



A PRACTICAL GUIDE TO BUILDING RESILIENT SUPPLY CHAINS

Abstract

Unexpected business disruptions due to pandemics, wars, natural disasters, and geopolitical disruptions are occurring more frequently than a decade ago. Resilience amid disruptions has become a crucial capability for any organization handling globally networked supply chains. This paper discusses why supply chain resilience is important and the common challenges to achieving it. It also provides a view into a proven framework by Infosys that helps organizations systematically move towards making their supply chains resilient.

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Introduction

Until recently, optimizing manufacturing and sourcing practices were the most effective way to make supply chains more efficient and cost-effective. It involved balancing inventory holding cost with customer service costs. However, modern supply chains are influenced by non-traditional forces such as globalization, complex

geopolitical conditions, cyber-attacks, environmental risks, increased customer expectations on service metrics, pandemics, natural calamities, disruptions to logistic routes, and wars. Thus, manufacturing companies must factor these additional constraints into their supply chain modelling processes.

Over the last 20 years, supply chains have witnessed a lot of turbulence. Organizations must revisit the concept of 'supply chain efficiency' not just from the perspective of lowering supply costs and improving customer service but also with the aim of building resilience. This is imperative considering the increasing potential sources and frequency of supply chain disruptions.

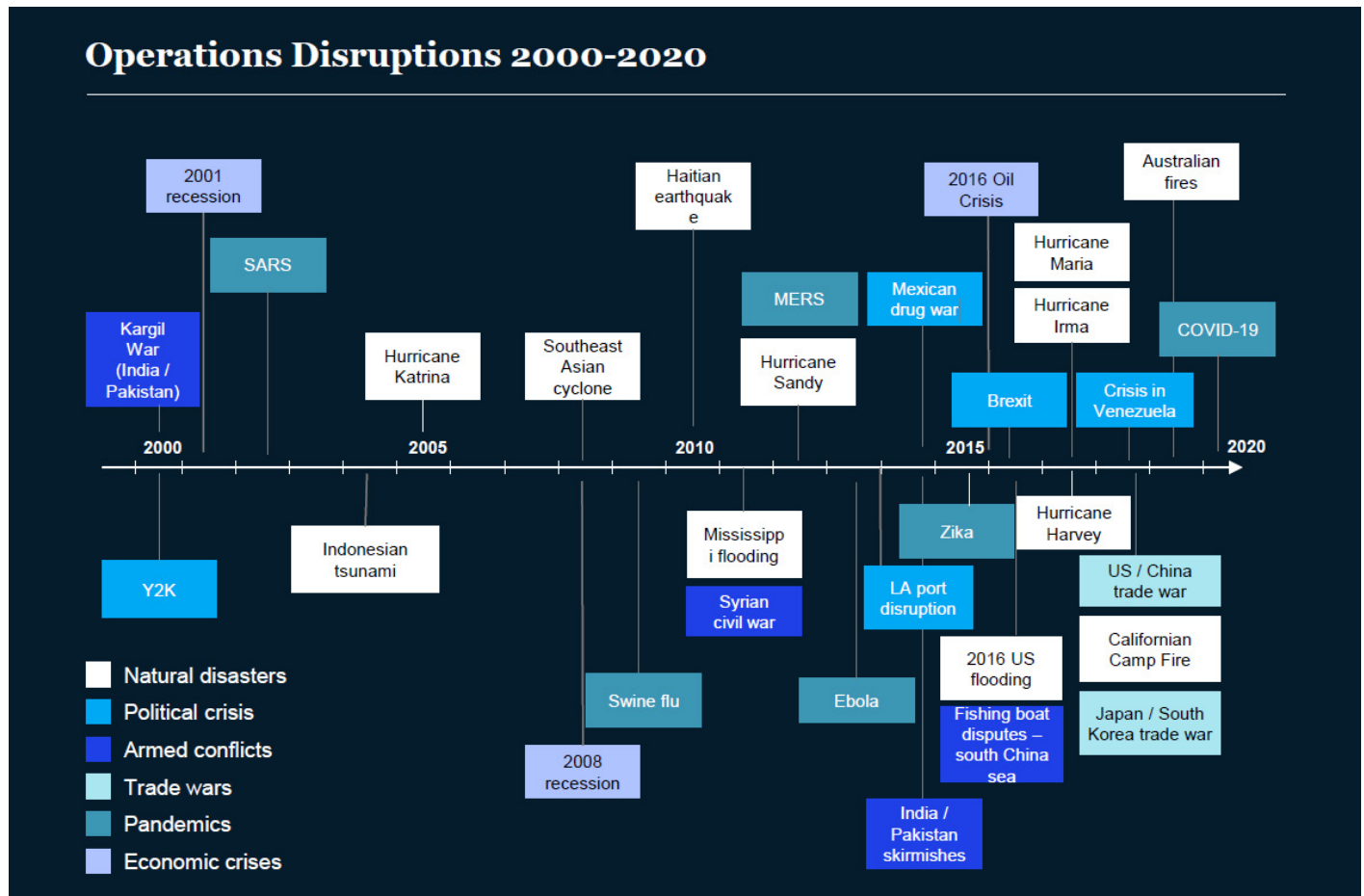


Figure 1 – Supply chain disruptions from 2000 to 2022

Source: "Supply chain risk management is back"; McKinsey Global Institute analysis, Expert interviews, literature reviews, press search

What is Resilience?

A simple definition of 'resilience' (and fitting for the purpose of this article) is, "The ability to resist disruption, survive impact, adapt to new norms, and flourish."

Most manufacturers focus on planning for and mitigating short-term predictable

disruptions and accordingly build capabilities around this. Severe economic impact experienced by large-scale disruptions, like the Covid-19 pandemic, brings heightened awareness of the vulnerability of supply chains in responding to unpredictable events. Even

lending organizations, such as banks, are becoming cognizant of the importance of resilience. An example is how HSBC, Europe's largest bank, has noticed a shift where investors are de-risking and focusing on companies with strengthened resilience in their supply chains.¹

Lessons from Past Disruptive Events

Globalized supply chains rose to prominence on the back of trends such as political changes, technology advancements, societal changes, improvements in transportation, and low-cost communication. In 1947, 23 countries signed the General Agreement on Tariffs and Trade (GATT), opening the doors for global supply chains. With the arrival of the standard shipping container in 1956 and the Internet in 1990, among many other developments, there was a shift towards globalization with deeper interconnections in supply chains.

This allowed companies to source materials from far off places and serve global customers while keeping costs lower than was possible with the pre-globalization supply chain model. Some of the key changes that characterized this period were:

- Arrival of new opportunities through interconnected and networked globalized supply chains
- Manufacturers could procure raw materials, semi-finished goods, sub-assemblies, and finished goods from global suppliers
- Sourcing of products became multi-tiered with the emergence of Tier 1, 2, and 3 suppliers

But it also created new challenges. Supply chains became more complex. Manufacturers did not have visibility into Tier 2 and 3 suppliers. Moreover, the nature of supply chain disruptions evolved, exposing organizations to greater risk due to sourcing and production delays that could range from a couple of weeks to a few months. Traditional risk management approaches, while useful in dealing with common risks, proved ineffective at handling low-probability high-impact incidents, also known as black swan events.

Here is an example.

In 2011, Japan suffered from a series of events – an earthquake, a tsunami, and a nuclear crisis – that had a domino effect on global supply chains. It led to the shortage of availability of a shiny pigment called Xirallic used in automobile paints. At that time, the pigment was manufactured at a plant located in Onahama, Japan, which suffered damages from the earthquake and exposure to radiation from the Fukushima nuclear reactor. The devastation forced most of the country's auto plants to cease production. As a result, many of the world's automakers including Ford Motor Co., BMW AG, and Toyota Motor Corp had to scramble for alternate solutions. They temporarily restricted orders on vehicles in certain shades of black, red, and other colors, resulting in huge revenue losses for these companies.

In the same year, Thailand suffered from catastrophic flooding, which affected supply chains of computer manufacturers dependent on hard disks. Again, this affected the supply chains of companies with manufacturing plants in Thailand.

Renowned PC makers Dell and HP suffered a hit on annual revenues due to a steep increase in hard disk prices.

Events such as these serve as early warning signals on the importance of resilience within a supply chain. Most companies today focus on a logical linear approach to risk management by identifying potential risks, assessing the impact, determining the probability of risk occurrence, and planning for risk mitigation activities based on the risk probability. Some have added safety stock or diversified suppliers. While these measures are useful, they do not prepare the organization for other frequent events that disrupt supply chains.

Therefore, it is vital for companies to complement existing risk management practices with plans to institute supply chain resilience, i.e., the ability to withstand multiple different kinds of shocks to the end-to-end supply chain. As the frequency of black swan events increase, organizations must re-examine their overall operations strategy with the objective of enabling and consistently fine-tuning supply chain resilience to ensure their survival.

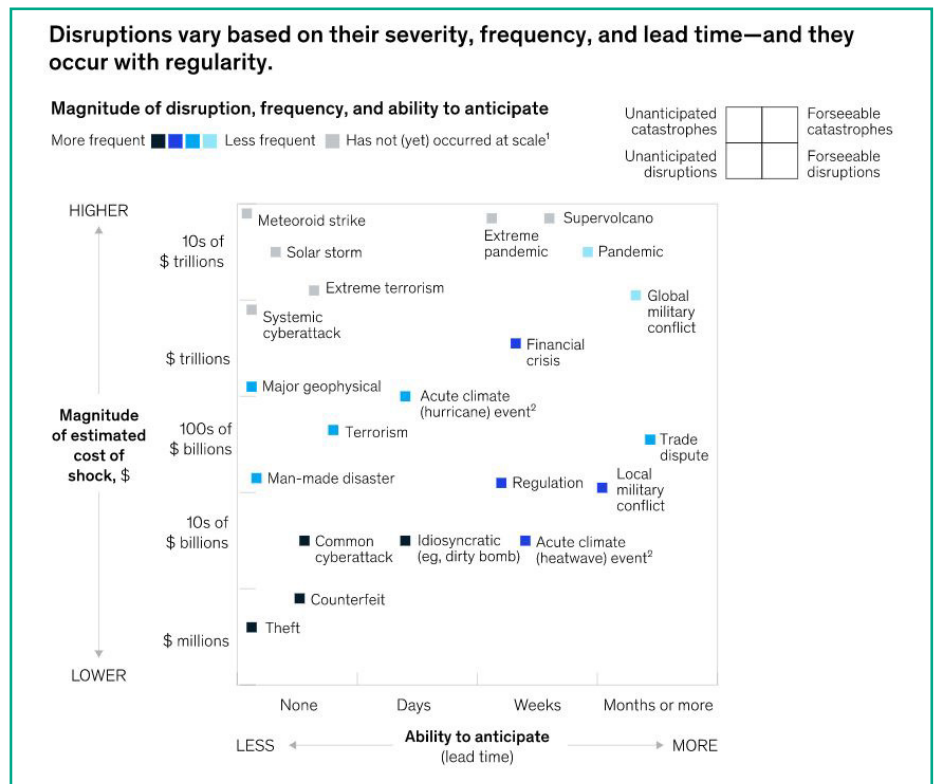


Figure 2 – A matrix mapping the ability to predict supply chain shocks with the estimated costs. McKinsey Report ³

How to Achieve Resilience?

To begin with, organizations must assess their current supply chain resiliency by mapping their end-to-end supply chain, which should include Tier 2 and 3 suppliers, global spread of manufacturing and distribution centers, key partnerships (suppliers, competitors, and private-public partnerships), and the nimbleness of business models. This mapping exercise will reveal areas of risk and areas to be strengthened.

Once the mapping exercise is completed, they have to model potential events that may disrupt their supply chains. The modelling works on a case-by-case basis depending on the nature of the business, geographic location, and speed of the supply chain. It should be overlaid with events like natural calamities, pandemics, wars, competitive innovations, environmental impact, and other such events.

A simple classification of supply-chain risks helps in defining response strategies.

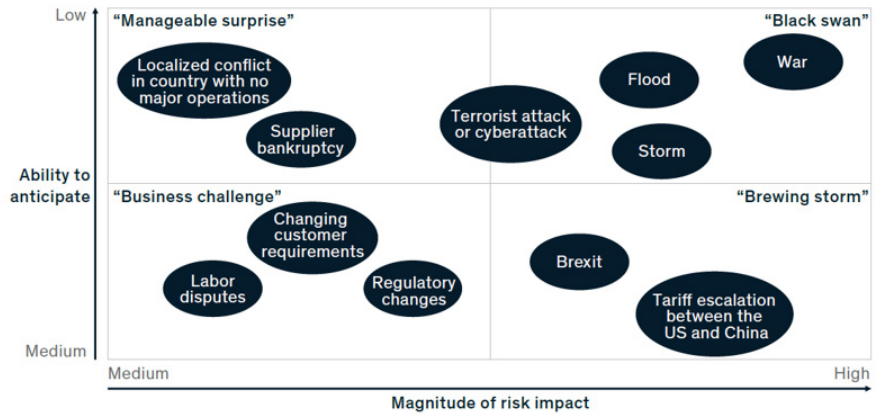


Figure 3 – A graph outlining predictability of risk with magnitude of impact. McKinsey Report ²

Companies must also re-examine their supply chain operating model and establish a balanced set of capabilities for supply chain resilience. Indeed, enabling this comes at a cost. However, the damages incurred from not adapting

to severe supply chain shocks far outweigh the costs of creating a resilient supply chain. Moreover, the return on investment is significant considering the benefit in being able to serve and retain customers effectively no matter the disruption.

Characteristics of a Resilient Organization

Organizations with resilient supply chains have a few common characteristics as mentioned below:

- **Strong collaboration** – They operate in multiple geographies but have strong collaborative relationships with suppliers. They also constantly refine their business continuity plans by actively integrating lessons from historical incidents.
- **Technology-first** – They rapidly deploy new concepts and analytics models, and can nimbly adjust their operating model to take advantage of technological advancements such as AI, robotics, IoT, 3D-printing, and more. They ensure these technology investments align with supply chain resilience.
- **Faster recovery** – Organizations with in-built resilience are capable of resisting disruptions. They institute measures that allow them to bounce back quickly and become operational soon after unforeseen disruptions.
- **Converting risk to opportunity** – These organizations view unforeseen disruptions as an opportunity to strengthen their supply chain capabilities. Moreover, they reorient themselves to gain market share and race ahead of less resilient companies.

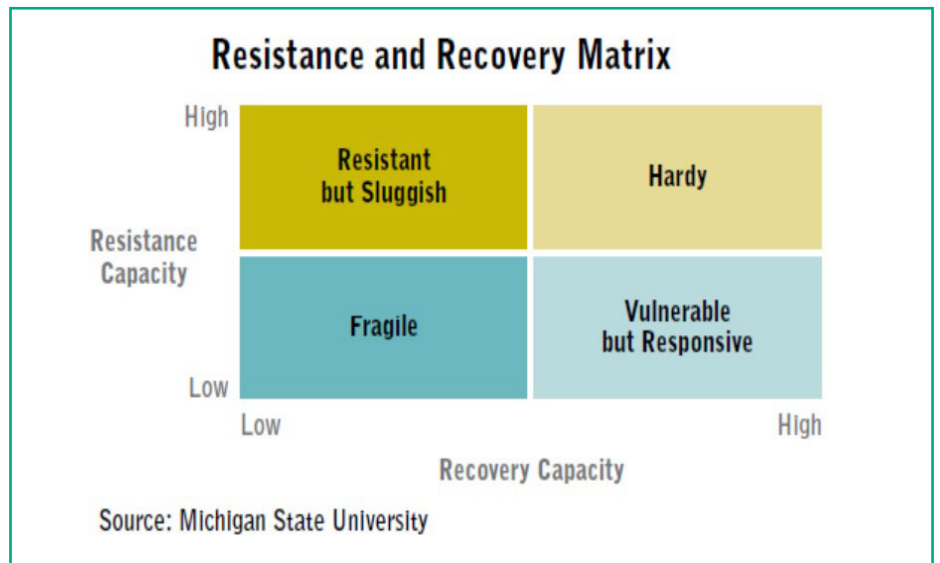


Figure 4 – The resistance and recovery matrix by Michigan State University

A study by Michigan State University shows that organizations that take longer to revert to normal business operations after a disruption will encounter challenges in surviving. On the other hand, 'hardy' organizations are those that can largely avoid the negative impact of disruptions. When affected, they are better prepared for business recovery.

Depending on the business environment, organizations may choose to invest either in resisting the disruption or in recovering from it. For example, the fashion industry may prefer to be more responsive due to frequent changes in customer preferences while the oil and gas industry may choose to invest in different ways to overcome a disruption.

Common Pitfalls

As organizations evaluate their supply chain design to build supply chain resiliency, they should be aware of the common challenges in achieving this:

- **Lack of leadership commitment** – Building resiliency in the supply chain design incurs additional cost. It is necessary that the leadership is committed to resiliency programs and views investments in building supply chain resiliency as part of the cost of doing business.
- **Cultural barriers** – Resiliency must be part of the organizational culture. People should be willing to rapidly embrace the changes in supply chains and operating models.
- **Lack of technology adoption** – Companies may need to increase the pace of technology adoption. It helps to establish a technology unit that examines advances in technology and works closely with the business to come up with solutions and changes to operating models.
- **Supply chain resilience as one-time activity** – Organizations must plan to make continuous improvements in their supply chain processes in response to ever-changing business dynamics. These have to be assessed and re-assessed continuously.

Infosys Supply Chain Risk Assessment Model (ISCRAM)

Infosys has a structured approach to assess the supply chain resiliency of an organization using the Infosys Supply Chain Risk Assessment Model (ISCRAM). This model provides a new custom supply chain resiliency operating model for companies by mapping to their unique existing supply chain and operating models. ISCRAM helps organizations create

an agile, adaptive, collaborative, sustainable, visible, customer-centric, efficient, secure, and balanced supply chain that minimizes the impact of unexpected disruptions.

After the mapping exercise is completed, organizations will have to model the potential of events (typically black swan events) that may disrupt their supply chains.

Five Phases of ISCRAM

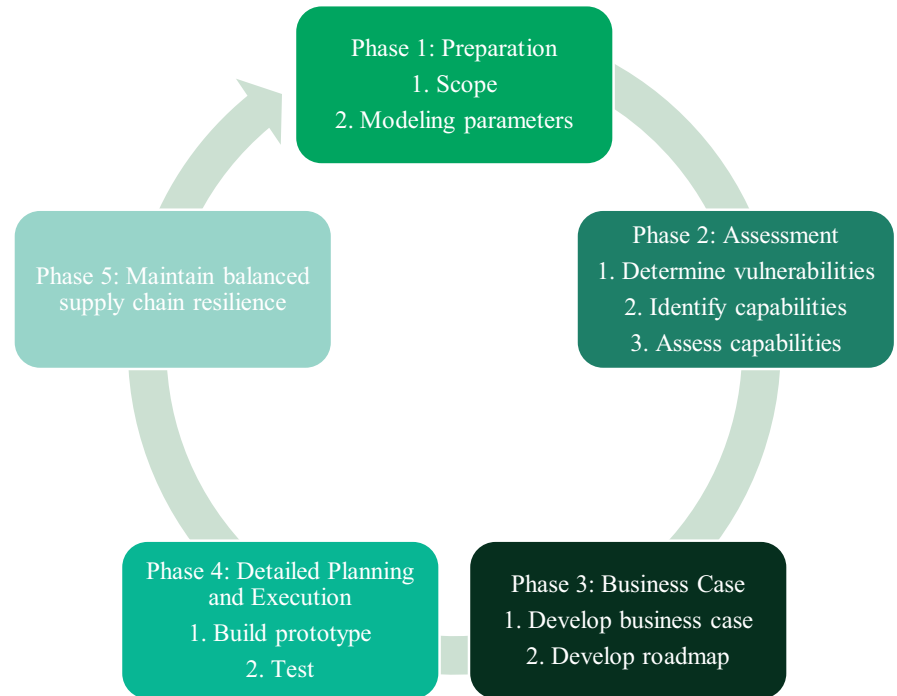


Figure 5 – Infosys Supply Chain Resilience Assessment Model (ISCRAM)

Infosys Supply Chain Resilience Assessment Model has the following five phases:

Phase 1: Preparation – Mapping the current supply chain network

The preparation phase starts with conducting surveys and interviews with the organization's supply chain experts and external partners to review the current manufacturing, supplier, customer, and logistics

footprint. It provides a clear view into the manufacturing and logistics footprint across the supply chain. Based on the modeling parameters, the organization can determine the scope of the project in the next phase.

Phase 2: Assessment – Evaluating various options

Using the data gathered in Phase 1, the organization ranks the 'vulnerabilities' and 'capabilities' from a strategic and operational perspective. Vulnerability rankings help identify the most significant threats to the supply chain. Capability rankings enable organizations to ascertain strengths and improvement areas in the supply chain. An outcome of the survey is that it clearly articulates what the strongest capabilities and greatest vulnerabilities of the organization are, right down to a specific product line or group. This helps to further fine-tune the scope of the project.

Some of the common strategies that address vulnerabilities and help achieve supply chain resilience are:



Figure 6 – Supply chain design strategies to address vulnerabilities

Phase 3: Business case – Getting executive sponsorship

Here, the supply chain leadership of the organization reviews and prioritizes the various design strategy options from Phase 2. Then, a set of initiatives (as determined during the assessment phase) is used to develop the business cases.

A detailed business case must be created by the relevant team for each priority item along with recommendations. The business case must be presented to the senior leadership for their approval. The expected implementation roadmap,

timeline, and budget should also be finalized.

Given below is a sample template to guide teams in building the business case and developing a suitable strategy for supply chain resiliency.

		Supply Chain Resiliency												
		Low	High	Low	High	Low	High	Low	High	Low	High			
Financial Impact	Mitigate Risk (Develop Capabilities)												Capabilities Priority	Capabilities and Vulnerabilities
	Exposure to Risk (Vulnerabilities)													
		Suppliers	Manufacturing	Distribution and Logistics			Inventory and Fulfillment	Customers			Value Chain			

Phase 4: Detailed planning and execution

A rigorous planning session should be conducted to identify various streams of work, cross-functional teams, key

leaders for each workstream, and core team members. Detailed activities and task plans must be created, as these form the foundation of the execution phase.

Phase 5: Continuous improvement

This is an ongoing phase where the organization continuously works to develop mechanisms that track supply chain resilience, identify new vulnerabilities, and create plans for next steps in supply chain improvement.

Conclusion

With the disruptions and economic impact experienced during Covid-19 pandemic, there is heightened awareness of the fragility of global supply chains. This is a looming concern for businesses, the public, investors, and even countries. Infusing resilience into supply chains is now a key business agenda. However, such initiatives must balance cost-effectiveness and operational efficiency with resiliency. It is important to understand that without the right leadership buy-in, technology investments, cultural mindset, and future-oriented focus, supply chain resiliency programs may fail. The Infosys Supply Chain Resilience Assessment Model helps organizations systematically build resilient supply chains through a phased approach that addresses the above challenges, provides a detailed implementation roadmap, and future-proofs supply chains from unpredictable disruptions.

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