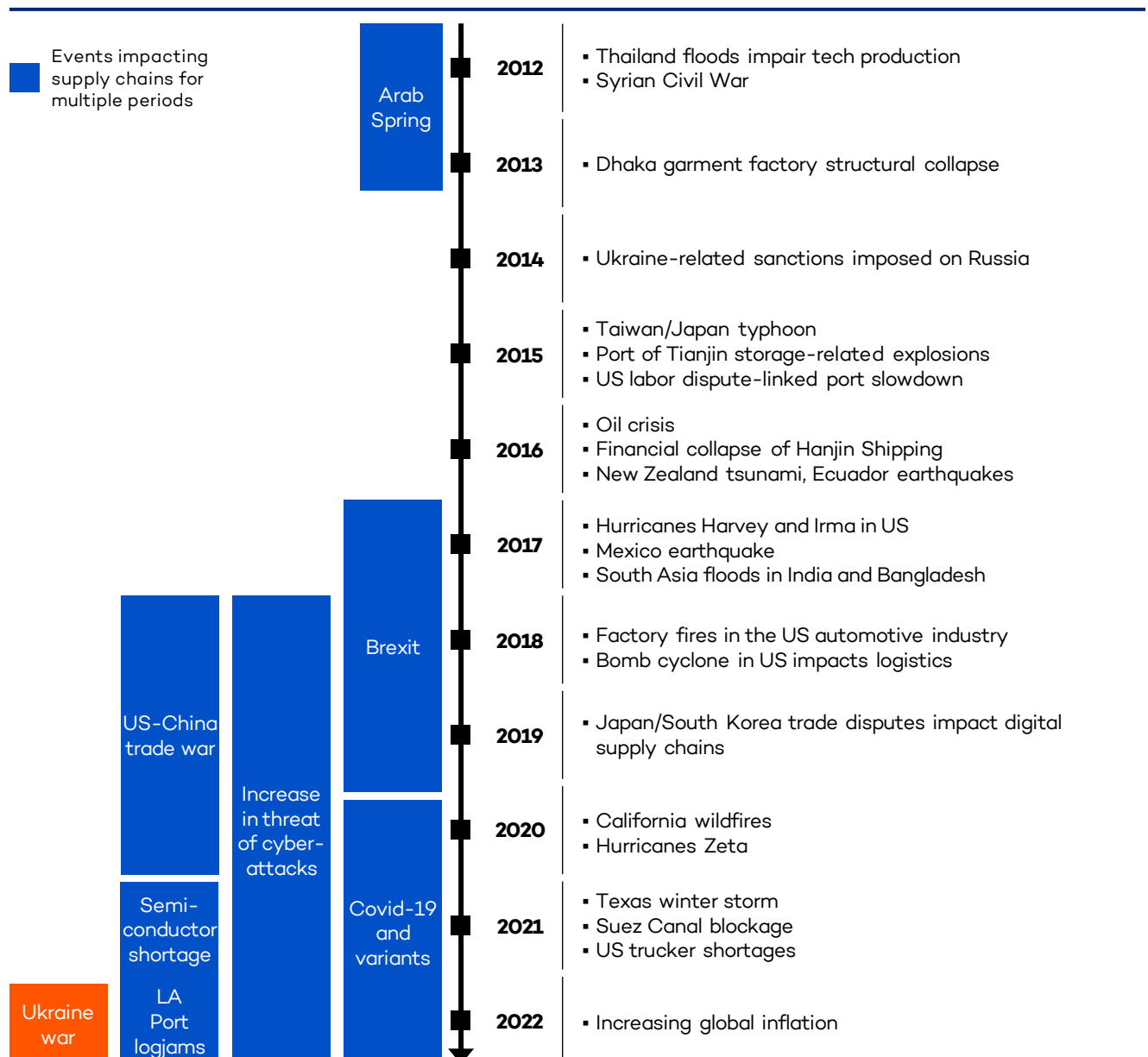


## The rise of geopolitical risks

Uncertainty and risk have always existed in supply chains and kept Procurement and supply chain managers up at night. Traditionally, risk management has focused on supplier-dependent events and incidents in three categories: financial, operational, and strategic risks. Insolvencies, demand fluctuations, and changes in suppliers' strategic direction have historically been prominent inducers of these risks. While organizations still need to excel at traditional risk management, today's supply chain leaders face different challenges: geo-political risks and natural disasters are increasing in frequency and severity, generating uncertainty, shortages, and inflationary trends in supply chains on a global scale.

Exhibit 2

### Overview of events disrupting supply chains in the last 10 years



Source: Adapted from Bain & Company, ISM report; Resilinc

# THE RISE OF SUPPLY CHAIN RESILIENCE – PRIORITIES ON THE RISK AGENDA

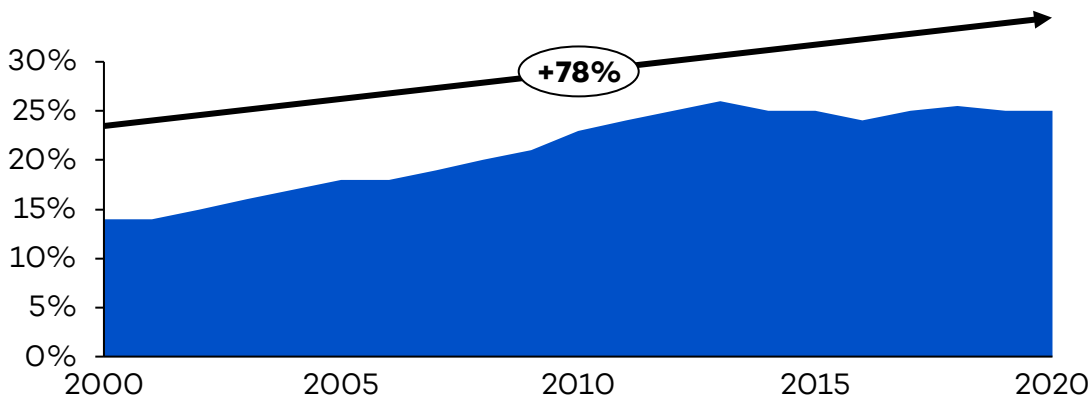


**Looking back: In the last 20 years, world trade with high political risk countries nearly doubled**

Not only are supply chain disruptions becoming more frequent. As Exhibit 3 highlights, world trade with high political risk countries has nearly doubled, rising from 14% in 2000 to 25% in 2020. As such, companies should not solely blame disruptions for the current misery but also acknowledge that parts of the current situation are homegrown because there was an exclusive focus on cost and less on other aspects such as risk and sustainability.

Exhibit 3

## Global trade share with bottom quartile political risk countries

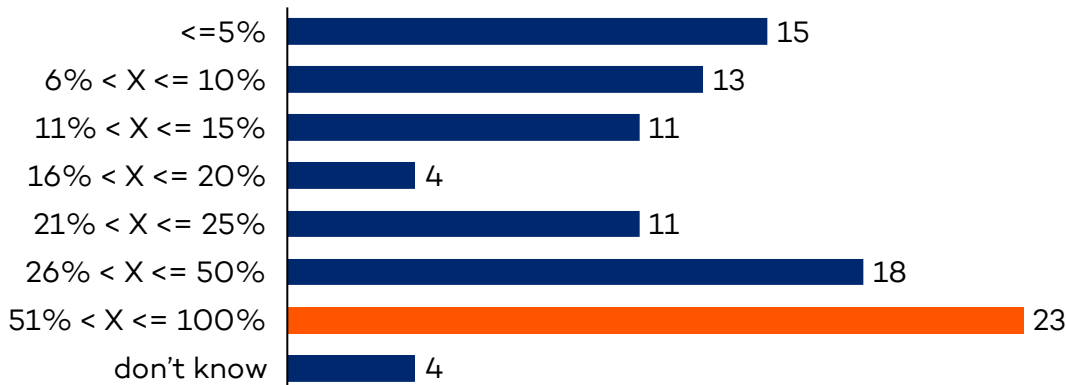


Source: Adapted from Savills Research; World Bank and UNCTAD data

Besides global trade with high political risk countries, another significant inducer and root cause for risk susceptibility is that a large share of spend remains with critical suppliers. In this context, “critical” means that if the supplier drops out and cannot deliver, production will come to a halt. Exhibit 4 shows that, on average, one-third of total spend is concentrated with critical Tier-1 suppliers.

Exhibit 4

## Percentage share of spend on critical Tier-1 suppliers, # of companies by cohort



Source: State of Supply Chain Resilience Survey; Procurement Initiative (2022)



**50%**

of the world's neon gas production is produced by Ukrainian suppliers



**90%**

of rare earth minerals are mined and processed in China



**66%**

of total foundry revenues in semiconductor manufacturing is generated by Taiwan

# ADDRESSING UNCERTAINTY – THE NEED FOR SUPPLY CHAIN RESILIENCE AS MEANS OF INSURANCE



## Supply chain resilience soaring on the tailwinds of black swans

Based on the preceding reasoning, COVID-19 was not the trigger for supply chain resilience but rather just one of several disruptions that have occurred over the past decade, urging companies to rethink their operations and prepare for the next crises. However, to build supply chain resilience as insurance in the face of increasing uncertainty, organizations must adapt their supply chain processes and structures.

## There is no free lunch – An impetus to reflect on supply chain resilience

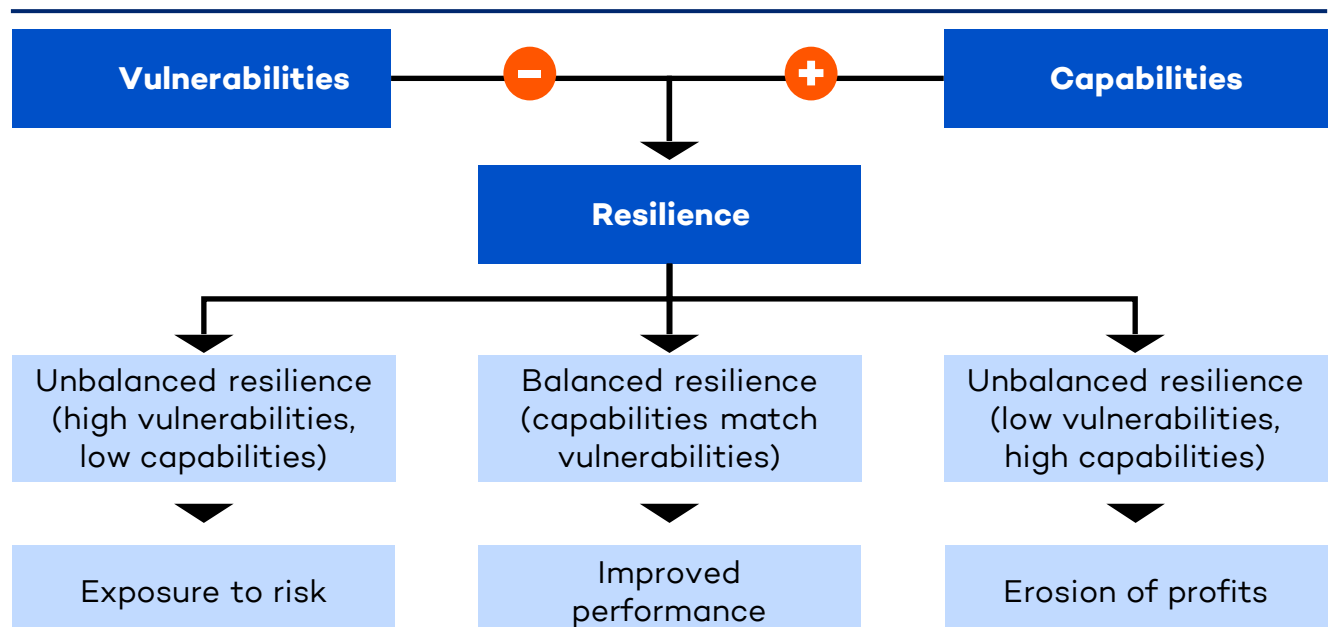
One possible explanation for why this insurance was not adequately built in the past is that there is no such thing as free lunch when building supply chain resilience. Reducing supply chain risk while maintaining profits is arguably one of the biggest challenges in corporate risk management (Chopra & Sodhi, 2004). Practitioners often struggle to achieve a state of balanced resilience in which management capabilities align with a company's vulnerabilities. Therefore, our survey aims to assess the degree to which companies are currently exposed to risks and whether they have implemented effective management controls. In line with Pettit et al. (2010; 2013), we developed a measurement instrument following two core concepts:

- **Vulnerabilities:** fundamental factors that make a company susceptible to disruptions, such as exposure to resource limits or supplier disruptions.
- **Capabilities:** fundamental attributes that enable a company to anticipate and overcome disruptions, such as flexibility in sourcing and supply chain visibility.

Appendix A1 & A2 provide a detailed overview of the vulnerability and capability constructs, along with the subfactors we used. Based on the measurement of subfactors and constructs, we offer managers an initial assessment of their resilience strengths and weaknesses, thereby revealing areas for improvement regarding their current state of supply chain resilience.

Exhibit 5

### Research model based on the Supply Chain Resilience Framework



# TOWARD AN OPTIMAL STATE OF SUPPLY CHAIN RESILIENCE



## A full range of motion in the resilience fitness space

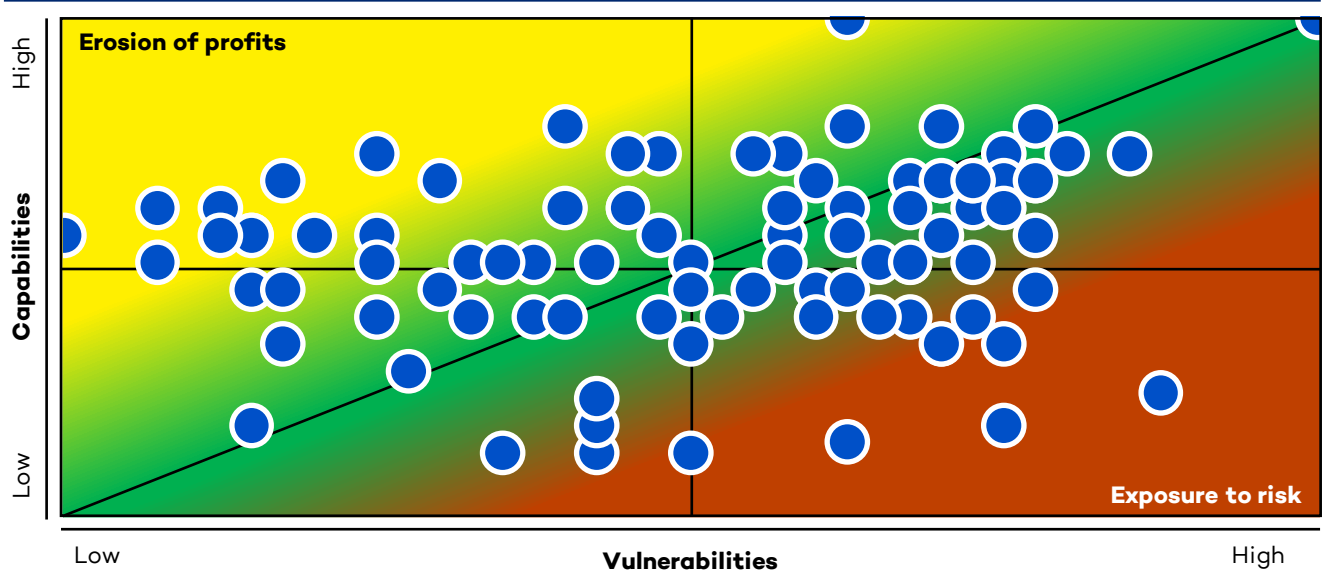
Based on the presented research model, companies should align their capabilities with their exposed vulnerabilities. To evaluate a company's current state of supply chain resilience, we distinguish three possible areas (Pettit et al., 2013):

- ▶ **Zone of balanced resilience:** a balance between capabilities and vulnerabilities leading to improved performance (capabilities match vulnerabilities)
- ▶ **Erosion of profits:** an imbalance between capabilities and vulnerabilities resulting in reduced profitability (high capabilities, low vulnerabilities)
- ▶ **Exposure to risk:** an imbalance between capabilities and vulnerabilities leading to increased risk exposure (low capabilities, high vulnerabilities)

Exhibit 6 provides an overview of the three potential states of supply chain resilience clustering the surveyed companies according to their self-assessed capabilities and vulnerabilities.

Exhibit 6

### The resilience fitness space (Adapted from Pettit et al. 2010, 2013)



Note:

State of Supply Chain Resilience Survey; Procurement Initiative (2022)

Blue circles represent one company in our survey

Positioning of companies is based on a resilience score R, ranging from 0% to 100%

R is based on a firm's average vulnerability score V ( $V = \sum V_j / n$ ), and the average capability score C ( $C = \sum C_i / n$ )

Computation of  $R = (C - V + 6) / 12$ , using a 7-point Likert scale for  $C_i$  and  $V_j$

## A heavy blow emphasizing the need for adjustment

While some companies are approaching an optimal state of resilience (as indicated by the centerline), our results suggest that there is still potential for further improvement to close resilience gaps in the zone of balanced resilience (green area). Furthermore, as most companies fall below the centerline, companies have, on average, higher vulnerabilities than capabilities. More specifically, we observe that a substantial 18% of companies are on the brink of or already experiencing excessive risk (red area). These companies are more likely to be severely impacted by supply chain disruptions.



# ASSESSING THE CURRENT STATE OF SUPPLY CHAIN RESILIENCE – VULNERABILITIES



## Assessment results: Vulnerabilities

Gaining awareness of the current vulnerability exposure is a necessary first step to improving overall supply chain resilience. Exhibit 7 provides an overview of the average vulnerability scores and their dispersion among all respondents in our survey. Overall, it can be observed from the company responses that agreement with vulnerability exposure is higher than disagreement. Interestingly, the only exception is in the area of customer disruptions, which respondents tend to disagree with being exposed to. More specifically, we identify three key observations:



**Resource limits:** constraints based on the availability of production factors, such as supplier capacity, raw material availability, and human resources, represent the most significant vulnerability across all companies.



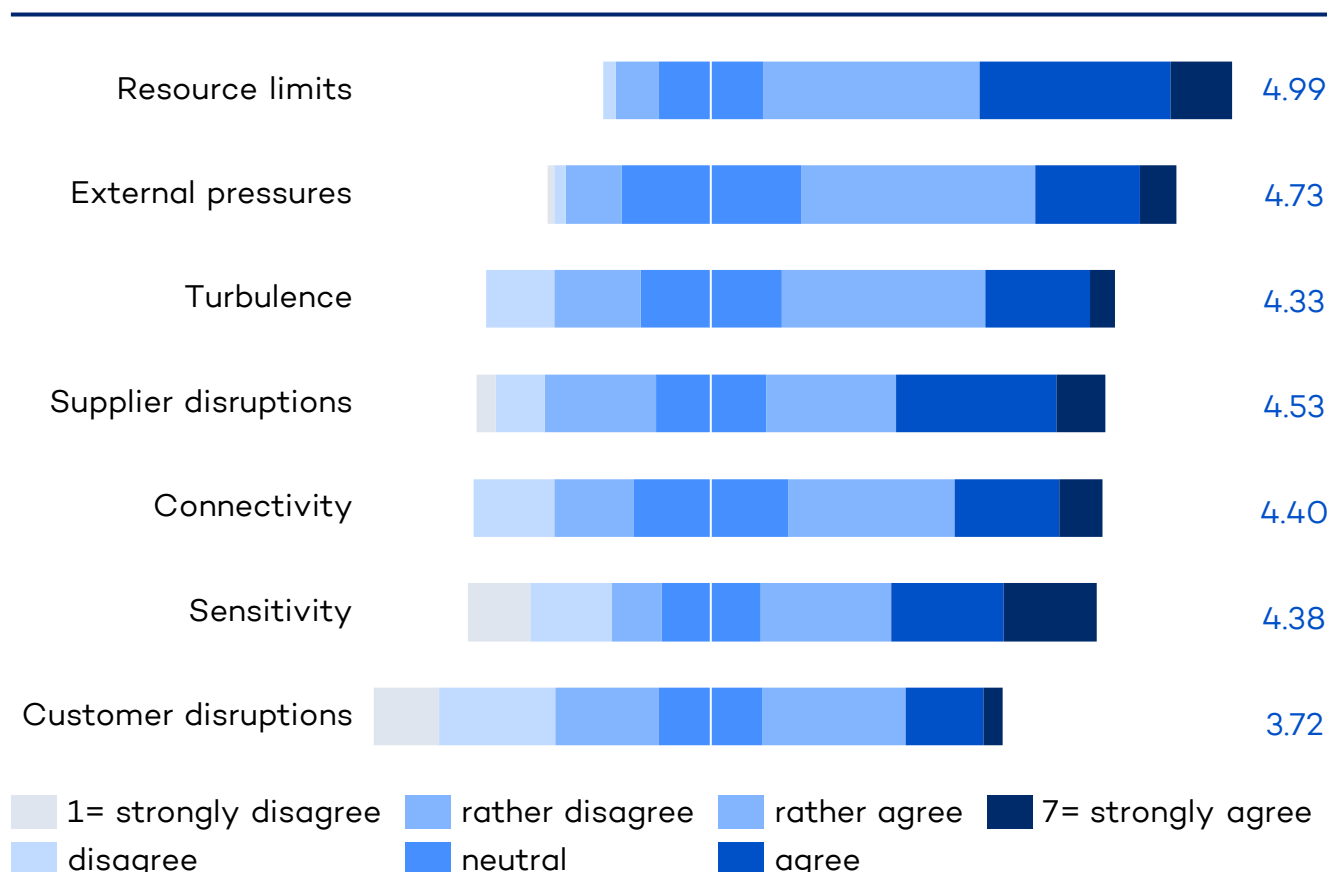
**Sensitivity:** at the positive extreme, most companies strongly agree that they are particularly vulnerable to having carefully controlled processes in place, such as equipment reliability.



**Customer disruptions:** at the negative extreme, most companies strongly disagree that their customers are susceptible to external forces and disruptions, such as sudden changes in demand.

Exhibit 7

### Dispersion of vulnerability scores among respondents



# ASSESSING THE CURRENT STATE OF SUPPLY CHAIN RESILIENCE – VULNERABILITIES

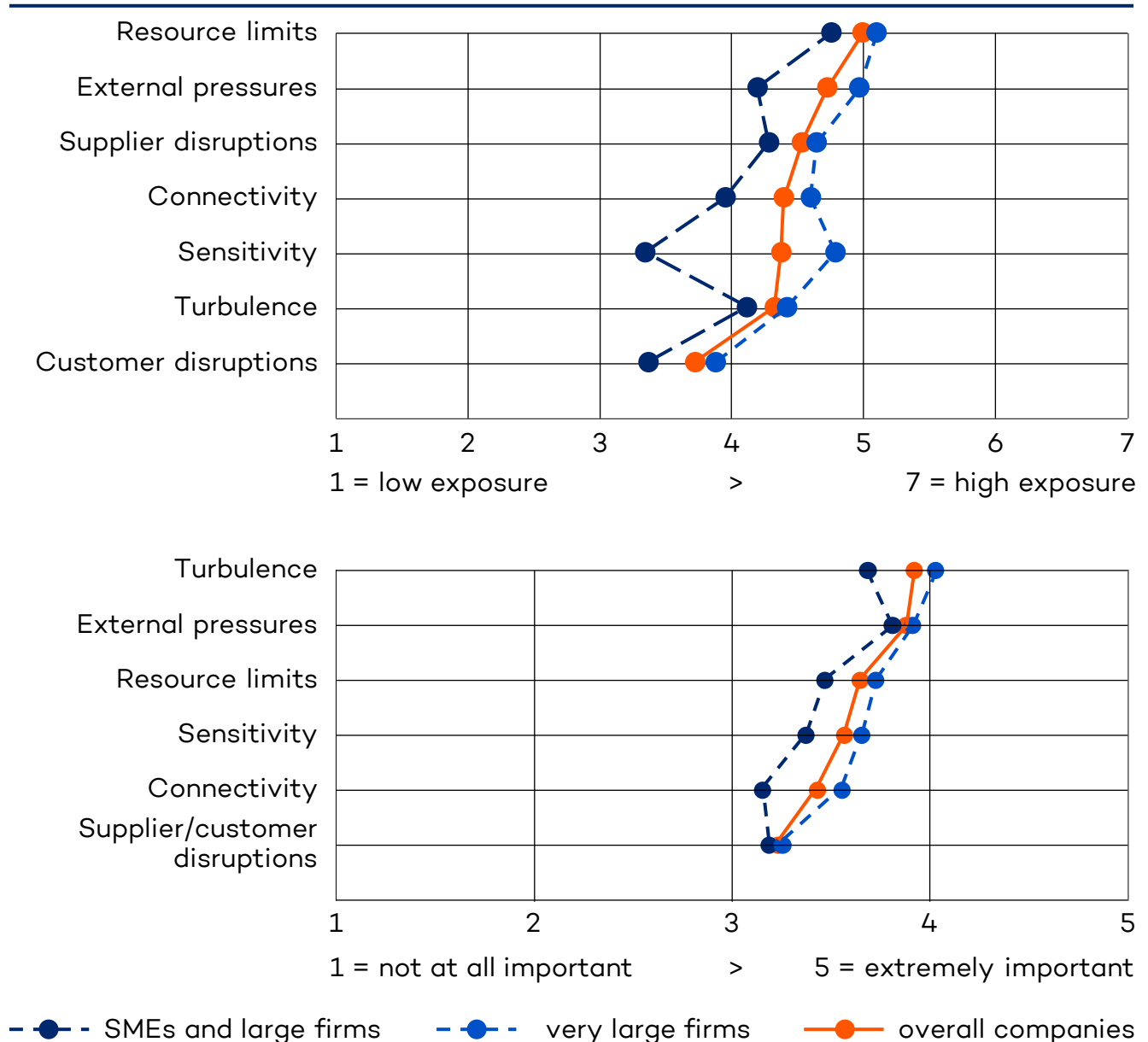


## Assessment results: Vulnerability scores and importance

While the dispersion of data provides initial insights, Exhibit 8 offers a ranked list of vulnerability scores and their perceived significance. Upon closer examination, SMEs and large firms report lower vulnerability scores and perceived importance compared to very large companies. We explain this gap across all items by the rather local footprint of SMEs and large firms. In particular, we note a significant difference in vulnerability scores for “external pressures” and “sensitivity”. Our analysis suggests that SMEs, unlike very large companies, are less impacted by political and regulatory changes and have less complex products or less extensive supply chain processes. Both SMEs and very large companies identify “resource limits”, particularly the challenges of recruiting and retaining highly skilled workers and securing raw materials, as a significant concern.

Exhibit 8

### Vulnerability scores and importance ranking



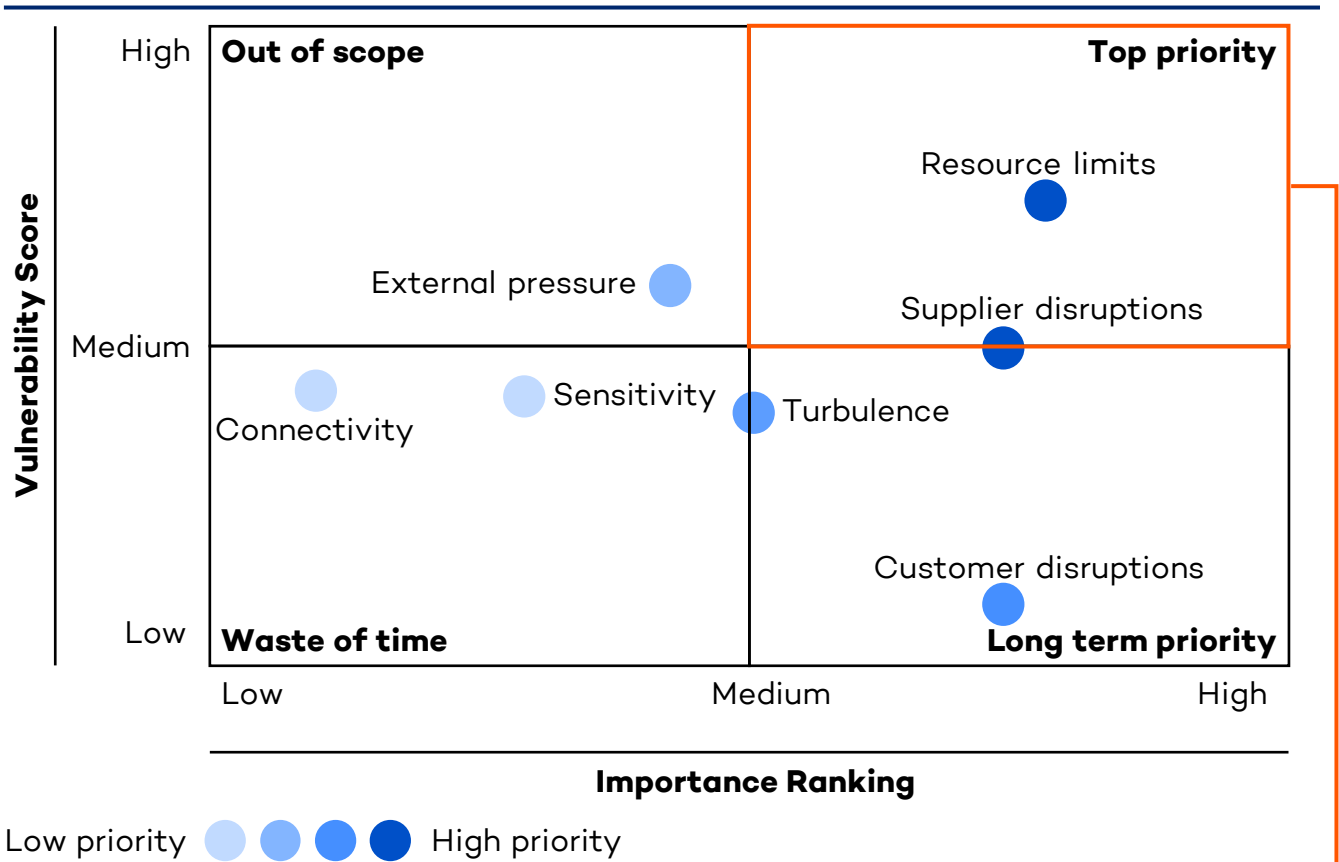
# ASSESSING THE CURRENT STATE OF SUPPLY CHAIN RESILIENCE – VULNERABILITIES

## Prioritization of vulnerabilities

Regardless of the company size, a major concern for companies are vulnerabilities with a high score and high importance. Therefore, mapping the factor scores of vulnerabilities with their relative importance helps us to identify and prioritize specific supply chain resilience vulnerabilities. Exhibit 9 provides an overview of top priority vulnerabilities given their scores and importance ranking (overall companies).







Exhibit 9

Prioritization of vulnerabilities averaged across all firms



### Vulnerability – Top priority

Across our sample of participants, our data suggests that companies are particularly vulnerable and assign high importance to:

1	Resource Limits	2	Supplier disruptions
	Supplier capacity		Geographical and product diversification
	Raw material availability		Financial resources
	Workforce availability and capability		Transparency regarding operations and production processes

# ASSESSING THE CURRENT STATE OF SUPPLY CHAIN RESILIENCE – CAPABILITIES



## Assessment results: Capabilities

As indicated, companies should not only consider their susceptibility to risk based on their vulnerabilities but also build adequate capabilities that can help companies in three stages: prevention, mitigation, and adaptation. To this end, Exhibit 10 provides an overview of the average capability scores and their dispersion among all survey respondents. Overall, most companies build reactive resilience capabilities, such as the ability to recover fast from crises. Interestingly, concurrent resilience capabilities such as visibility or flexibility in order fulfillment are less pronounced.



**Recovery:** most companies agree that they excel at mobilizing their resources to manage crises and mitigate the consequences of a disruption.



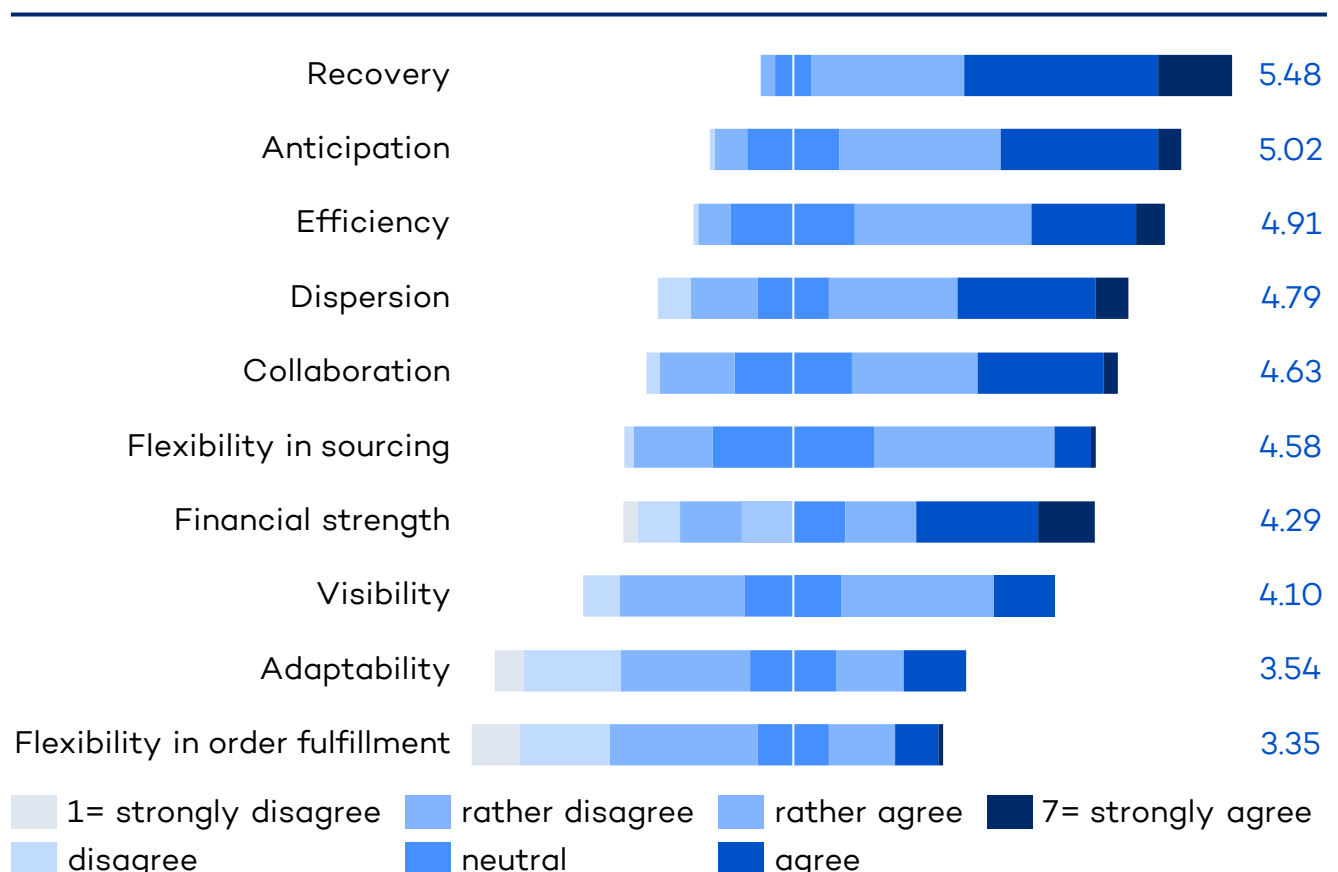
**Anticipation:** besides the ability to recover fast, most companies state that they are particularly able to anticipate future events by monitoring early warning signals and ensuring business continuity.



**Flexibility in order fulfillment:** at the negative extreme, most companies strongly disagree that they can quickly change outputs or the mode of delivering outputs, such as postponement or alternate logistics channels.

Exhibit 10

### Dispersion of capability scores among respondents



# ASSESSING THE CURRENT STATE OF SUPPLY CHAIN RESILIENCE – CAPABILITIES

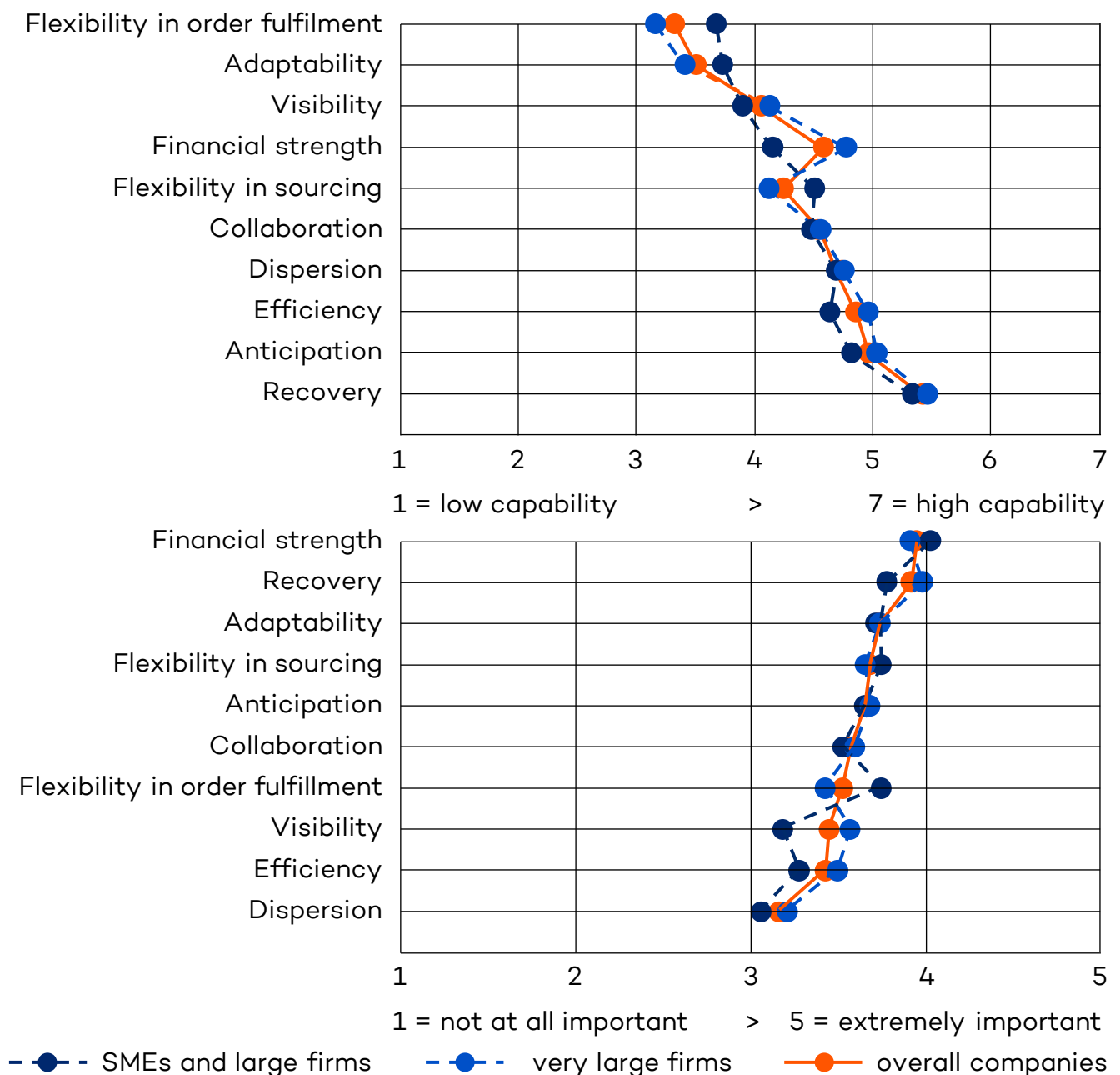


## Assessment results: Capability scores and importance

While the dispersion of data provides initial insights, Exhibit 11 offers a ranked list of capability scores (low to high) and perceived importance (high to low). Overall, SMEs and large firms report lower capability scores than very large companies. We explain this gap across all items due to the higher vulnerabilities and the excess resources in very large companies. Besides the differences based on organizational size, we note a significant gap in the capability priority based on scores and associated importance. For instance, while the ability to recover scores high, most companies also attribute high importance. In contrast, most companies perceive flexibility in order fulfillment to be important but indicate a low capability at it.

Exhibit 11

### Capability scores and importance ranking



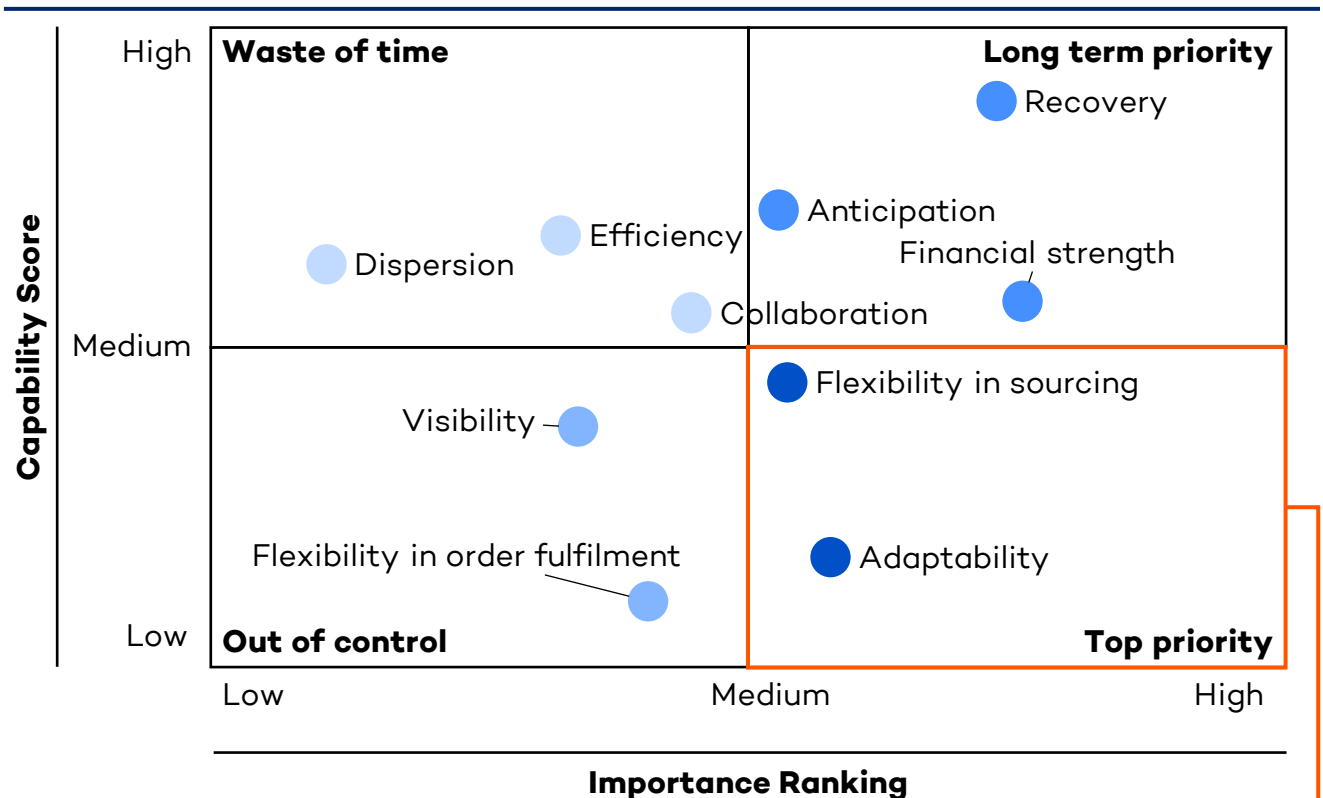
# ASSESSING THE CURRENT STATE OF SUPPLY CHAIN RESILIENCE – CAPABILITIES

## Prioritization of capabilities

Building on the preceding analysis, mapping the factor scores of capabilities with their relative importance helps us to identify and prioritize specific supply chain resilience capabilities. Exhibit 12 provides an overview of top priority capabilities given their scores and assigned importance across our sample of participants.

Exhibit 12







### Prioritization of capabilities averaged across all firms



**Firm Priority** Low priority ● ● ● ● High priority

### Capability – Top priority

Across our sample of participants, our data suggests that companies should prioritize the following capabilities based on factor scores and importance:

1	Adaptability	2	Flexibility in Sourcing
 Fast re-rerouting of requirements		 Modular product design	
 Lead time reduction		 Supplier contract flexibility	
 Strategic gaming and simulation		 Multi-sourcing (multiple sources in multiple countries)	

# BUILDING SUPPLY CHAIN RESILIENCE – A BALANCING ACT BETWEEN VULNERABILITIES AND CAPABILITIES



## Supply Chain Resilience Dashboard

In the realm of supply chain resilience, simply knowing one's position is insufficient. Managers require actionable insights to enhance their strategies. Recognizing that each company thrives in a unique environment, we introduce the Supply Chain Resilience Dashboard to offer customized guidance for bolstering resilience while addressing specific needs and circumstances.

Our framework perceives vulnerabilities as inherent aspects of the supply chain environment that can be mitigated by developing appropriate capabilities. To achieve this, managers must discern the connections between vulnerabilities and capabilities. For instance, if a company grapples with connectivity issues like high supplier concentration as a key vulnerability, it must identify the optimal capability – or even better, a portfolio of capabilities – that will best safeguard the organization from disruptions while considering all vulnerabilities.

Drawing on Pettit et al. (2013), we identified 38 distinct connections between capabilities and vulnerabilities, creating a dashboard that delivers a transparent overview of an organization's supply chain resilience status. Our dashboard features resilience gaps for each vulnerability-capability linkage, empowering organizational leaders to pinpoint areas for improvement.

Resilience gaps illustrate the deviation from the theoretical optimal state of balanced resilience for each vulnerability-capability pairing, based on the self-assessed 7-point Likert scale. Positive (yellow) gaps signify capabilities surpassing their associated vulnerabilities, which could potentially diminish profits. Conversely, negative (red) gaps indicate capabilities falling short of their corresponding vulnerabilities, leaving the organization exposed to potential risks.

Exhibit 13

### Prioritization of capabilities averaged across all firms

Capability   Vulnerability	V1: Turbulence	V2: External Pressures	V3: Resource Limits	V4: Sensitivity	V5: Connectivity	V6: Supplier Disruptions	V7: Customer Disruptions
C1: Flexibility in Sourcing	-1% →		-12% ↗		-2% →	-4% →	9% ↘
C2: Flexibility in Order Fulfillment	-16% ↗		-27% ↗		-17% ↗	-20% ↗	-6% →

Exhibit 13 showcases a segment of the resilience dashboard. Executives can utilize this visual representation to pinpoint pertinent resilience gaps in their supply chain operations. It is important to emphasize that a positive gap does not automatically suggest a company should decrease the associated capability, as it may serve strategic purposes beyond resilience considerations. Page 16 provides an overview of the dashboard with the collected survey data.

# MONITORING THE CURRENT STATE OF SUPPLY CHAIN RESILIENCE



## Supply Chain Resilience Dashboard





# RECOVERY ON THE HORIZON?

## POTENTIAL WAYS FORWARD



### Leveraging the Supply Chain Resilience Dashboard

Understanding the current state of resilience based on our dashboard is a solid first step. However, to get to the next level and derive tailored recommendations for action, managers must consider three patterns going forward:



**Monitoring resilience** capabilities and vulnerabilities over time to identify room for improvement and close existing gaps.



**Thinking cross-functional** becomes key as single perspectives don't paint the picture. Different stakeholder views need to be integrated into the resilience dashboard.



**Understanding company and industry specifics** requires a fundamental examination of the underlying supply chain and capability priorities.

To demonstrate the effectiveness of our dashboard in enhancing supply chain resilience, let's examine a hypothetical scenario: a capital-intensive organization within the heavy-machinery sector that manufactures long life-cycle products like construction equipment. Using Cohen et al.'s (2022) triple-P framework, this company should customize its resilience strategy and capability focus in alignment with its supply chain's product, partnership, and process characteristics:



**Product complexity:** the need for fixed and highly specialized manufacturing infrastructure limits outsourcing options, as seen in the semiconductor industry. Strategy: diversify geographical footprint



**Partner complexity:** high product diversity and different components require a complex, multi-tiered supply chain, such as in the automotive industry. Strategy: build supply chain visibility



**Process complexity:** a broad product portfolio with varying supply chain requirements, such as the use of contract manufacturers with short and long lead times. Strategy: standardize processes

In our illustrative scenario, product complexity poses the most significant challenge to resilience. Consequently, we advise the company to adopt technology and expand its geographical presence to counter risk, instead of relying solely on a broad supplier portfolio. Based on this evaluation, the organization in our example should prioritize harnessing the following three capabilities from our resilience dashboard: sourcing flexibility, order fulfillment flexibility, and dispersion (see Appendix A2).

By leveraging our dashboard, procurement organizations can generate value not only through traditional net savings but also by diversifying their supplier base, evading costs, and outperforming competitors. Time to shine for Procurement.

## ABOUT THE PROCUREMENT INITIATIVE



The Procurement Initiative is a modern think tank and a platform for people who want to shape the future of procurement. We live in a world where uncertainty and crises are the new normal. And that is exactly why we believe in a new purpose of procurement: to take full responsibility for creating and orchestrating global supply chains that positively impact the needs for viable and sustainable businesses, a prosperous society, and a healthy planet alike.



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## A1: Vulnerabilities<sup>6,7</sup>

We used 7 constructs and related subfactors to measure vulnerabilities. Survey responses were designed in ordinal form using the 7-point Likert scale strongly disagree/strongly agree.

Factor	Vulnerability	Definition	Subfactors
V1	Turbulence	Environment characterized by frequent changes in external factors beyond your control	Natural disasters, Geopolitical disruptions, Unpredictability of demand, Fluctuations in currencies and prices, Technology failures, Pandemic
V2	External pressures	Influences, not specifically targeting the firm, that create business constraints or barriers	Competitive innovation, Social/Cultural change, Political/Regulatory change, Price pressures, Corporate responsibility, Environmental change
V3	Resource limits	Constraints on output based on availability of the factors of production	Supplier, Production and Distribution capacity, Raw material and Utilities availability, Human resources
V4	Sensitivity	Importance of carefully controlled conditions for product and process integrity	Complexity, Product purity, Restricted materials, Fragility, Reliability of equipment, Safety hazards, Visibility to stakeholders, Symbolic profile of brand, Concentration of capacity
V5	Connectivity	Degree of interdependence and reliance on outside entities	Scale of network, Reliance upon information, Degree of outsourcing, Import and Export channels, Reliance upon specialty sources
V6	Supplier disruptions	Susceptibility of suppliers to external forces or disruptions	Supplier reliability
V7	Customer disruptions	Susceptibility of customers to external forces or disruptions	Customer disruptions



## A2: Capabilities<sup>6,7</sup>

We used 10 constructs and related subfactors to investigate capabilities. Survey responses were designed in ordinal form using the 7-point Likert scale strongly disagree/strongly agree.

Factor	Capability	Definition	Subfactors
C1	Flexibility in sourcing	Ability to quickly change inputs or the mode of receiving inputs	Part commonality, Modular product design, Multiple uses, Supplier contract flexibility, Multiple sources
C2	Flexibility in Order Fulfillment	Ability to quickly change outputs or the mode of delivering outputs	Alternate distribution channels, Risk pooling/sharing, Multi-sourcing, Delayed commitment/Production postponement, Inventory management, Rerouting of requirements
C3	Efficiency	Capability to produce outputs with minimum resource requirements	Waste elimination, Labor productivity, Asset utilization, Product variability reduction, Failure prevention
C4	Visibility	Knowledge of the status of operating assets and the environment	Business intelligence gathering, Information technology, Product, equipment and people visibility, Information exchange
C5	Adaptability	Ability to modify operations in response to challenges or opportunities	Fast rerouting of requirements, Lead time reduction, Strategic gaming and simulation, Seizing advantage from disruptions, Alternative technology development, Learning from experience
C6	Anticipation	Ability to discern potential future events or situations	Monitoring early warning signals, Forecasting, Deviation and near-miss analysis, Risk management, Business continuity/preparedness planning, Recognition of opportunities
C7	Recovery	Ability to return to normal operational state rapidly	Crisis management, Resource mobilization, Communications strategy, Consequence mitigation
C8	Dispersion	Broad distribution or decentralization of assets	Distributed decision making, Distributed capacity and assets, Decentralization of key resources, Location-specific empowerment, Dispersion of markets
C9	Collaboration	Ability to work effectively with other entities for mutual benefit	Collaborative forecasting, Customer management, Communications, Postponement of orders, Product life cycle management, Risk sharing with partners
C10	Financial strength	Capacity to absorb fluctuations in cash flow	Insurance, Portfolio diversification, Financial reserves and liquidity, Price margin

# APPENDIX



## A3: Cronbach's Alpha

All survey constructs are acceptable based on Cronbach's alpha as an unbiased estimator of internal consistency.

	<b>V1</b>	<b>V2</b>	<b>V3</b>	<b>V4</b>	<b>V5</b>	<b>V6</b>	<b>V7</b>
Cronbach's Alpha	.795	.733	.728	-	.725	-	-
Sample size	98	99	97	96	94	93	93

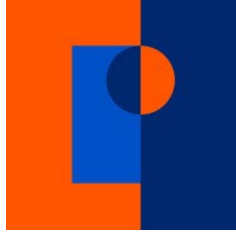
	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>C5</b>
Cronbach's Alpha	.746	-	.708	.814	-
Sample size	87	84	92	86	95

	<b>C6</b>	<b>C7</b>	<b>C8</b>	<b>C9</b>	<b>C10</b>
Cronbach's Alpha	.753	.818	-	.714	-
Sample size	90	95	93	86	95

Note:

Sample size due to listwise deletion of missing or «don't know» responses, N = 102

We accept items with a Cronbach's alpha of .7 or greater



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