

# Periculum™

## HERE TODAY, GONE TOMORROW

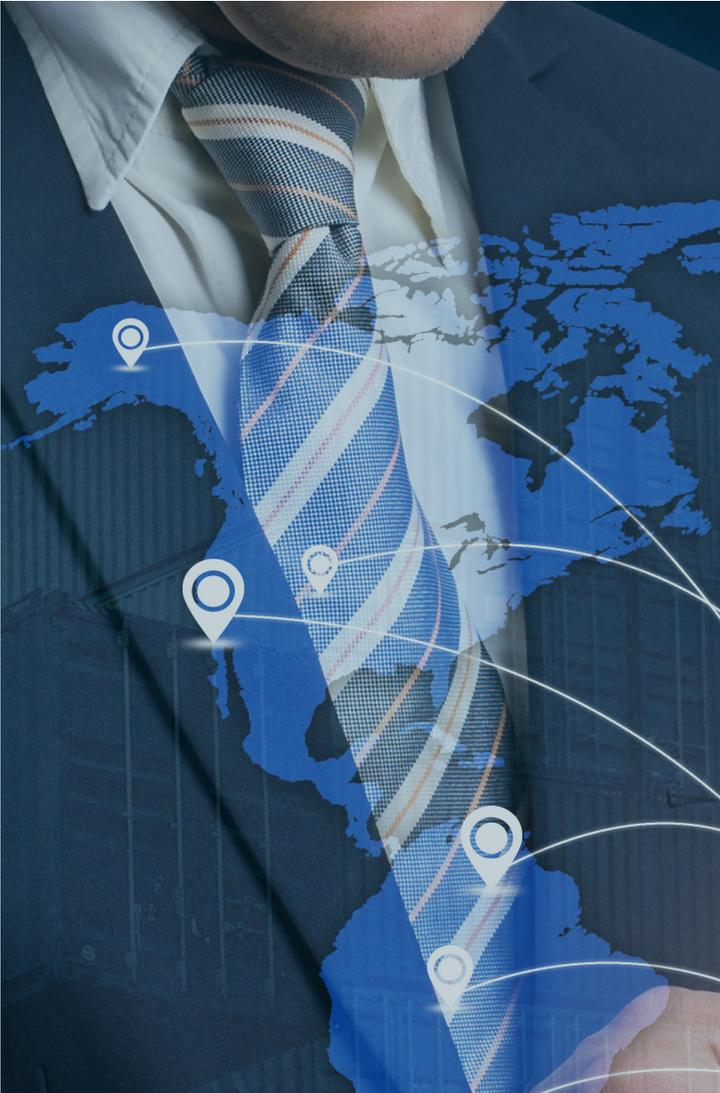
Pre-empting Supply  
Chain Disruptions



In collaboration with:

**Accelor**Corp 

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# INTRODUCTION

For many companies, the supply chain is the lifeline of the company. A failure of the supply chain can cause severe delays in product shipments, lost revenues, share price devaluation, damaged or lost customer relationships, and lasting reputational damage.

As supply chains are being transformed by technology, globalization, and new lower-cost competitors, the complexity and severity of vulnerabilities within the supply chain are multiplying – placing some supply chains at risk of being here today, gone tomorrow.



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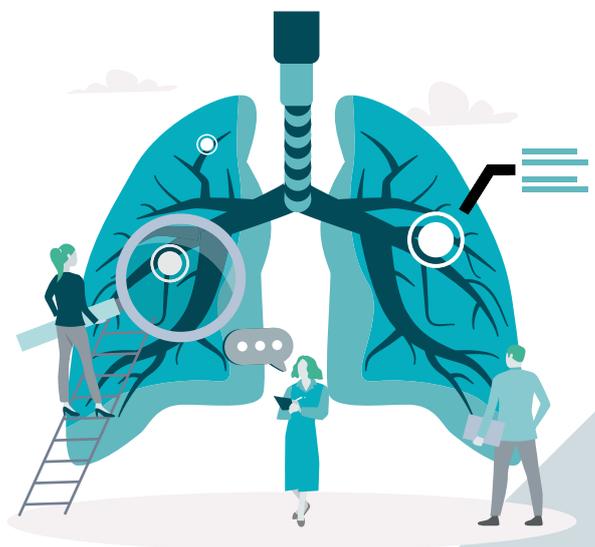
Your supply chain is the oxygen that keeps your business breathing. Like breathing, your supply chain is not optional. Maintaining continuity of supply is as vital to your operation as breathing is to living.

Further, your customers rely on your supply chain just as much as you do. Resilience in the supply chain is as essential to their operations as it is to yours. They need to know you can meet your product and service commitments because disruptions in your supply chain means lost business for you and your customers.

Supply chain disruption costs are harsh. A study of 800 companies that reported a supply chain event in their filings to the SEC found that companies who experienced a disruption event saw 7% less sales growth versus their peers in the first year and 38% less growth in shareholder value versus their peers three years after the event.<sup>1</sup>

**The question is not whether a disruption will happen; it is when, how to see it evolving, and what to do to pre-empt it.** Predictive supply chain risk mitigation requires forward-looking event predictions that increase visibility, so you can find ways to avert crisis and mitigate your exposure to revenue loss, share price devaluations, reputational damage and lost customers.

When a failure happens, your investors become concerned about their returns; customers want to be informed immediately to know what their options are for maintaining continuity; and stakeholders demand answers on how the risks were addressed and what contingencies were in place. And your investors grow concerned about their returns. This paper addresses the detection of supply chain disruptions using predictive analytics. For a thorough discussion on operational resilience, refer to our paper, “Ready. Set. Crisis.” that provides practical solutions for embedding operational resilience into all aspects of your corporate risk governance.<sup>2</sup>





## Example mass scale disruption events occur on a regular basis:

### Fires and Power Outages

Destructive forces like the wildfires in California disrupted key suppliers and sub-tier sites. Weather events, transformer explosions, and accidents cause many power outages each year that affect production and delivery, like the 2018 Hokkaido Eastern Iburi earthquake that knocked out power to 2.95 million people and caused approximately \$124 million in damaged goods.



### Geographical

We are seeing more “100-year” events happening than ever before. For example, in the U.S., Houston, Texas has experienced three 500-year floods in the last five years.



### Political

Regulatory and political decisions like pollution controls in China and Thailand, EU exit referendums, secession movements, trade wars, and tariff threats increase uncertainty and are forcing supply chains to be adaptive to sudden and sometimes unpredictable events.



### Cyberattacks

The increasing number of cyberattacks includes recent large scale malware, ransomware, and data breaches and state-sponsored commercial espionage.



# CONTROLLING SUPPLY CHAIN RESILIENCE

Though supply chains are integral to meeting customer demands, companies still struggle with supply chain resilience.

If the supply chain breaks, everything can fall apart. Aligning supply chain resilience objectives with your business strategy is key. However, in one study, over half of participating leaders did not think supply chain needed to be closely aligned to general business strategies.<sup>3</sup>

Effective supply chain risk management requires close alignment between the supply base and your company, and it is important to be alert to a false sense of safety. A supply chain may seem strong because there are two alternative suppliers at any given link within the chain, but do you know the risks to both suppliers? Perhaps the suppliers are located in the same area where they, and other suppliers, could be shut down by a single event. Alternately, both of your suppliers could have the same dependencies on common sub-tier suppliers.

Early detection of materializing risks means you can devise plans to mitigate incident probability and impact. Systemic risks can interrupt the performance of the supply chain in its entirety which can have far-reaching consequences.



**Traditional risk management procedures focus on close risk detection and post-event learning, but there has been an evolution in risk management practices that means you can stop reacting to and begin pre-empting adverse events.**

# ADDRESSING RISK TO SUPPLY CHAIN PERFORMANCE

Resilience is the ability of a company to prepare for and hold up against unforeseen crises and adapt to the changes that occur during and afterward (whether the event is unforeseen or not). Your level of supply chain resilience determines your company's performance, integrity, and reputation.

## Supply chain risk management exists to:

 Identify

 Assess

 Manage

 Mitigate

 Govern

Risks that could have an adverse effect on your company's performance.

Organizations must address an ever-increasing universe of risks. Here, we propose six risk areas that are essential to establishing resilient supply chains through pre-emptive supply chain risk management. Every supply chain is exposed to unique risks that are determined by industry, product complexity, delivery model, competition, and other distinct factors.

### 1. Quality

A deviation in quality can lead to severe product defects, such as an engine explosion on an airline jet or a large-scale product recall. When products malfunction or are not safe for the public, companies lose the trust of their customers.

**CASE STUDY:** An international auto manufacturer recalled 660,000 trucks due to a nut in the vehicle's steering system that could come loose and create an inability to steer. They had to recall an additional 222,000 models when they discovered their adjustable pedal could fall off if adjusted to certain positions creating a dangerous situation.

### 2. Quantity

Preparing product as-you-go may seem like the cost-efficient option, but if a disruption in the supply chain occurs, you may not have the product you need to continue your operation. **It's important to look for systemic risks that could disrupt multiple suppliers and subcontractors.**

**CASE STUDY:** Rare earth minerals are a growing concern across many spectrums, including the future of green energy. Ker Than wrote in a Stanford article, "The supply chains for critical and rare minerals are vulnerable to political and economic disruptions that could hamper the global shift to a renewable energy future."<sup>4</sup> China produces more than 90% of the world's rare earth minerals. In the event of a conflict, they could raise the prices or block nations entirely.<sup>5</sup>



3.

### Delivery

**Delays in shipping essential materials and components could postpone delivery of the end-product to the customer.** This often results in financial and reputational damages influencing future business prospects.

**CASE STUDY:** In 2017, a global shipping company experienced one of the biggest disruptions to hit global shipping when a virus spread through its system. 20% of their business dropped during this time as they ceased operations in some parts of the world. The rest had to manage manually for 10 days, affecting delivery around the world.

4.

### Capacity

**Capacity constraints can have severe effects on the company's ability to meet production targets and customer commitments. Long-term capacity fluctuations should be planned years in advance to ensure the supply chain collectively builds the capacity required to support the end-production targets.**

**CASE STUDY:** An international aircraft manufacturer introduced a new airplane which has become the "fastest selling plane in history." The company recreated their supply chain fit for the distinct needs of the airplane but quickly ran into quality defects, employee strikes, product shortages, and other supply chain problems. As a result, the Dreamliner was delivered three years late.

5.

### Compliance with laws and standards

**Failure to comply with local and international laws can result in sanctions and severe reputational damage.** This does not just happen for your company—it also applies to everyone in your supply chain. So, you have to continuously monitor compliance to the international and local laws that could affect your supply chain.

**CASE STUDY:** Due to a shortage in cobalt, a key mineral in smartphones and other electronic devices, a leading consumer electronics company wanted to go directly to the mines to obtain it independently. However, investigations have shown the use of child labor in those mines which violates the International Labor Organization's standards and many countries in which the electronics company sells.

6.

### Price

**Variations in prices within the supply chain can result in reduced margins and can turn a profitable product into a loss-making product.** Many industrial companies operate on thin margins, leaving little capacity to absorb unplanned price variations before having to make structural changes to their business – often resulting in delays to the delivery of strategic company objectives.

**CASE STUDY:** To balance intense global competition, some countries are leaning toward pro-nationalist policies on goods while other countries are challenged to balance global trade. For example, \$200 billion in import tariffs were placed on goods entering the U.S. from China as the U.S. Government attempted to balance trade between emerging countries. The tariffs hit companies like Pepsi, Walmart, and LG who were forced to raise prices of products, leading to lower demand. Likewise, several auto makers announced plans to pass the price impact directly to consumers. A spokesperson for one of the largest global auto manufacturers admitted that the tariffs would mean an \$1,800 increase in the price of their best selling model in which the electronics company sells.

**As these case studies illustrate, products and services depend on supply chains that are here today, but may be gone tomorrow. Advanced analytics help companies identify changes in operating conditions within the supply chain which provides early warning signals that pre-emptive action is required. Pre-empting risk requires commitment to proactively scan for possible health issues within the supply chain and create procedures and contingencies to avert them.**

# BUILDING A RESILIENT SUPPLY CHAIN: RECOMMENDED STEPS

To address risk, you need to embrace supply chain risk management through a programmatic approach.

By following the five steps outlined below, you can pre-empt materializing risks and begin improving the effectiveness of supply chain risk management to ensure the supply chain can meet the performance demands you require.

## 1 Map the supply chain

**Do you truly know your supply chain?** Your supply chain includes suppliers, subcontractors and sub-tiers. Unless you keep information on the web of participants within the supply chain, you have blind spots that could create issues across the six areas of potential risk (and other specific risks within your supply chain). In turn, this can lead to costly fixes, lost revenue, lost customers, and brand damage. To navigate your blind spots, start by mapping the supply chain.

Press beyond what you already know to learn who else exists in your ecosystem and what risks affect them. Be sure to include subcontractors, small and large manufacturers, and sub-tier sites. **Often, mapping the supply chain ecosystem requires the involvement of your suppliers to provide the insights needed.**

## 2 Determine supply chain exposure

To open the flow of communication and gain visibility, you should determine the exposure to risk within your supply chain. It is important to all risks to operations by assessing internal spheres in which disruption events are likely to occur. **Your supply chain risk exposure assessment should reach across several areas** (beyond those already mention in this paper):



**Strategy.** Which supplier failures could impede your ability to deliver on your strategic objectives? For example, perhaps your company has positioned itself as a leader in on-time delivery, but there are often blizzard threats in one of your service areas that would make delivery difficult or impossible. Considering alternative approaches to each point of strategy can make your position in the market stronger.



**Market.** Your suppliers and sub-suppliers face pressures that you may not know about, so it is important to assess not only your market, but theirs. Pressures on your supply chain may lead to suppliers exiting the market, no longer being liquid, or moving into a more profitable market. In some cases, you may be using a sole source supplier—what are the contingencies?



**Technology.** Do you know the technology dependencies of your supply chain? Many manufacturers are migrating to additive manufacturing, moving away from traditional methods of production and toward automated development. Anytime a technology migration occurs there will be teething problems that may cause delays or quality issues in production. This could lead to shortages that affect



your product quantity requirements or capacity to supply services such as ongoing maintenance or delivery of goods for the existing install base.



**Contracts.** Your contracts with your supply chain are a primary vehicle for formalizing terms and conditions that set out responsibilities between you and your parties. So, when a compliance issue occurs, who is responsible and who carries the legal risks?



**External Threats.** The location of your suppliers and their proximity to potential natural disasters and political or regulatory interruptions should be examined to better understand how the threats could affect delivery, quantity, capacity, quality, compliance, and price. It can be difficult to recover after natural disasters, but by assessing your supply chain's capabilities to mitigate risk, you can establish monitoring that helps you pre-empt the loss of a supplier.

These five examples, combined with other examples mentioned in this paper, are just a few of the most prominent areas of exposure to explore. It is important to investigate the entire universe of risks within the supply chain to adequately assess your exposure and the impact it could have on you and your customers.

### 3 Build continuous data flows

The supply chain needs to be studied and the lines of communication opened so you can gather risk information and deploy predictive analytics to direct your approach. When organizing your own assessment of supply chain risks, you should ask your suppliers (and their suppliers) these questions to orchestrate the flow of information:

1. What are the current threats and vulnerabilities within your supply chain?
2. What critical dependencies exist within your supply chain?
3. What incidents and events have occurred that disrupted the performance of your supply chain in the past five years?
4. What are you doing to control your current risk profile and address significant threats and vulnerabilities?
5. What types of controls do you use and how do you monitor performance?
6. Where are your subcontractors and sub-tiers located?
7. Are your suppliers and their subcontractors and sub-tiers treating their risks in the same manner as you?
8. How do you govern and oversee the treatment of risks within the supply chain?
9. What are your primary sources of visibility into the current and changing risk profile within your supply chain?

Information flow within the supply chain depends on open dialogue, trust, and a commitment to transparency across all participants. You are only as strong as the weakest link in your supply chain, so it is imperative that you treat risks pre-emptively to maintain resilience. The flow of information you receive will allow you to assess whether the supply chain is appropriately reporting current and changing risks and taking adequate steps to treat key threats and vulnerabilities.



## 4 Adopt advanced analytics

You can estimate the impact and probabilities of adverse events to move away from reactive behaviors and into predictive actions. **PredictLens™ is the first truly predictive risk analytics solution to predict, reduce, or eliminate risk impact.** By applying Key Risk Predictors, your company receives forewarning of escalating risks in the operating environment. You can determine the sites most likely to suffer an outage and which will make the biggest impact on your business when they do.

Machine learning data models help your company be more agile in the face of crisis, so your reactions come before the event, not after. You can find more information on PredictLens™ and advice on applying predictive analytics in our publication “RISK: See It, Solve It, Prevent It.”<sup>6</sup>

## 5 Prepare pre-emptive actions

If you are in the path of natural disasters, you might know a little something about putting together a survival kit. In California, earthquake preparedness kits are widely available, but you need to get them before an earthquake. During the disaster, it's too late.

**Preparing for organizational risk events is similar in that it must be done proactively.** You need to know what you are going to do in case of disruption. Are there contingency sites for production? What is the procedure for a cyber event? Who will lead and coordinate the recovery operation? What will you communicate to impacted customers? What are the protocols for managing media attention including social media?

The first sixty minutes of a crisis is decisive in determining how your brand and reputation survive during and after the crisis. It's like suffering an injury on the battlefield. Dr. R Adams Cowley once said: “There is a golden hour between life and death. If you are critically injured you have less than sixty minutes to survive. You might not die right then; it may be three days or two weeks later – but something has happened in your body that is irreparable.” Are you prepared?

Start by putting these basic practices in place:



Define a contingency plan with supply chain options, and ensure stakeholders within the supply chain are aware of the role they play in a disruption event.



Create procedures for dealing with the crisis, including outlining the roles and individuals responsible for each procedure.



Assign a crisis management team who is responsible for drawing up a crisis response plan, a recovery plan and performing crisis and recovery testing.



Conduct regular tests that involve executives and staff to ensure everyone knows how to behave and what procedures to initiate when.



Develop customer communications to provide informative and timely updates to customers, employees, investors, and other stakeholders on the nature of disruption, your proactiveness in addressing the event, potential impact, and other relevant information given the nature of event. The first 60 minutes of a crisis is decisive in determining how your brand and reputation survive during and after a crisis.



Periodically perform war games and scenario tests, including participants from within your supply chain, to assess your ability to recover from probable supply chain disruptions.



**Predictive analytics offers a “look around the corner” that reveals emerging risks.**



Recovery could take many months if you have not put these safeguards in place before a risk event. By using a programmatic approach, you can prepare with measures that shorten the recovery process.

You can monitor underlying changes in the operating environment within the supply chain for early visibility of materializing events. The end goal when examining your supply chain’s risks is to gather information that will allow you to effectively govern the supply chain and to take pre-emptive actions to avert disruption to you and your customers.

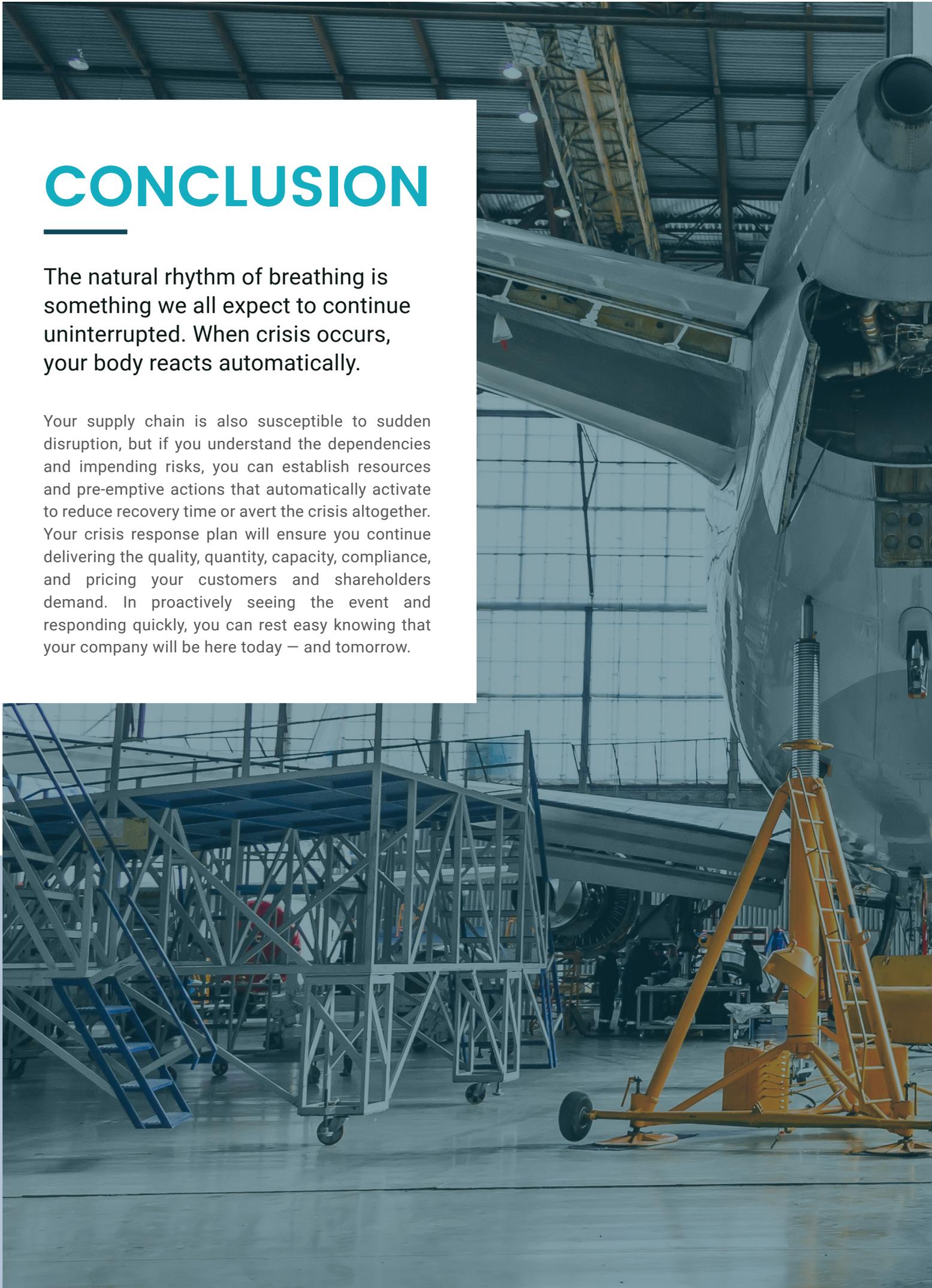
For more information on operational resilience, refer to our publication entitled: *Ready. Set. Crisis. What Are You Willing to Lose?*<sup>7</sup>

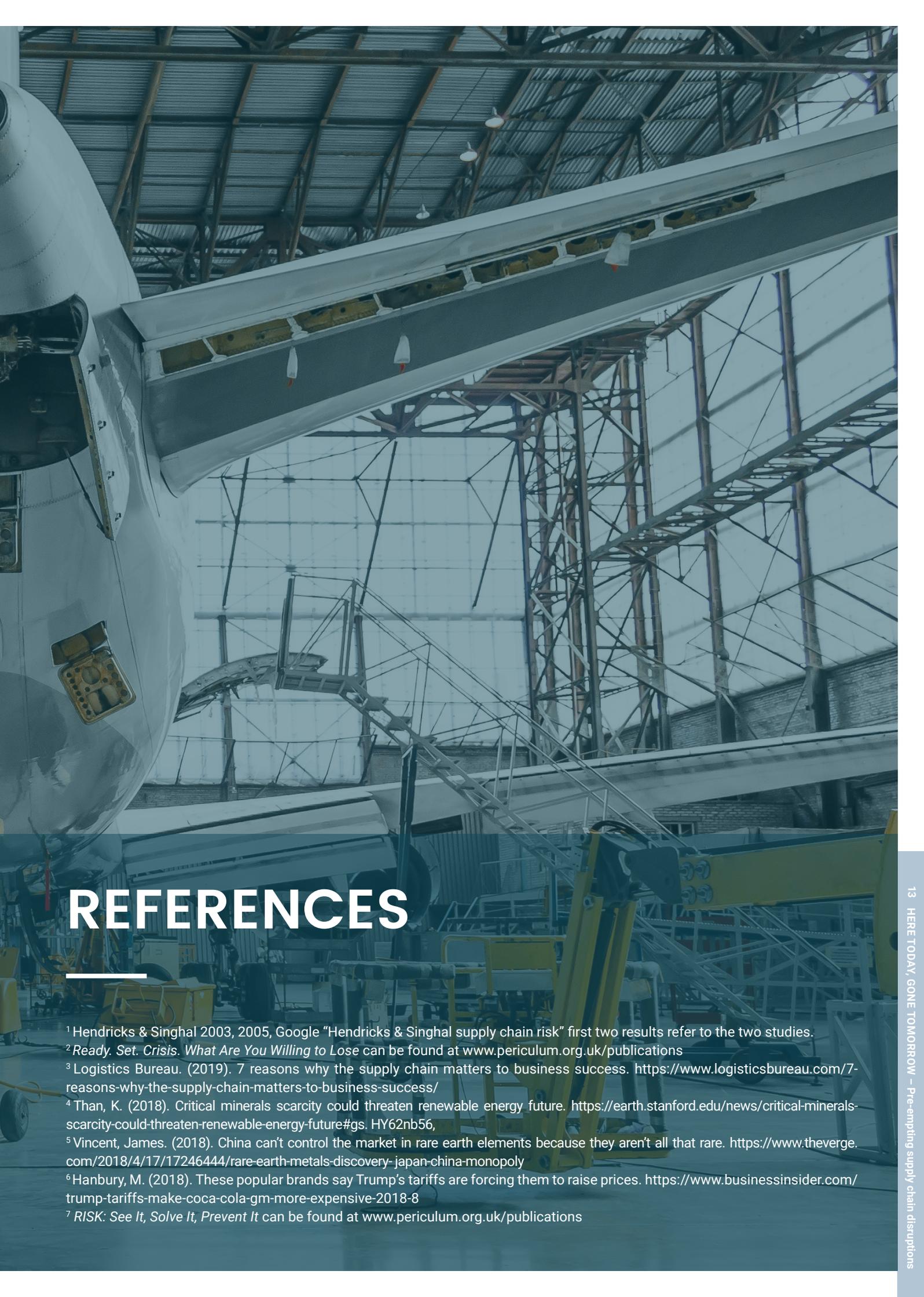
# CONCLUSION

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The natural rhythm of breathing is something we all expect to continue uninterrupted. When crisis occurs, your body reacts automatically.

Your supply chain is also susceptible to sudden disruption, but if you understand the dependencies and impending risks, you can establish resources and pre-emptive actions that automatically activate to reduce recovery time or avert the crisis altogether. Your crisis response plan will ensure you continue delivering the quality, quantity, capacity, compliance, and pricing your customers and shareholders demand. In proactively seeing the event and responding quickly, you can rest easy knowing that your company will be here today – and tomorrow.





# REFERENCES

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<sup>1</sup> Hendricks & Singhal 2003, 2005, Google “Hendricks & Singhal supply chain risk” first two results refer to the two studies.

<sup>2</sup> *Ready, Set, Crisis. What Are You Willing to Lose* can be found at [www.periculum.org.uk/publications](http://www.periculum.org.uk/publications)

<sup>3</sup> Logistics Bureau. (2019). 7 reasons why the supply chain matters to business success. <https://www.logisticsbureau.com/7-reasons-why-the-supply-chain-matters-to-business-success/>

<sup>4</sup> Than, K. (2018). Critical minerals scarcity could threaten renewable energy future. <https://earth.stanford.edu/news/critical-minerals-scarcity-could-threaten-renewable-energy-future#gs.HY62nb56>,

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<sup>6</sup> Hanbury, M. (2018). These popular brands say Trump's tariffs are forcing them to raise prices. <https://www.businessinsider.com/trump-tariffs-make-coca-cola-gm-more-expensive-2018-8>

<sup>7</sup> *RISK: See It, Solve It, Prevent It* can be found at [www.periculum.org.uk/publications](http://www.periculum.org.uk/publications)



## About Periculum

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Periculum Associates is a leading global risk management company providing tailored forward-thinking solutions to clients across industries bringing agility, creativity and authenticity to every client engagement. We help transform risk management into competitive advantage by assisting our clients in innovating and growing, affecting change, putting data to better use and managing risk more effectively to future proof their businesses.

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## About AccelorCorp

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Accelor Corp cloud-based predictive risk reduction software has protected client profitability since 2007. Accelor Corp PredictLens™ (US Patent 8,515,804) leverages proven Machine Learning risk models that quantify root causes of losses. Machine Learning insights feed the PredictLens™ proactive mitigation workflow to prioritize the mitigation actions most likely to pre-empt future losses.

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