How the strongest supply chains protect what customers cherish most

Constantine G. Vassiliadis, Ph.D
Glen Goldbach
**How the strongest supply chains protect what customers cherish most**

By Constantine G. Vassiliadis and Glen Goldbach

When a disruption next knocks your supply chain — will you be able to continue giving customers what they most value from your organisation — whether that’s low cost, innovation, quality or outstanding customer service?

This outside in perspective should be the starting point for tackling where to build resilience in your supply chain. Have you thought about it that way before?

Today, supply chains are more critical to an organisation’s success, but more vulnerable to disruption than ever. Over 60% of respondents to a recent PwC survey said their performance indicators had dropped by 3% or more as a result of supply chain disruptions in the past year.

While best-in-class supply chains are getting better at knowing where their most vulnerable links are and reinforcing them pre-emptively by managing the risks, they are still in the minority. The same survey shows that only 41% of companies have mature supply chain processes in place to effectively address incidents.

Another recently published book also provides concrete evidence that supply chain performance and financial performance go hand in hand. So why aren’t more businesses on top of the risks that pose the greatest threat to their supply chains?

One reason is that it’s difficult to know where to start. Global supply chains are becoming more complex, with so many more variables. Risks come in many forms, from many directions and impact different supply chains in different ways. Which ones should your business prioritise? In today’s complex, volatile environments it’s unlikely that you can mitigate all risks, nor do you need to build equally strong resilience capabilities everywhere.

Our view is that you start with thecustomer in mind.

The supply chain is the instrument through which your organisation delivers its customer value proposition to the market. In this light, supply chain resilience is ultimately the ability of a supply chain to recover from — or be prepared for — a disruption or change so that it continues to deliver on the leading dimension of your customer value proposition. Success is when your highest valued customers hardly feel the after-shock of a disruption in your supply chain.

This article will help you assess the approaches for establishing supply chain resilience through the lens of your customer value proposition. Insights from a leading study on the topic will guide you on building resilience from this perspective.

---


Resilience where your supply chain needs it most

High performing supply chains support the overall business strategy and are designed ‘from the customer in’. The same is true for capabilities that strengthen supply chain resilience. Simply put, your organisation needs to:

- Be clear on its primary customer value proposition
- Identify the risks and level of complexity that threaten the business’ capability to deliver that value proposition
- Build the right resilience capabilities to mitigate those risks as a priority, using a combination of resilience enablers

What’s the pay-off? The chart below illustrates the percentage of companies significantly impacted on each of their KPIs as a result of disruptive incidents in the past twelve months. Companies with mature supply chain and risk management capabilities, which also invest in risk segmentation based on different value propositions, demonstrate higher performance resilience than companies that do not invest in risk segmentation.

Figure 1: Difference in performance resilience based on risk strategy segmentation

Percentage of companies who suffered higher than three percent impact on this KPI as a result of three or more disruptive incidents in the past twelve months

- MV: Market value
- SR: Sales revenue
- MS: Market-share
- TSCC: Total supply chain cost
- SCAU: Supply chain asset utilisation
- IT: Inventory turns
- CSL: Customer service level
- TSCLT: Total supply chain lead time
- TSCLTV: Total supply chain lead time variability
- OFLT: Order fulfilment lead time

Abbreviation list

3 PwC and the MIT Forum for Supply Chain Innovation, Making the right risk decisions to strengthen operations performance, 2013.
1. **Protect what your customers cherish**

So how does your company differentiate itself in the market place? What is it that your customers value most from you? When deciding how to make your supply chain more resilient to disruption, prioritise protecting what your most important customers cherish. The above table from the book *Strategic Supply Chain Management, Second Edition* provides an overview of how supply chains can contribute to your customer value proposition.

With your primary customer value proposition front-of-mind, you can segment the risks that would negatively impact how the supply chain contributes to that value proposition and build resilience capabilities to mitigate major risks.

How does this look in practice? If you are a leading consumer technology company, people may buy your products based on your innovative design and cutting-edge technology. Once you’ve created market demand for a new product, your supply chain needs to scale up production and get products to market rapidly and secure market share. What risks threaten your ability to do that? If a natural disaster creates a sudden shortage of the raw material needed for your new product, can you stabilise your supply so that you continue to meet “must-have” demand generated in the market? Perhaps you opt to work with multiple suppliers in different geographical locations, but this implies a higher cost, greater time needed in integrating and aligning with several suppliers and so on. Your value proposition hinges on your being prepared for these eventualities, though.

Careful evaluation of multiple factors like this will highlight trade-offs and help determine investments in resilience capabilities you’re willing to make.

<table>
<thead>
<tr>
<th>Primary basis of competition</th>
<th>Product and service attributes</th>
<th>Key supply chain contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation</td>
<td>Cutting-edge, must-have</td>
<td>Time to market and time to volume</td>
</tr>
<tr>
<td>Customer experience</td>
<td>Tailored to meet customers’ specific needs</td>
<td>Supply chain interactions designed from the customer’s perspective</td>
</tr>
<tr>
<td>Quality</td>
<td>Reliable performance</td>
<td>Procurement and production excellence and quality control</td>
</tr>
<tr>
<td>Cost</td>
<td>Lowest priced</td>
<td>Efficient, low-cost configuration and processes</td>
</tr>
</tbody>
</table>

Cherish. The above table from the book *Strategic Supply Chain Management, Second Edition* provides an overview of how supply chains can contribute to your customer value proposition.

2. **Consider complexity — it hides surprises**

When assessing supply chain risk exposure, a first step you usually take is to make a list of things that could go wrong, how likely they are to occur and the expected impact. On top of these known threats and vulnerabilities that you can anticipate and mitigate, there are usually hidden dangers too. These are potential disruptions that are caused as a result of events, interactions or patterns of behaviour that cannot be easily anticipated.

The more complex the business environment, the more likely it is that your company’s value proposition, and the supply chain that delivers it, are exposed to these types of unpredictable risks.

What increases complexity? Supply chain size, the industry speed of change, the number of supply chain entities and dependencies between them, the level of visibility or opacity across the network, and the use of information technology are all factors. Importantly, the customer value proposition is typically correlated with the level of complexity in the supply chain. Certain customer value propositions go hand in hand with higher levels of complexity. If you are that same leading consumer technology company whose primary basis of competition is innovation, it probably means that you are competing in a fast-changing, very dynamic, interactive and uncertain environment. This is a highly complex environment — but the complexity is essential for delivering on the key value proposition of innovation.

Understanding the complexity in your environment helps properly assess the nature of risk you’re exposed to. You can then identify the right kind of capabilities suited to reducing exposure and improving your supply chain resilience.

However, if complexity does not demonstrably contribute to customer value, reduce or eliminate it.

Two kinds of complexity may co-exist in any value chain: the good complexity that we need to embrace because it goes hand in hand with more dynamic value propositions; and the bad complexity, the unnecessary complexity that simply hasn’t successfully been removed yet. This often includes complexity in the form of unnecessary buffers, relationships, functions, operating models, products and services.

How can you reduce the kind of complexity that IS NOT needed to deliver your value proposition?

The key is to drive down complexity as far as possible while still building in flexibility. This brings cost benefits while reducing risk exposure.

Having clearly defined roles and responsibilities across the supply chain organisation is important. It aids transparency and is essential for identifying and solving glitches that may arise. It also prevents over-reliance on one person’s knowledge or networks during times of crisis.

An important strategy is to standardise and harmonise interfaces, products...
and processes. Indeed, planning processes and a reliable, adaptable end-to-end process architecture are particularly powerful levers for resilience. Benchmarking studies\(^5\) have found that leading companies have more mature planning processes, and as a result provide better service, with greater flexibility and lower costs.

3. **Choose the right kind of resilience capability**

There is no one-size-fits-all approach for building resilience across your supply chain. As we’ve seen, a threat to your organisation’s value proposition will not necessarily pose the same risk to other companies. How you build resilience will be tailored to your specific value proposition, the risks you’ve identified it faces and the complexity of the environment. It then comes down to finding the balance between three types of key capabilities.

**Ask yourself these questions:**

1. What are your primary bases of competition?
2. Are they likely to lead to more or less complex operating environments?
3. Have you removed all the unnecessary complexity?
4. Do you have the right mix of capabilities to build resilience in your type of environment?

**A. The ability to anticipate** — In less complex environments, it makes good sense to anticipate as patterns of behaviour and analysis are typically better established. Volatility can be absorbed by targeted redundancies and buffers which equip your supply chain with backup resources that it can call on when something unexpected happens. Buffers come in the form of additional inventories or stock, capacity reserves and additional facilities such as factories and extra time. One of the down sides of using buffers is the cost incurred in having redundancy in the supply chain. Additionally, to use buffers successfully, a company needs to know which kind of buffer to place where along the supply chain. This requires a close analysis of how the different parts of the supply chain react to changes in inputs. It follows that an analysis is only meaningful if the inputs are reliable — such as a steady demand forecast — and the behaviours more predictable. In simple, less-complex supply chains this is achievable.

**B. The ability to respond** — As complexity starts to increase with certain customer value propositions (necessary complexity) the characteristics of the known-unknowns (probability of occurrence, expected impact) cannot be captured with the same level of confidence as in the simpler scenario. So, placing buffers has less effect. In addition, the unknown-unknowns start becoming more relevant. In this scenario, the supply chain needs responsiveness strategies so you can quickly analyse and be one step ahead of what might happen, and also be able to respond swiftly as events start to unfold. Key to responsiveness is flexible risk governance structures and business continuity plans. Visibility is also important — both across the supply chain, as well as into market and environmental trends. Shared information between the supply chain actors will improve visibility. Today, advanced analytics makes it easier to keep on top of external changes. When disruptions occur, each node of the supply chain needs to react quickly, decisively and coherently to continue delivering on the organisation’s key value proposition as optimally as possible. Robust business continuity management plans, compiled together with supply chain partners and communicated across the supply chain network ahead of time, go a long way to creating this responsiveness.

**C. The ability to adapt-evolve** — In highly complex environments, patterns emerge as a result of the fast dynamics and interactions within the value chain — they are not a priori established. These emerging value chain patterns need to be identified and shaped and then matched with the right operating strategies along the supply chain. Unknown-unknowns are dominant over known-unknowns so flexibility strategies are deployed in these environments. Adaptability requires all agents and nodes of the supply chain to be structurally aligned and ready to co-operate and co-create. Alignment may also stretch beyond the boundaries of the organisation’s own supply chain, and may involve collaborating with competitors and other industry actors to identify the patterns, set new standards or create new interfaces.

**Keep in mind — this is a framework, not a formula.**

There is no either/or scenario. Even if you are competing on innovation, there may still be some parts of your business environment that are relatively very simple. In which case you could adopt a targeted redundancy strategy for those parts, and implement flexibility strategies elsewhere.

**And then there’s your competition.**

The resilience of your competitors’ supply chains must also be factored in to your resilience strategies. Do you have the same primary source of raw material and is it geographically concentrated, for example? A condition like this may dictate a different resilience plan than if your supply is distributed. What might your competitor do if faced with the same disruption as you? What if your plan B is also their plan B? Do you have a creative plan so that you can continue delivering on your value proposition and take market share?

---

With clarity on the resilience strategies that best position you to withstand a disruption and keep your customers happy, there are seven practical enablers you can use to strengthen your capabilities (see the graphic below). How you balance your investment across the seven enablers will determine how your organisation can respond to disruptions.

<table>
<thead>
<tr>
<th>Seven enablers</th>
<th>Resilience measures you’re aiming for</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Risk governance</td>
<td>Appropriate risk management structures, processes and culture.</td>
</tr>
<tr>
<td>2. Flexibility and redundancy in product, network and process architectures</td>
<td>The right levels of flexibility and redundancy across the value chain to be able to absorb disruptions and adapt to change.</td>
</tr>
<tr>
<td>3. Alignment between partners in the supply chain</td>
<td>Strategic alignment on key value dimensions, identification of emerging patterns and advancement towards higher value propositions.</td>
</tr>
<tr>
<td>4. Upstream and downstream supply chain integration</td>
<td>Information sharing, visibility and collaboration with upstream and downstream supply chain partners.</td>
</tr>
<tr>
<td>5. Alignment between internal business functions</td>
<td>Alignment and integration of activities between company value chain functions on a strategic, tactical and operational level.</td>
</tr>
<tr>
<td>6. Complexity management/rationalisation</td>
<td>Ability to standardise and simplify networks and processes, interfaces, product architectures and product portfolios and operating models.</td>
</tr>
<tr>
<td>7. Data, models and analytics</td>
<td>Development and use of intelligence and analytical capabilities to support supply chain and risk management functions.</td>
</tr>
</tbody>
</table>

Some enablers — such as good analytics manifested in different types of tools and applications — are required by all three types of resilience capabilities. There are, however, certain enablers that are more tailored towards certain resilience building capabilities.

When we asked 209 companies their views on which enablers they considered most important for risk reduction, they said that alignment between partners in the supply chain was the single most important enabler.

Figure 2: Survey participants’ view on which capability enabler they consider the most important

Source: PwC and the MIT Forum for Supply Chain Innovation, *Making the right risk decisions to strengthen operations performance*, 2013
How to link it all together?

To re-cap, the required balance of capabilities and enablers to achieve resilience is determined by the customer value proposition you are trying to protect and the complexity in your value chain and environment. The table below frames the possibilities.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation</td>
<td>Relatively higher</td>
<td>Adapt and Evolve</td>
<td>Value chain alignment,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>integrated business planning</td>
</tr>
<tr>
<td>Customer Experience</td>
<td>Relatively Lower</td>
<td>Respond quickly</td>
<td>Risk governance</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td>Anticipate</td>
<td>Targeted redundancies in</td>
</tr>
<tr>
<td>Quality</td>
<td></td>
<td></td>
<td>process, product and network</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>architectures</td>
</tr>
</tbody>
</table>

**Competing on innovation?** If we look again at a company whose main value proposition emphasises product innovation, what kind of resilience strategies might they choose? The high speed of innovation makes it difficult to forecast sales with accuracy, creating a higher price risk, a higher supply risk and a greater risk that the organisation internally can’t scale up capacity and capabilities to meet demand. A build-up of inventories might not be the best fit as the organisation wouldn’t know where to put the buffers anyway. It’s more likely that flexible risk-sharing contracts with suppliers would be adopted. Working closely with supply chain partners allows the organisation to jointly detect emerging patterns, aligning with partners to quickly adapt and develop capabilities to build resilience.

**Competing on cost?** Organisations offering lowest-priced goods or services need to create low-cost and super-efficient supply chains. They may place targeted redundancies along the supply chain as a way to build resilience. Buffers can be particularly useful as the supply chain is in principle less complex once the unnecessary complexity is removed and inputs, such as demand, are steady and relatively easy to forecast. It should be possible to position targeted redundancies to allow for strategic management of total supply chain variability.

These “cost-efficient” organisations face a difficult dilemma, however. Evidence shows that their performance suffers more from the changes and disruptions in their supply chain even when they possess mature supply chain capabilities. The majority of companies whose strategies emphasise cost and efficiency (80%) face high variability in their supply chain lead times once a supply chain disruption takes place (see Figure 3). This is remarkable given that low variability is one of the key drivers of an efficient operating strategy.

---

6 PwC and the MIT Forum for Supply Chain Innovation, Making the right risk decisions to strengthen operations performance, 2013.
Figure 3: Difference in performance resilience between mature cost-efficient and mature flexible-response companies

Source: PwC and the MIT Forum for Supply Chain Innovation, Making the right risk decisions to strengthen operations performance, 2013

Percentage of companies who suffered higher than three percent impact on this KPI as a result of three or more disruptive incidents in the past twelve months

Abbreviation list

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MV</td>
<td>Market value</td>
</tr>
<tr>
<td>SR</td>
<td>Sales revenue</td>
</tr>
<tr>
<td>MS</td>
<td>Market-share</td>
</tr>
<tr>
<td>TSCC</td>
<td>Total supply chain cost</td>
</tr>
<tr>
<td>SCAU</td>
<td>Supply chain asset utilisation</td>
</tr>
<tr>
<td>IT</td>
<td>Inventory turns</td>
</tr>
<tr>
<td>CSL</td>
<td>Customer service level</td>
</tr>
<tr>
<td>TSCLT</td>
<td>Total supply chain lead time</td>
</tr>
<tr>
<td>TSCLTV</td>
<td>Total supply chain lead time variability</td>
</tr>
<tr>
<td>OFLT</td>
<td>Order fulfillment lead time</td>
</tr>
</tbody>
</table>

Source: PwC and the MIT Forum for Supply Chain Innovation, Making the right risk decisions to strengthen operations performance, 2013
Their focus on cost often results in lower total supply chain inventory, a consolidated supply base and larger scale, more efficient product capabilities which result in more concentrated risk. Consequently, these companies are left vulnerable to disruptions and may find their supply chain unable to deliver on their low-price value proposition.

**Competing on quality?** Significantly more companies say that quality (23%) is the major value dimension in their supply chains\(^7\), above innovation (14%), price (14%), brand (12%), customer experience (9%) and others. For these companies, having supply chain partners committed to quality and reliability in production and sourcing is critical, as is having the ability to access high quality raw materials. Take a manufacturer of functional outdoor wear for extreme temperatures which uses wool that comes from a particular breed of sheep. How does the manufacturer recover fastest from a sudden shortage in supply of that wool from a particular location? Maintaining suppliers in multiple geographies might be an option that provides flexibility, but adds costs and complexity. Holding stocks of the wool a few seasons ahead as buffers would be an option, but it also increases inventory costs. And where would the stock be held such that the materials maintain their desired qualities?

Many businesses competing on quality deal with the ever-present threat of counterfeiting. The pharmaceuticals industry is a well-known example. These organisations choose to invest in resilience through minimising risks up front. They implement preventive measures along their supply chain to reduce the chances of known, value-damaging disruptions even taking place. Measures may be risk governance heavy, including product flow controls, quality assurance checks and track-and-trace technologies to ensure traceability and reliability of the product as it moves along the supply chain.

**Competing on customer service?** What supply chain resilience choices might a company that stands out for superior customer service experience make? If road closures or a labour strike at an airport threaten its ability to transport products, or if rocketing oil prices make transportation prohibitively expensive, perhaps it can use what it knows about its customers to identify those who truly value and need frequent deliveries. It can switch transportation resources to prioritise those customers while devising a strategy for customers who are prepared to wait. This is a flexible approach which also requires strong visibility into the extended supply chain as well deep customer knowledge. It can be a costly way to build resilience, but the value proposition requires it.

**A look to the future of data analytics: Know what your supply chain might be up against**

Recent significant advances in analytics are enhancing predictability and shortening response times.

Imagine this...

You have the capability through a predictive analytics programme to overlay the geographic locations of your suppliers with weather data. You are now able to calculate the probability of a natural disaster in a particular region. You harness that data to re-align supply flows in such a way that you have back-up supply in other parts of the world. You are now better positioned to avoid potential disruptions to the business.

This is the promise of data analytics — more creative and accurate ways to simulate risks and the impacts on remote parts of your supply chain and steer resilience investments more smartly.

In practice this means mapping out your supply chain nodes (e.g., suppliers, warehousing) and the various links (e.g., methods of transportation). Many organisations don’t even have this overview to start with. Data analytics allow you to more accurately play out certain scenarios. What might happen to your raw materials supply if a port closes in LA, an earthquake shudders in Asia or unrest hits the Middle East?

With a solid scenario analysis, more robust discussions can be held with the broad range of stakeholders interested in supply chain management. You can better inform your CFO, COO, heads of distribution in various markets, heads of warehousing and transportation, managers responsible for strategic sourcing in the US and Europe, those responsible for procurement in Asia, customs and international trade teams. You are also now well-positioned to engage third-party providers and supply chain partners in mitigation actions.

Data analytics opens the possibility for more accurately predicting what your supply chain might be up against and responding accordingly.

**Keep a happy customer at the end of your supply chain — even when it shakes**

It’s clear that no global supply chain is immune to the disruption presented by today’s business environment. That’s why leading companies don’t design their supply chains to operate only in ideal conditions. They test them out and prepare them to withstand knocks and disruptions. But with only 9% of companies being fully prepared for supply chain disruptions, there’s a long way to go\(^7\).
Protecting your supply chain against every risk and every eventuality is way too tall an order though. So, hone in on your main customer value proposition and focus your organisation’s energy on where recovery has to happen fastest in case of disruption.

Resilience is about making choices related to events that have yet to take place, and might not even take place. But a decade of increasing disruption is forcing business leaders to make those decisions and find ways to make their organisations more agile and adaptable. One step is to design their operations and supply chains to become more resilient. In times of uncertainty, the most resilient supply chains will continue to connect and collaborate so that the right resources can still come together, at the right time, in the right places.
Resilience
Resilience: A journal of strategy and risk

Publisher
Dennis Chesley
Global Risk Consulting Leader
PwC US

Miles Everson
US Advisory Leader
PwC US

Juan Pujadas
Vice Chairman, Global Advisory Services
PricewaterhouseCoopers International Ltd.

Executive Editors
Robert G. Eccles
Professor of Management Practice
Harvard Business School

Christopher Michaelson
Director, Strategy and Risk Institute, PwC Global Advisory
Associate Professor, University of St. Thomas Opus College of Business

Managing Editor
Rania Adwan
+1 (646) 471 5116
rania.adwan@us.pwc.com
PwC US

Production Editor
Shannon Schreibman
+1 (646) 471 1102
shannon.schreibman@us.pwc.com
PwC US

Author
Constantine G. Vassiliadis
+30 6948 183 139
costas.vassiliadis@nl.pwc.com
PwC Netherlands

Glen Goldbach
+1 (412) 298 4543
glen.goldbach@us.pwc.com
PwC US

Special thanks to the following parties for their production and editorial assistance:
John Ashworth, Chris Barbee, Lisa Cockette, Marc Farre, Tracy Fulham, Malcolm Preston, Alastair Rimmer, Julie Szydlowski and Gautam Verma

www.pwc.com

PwC firms help organisations and individuals create the value they’re looking for. We’re a network of firms in 158 countries with close to 169,000 people who are committed to delivering quality in assurance, tax and advisory services. Tell us what matters to you and find out more by visiting us at www.pwc.com.

This publication has been prepared for general guidance on matters of interest only, and does not constitute professional advice. You should not act upon the information contained in this publication without obtaining specific professional advice. No representation or warranty (express or implied) is given as to the accuracy or completeness of the information contained in this publication, and, to the extent permitted by law, PricewaterhouseCoopers does not accept or assume any liability, responsibility or duty of care for any consequences of you or anyone else acting, or refraining to act, in reliance on the information contained in this publication or for any decision based on it.

© 2013 PwC. All rights reserved. Not for further distribution without the permission of PwC. “PwC” refers to the network of member firms of PricewaterhouseCoopers International Limited (PwCIL), or, as the context requires, individual member firms of the PwC network. Each member firm is a separate legal entity and does not act as agent of PwCIL or any other member firm. PwCIL does not provide any services to clients. PwCIL is not responsible or liable for the acts or omissions of any of its member firms nor can it control the exercise of their professional judgment or bind them in any way. No member firm is responsible or liable for the acts or omissions of any other member firm nor can it control the exercise of another member firm’s professional judgment or bind another member firm or PwCIL in any way.

DT-14-0034 vhw