



Supply chain risk management

Knowing the risks – mitigating and responding for success

Significant events around the world have heightened awareness of how detrimental risk can be to business. As a result, supply chain risk management has become top of mind for many organizations. Learn about the 4 steps to analyze and mitigate supply chain risks, and the capabilities for managing them.

Risks are a part of life and are involved in everything we do. Some people are very risk adverse and won't do anything that has any risk associated with it. Others thrive on risk and will seek out adventures like rock climbing, sky diving, and racing despite clear and obvious risk. People take risks because there is a potential reward. Even chronic risk takers, however, mitigate their risk by employing safety measures. Rock climbers use safety ropes. Race car drivers wear flame retardant suits and helmets. Skydivers have reserve parachutes that open automatically if the main parachute fails to open. There is still risk, but when the right mitigation strategy is employed, risk can be reduced to a manageable level.

In supply chain there are many decisions that while risky, could result in significant benefit to the company; introducing a new product, expanding into different markets, outsourcing manufacturing operations. How we manage those risks separate those who succeed from those who fall short. Companies that make decisions without thought to what the risks could be or take risks without planning mitigation strategies have a higher potential to fail. Conversely, companies that take risks and plan for them (have mitigation strategies defined should the risk materialize) are likely to be more successful. But having a mitigation strategy isn't enough. What is also required is a strategic competency in responding to the unexpected. This ability is a combination of agile processes and tools that allow a company to recognize an event, assess the impact, and respond accordingly.

"An overwhelming majority of companies surveyed (83 percent) consider supply chain disruptions to be a "moderate" to "greatest risk" overall considering all of the factors that can affect the financial well-being of their organizations."¹

Why supply chain risk management?

Supply chain risk management has been on the agenda for most supply chain practitioners for the past 10 years. And the last few years have seen significant events around the world that have only heightened the awareness of how detrimental risk can be to the business. This has caused supply chain risk management to become front and center in organizations' minds. But supply chain risk management isn't just about identifying and mitigating against natural disasters and other "big" events. There are countless other risks associated with doing business on a daily basis. Some include;

- ▶ **Daily fluctuations in demand and supply:** While these are typically in the realm of daily supply chain management, both severe demand / supply fluctuations and normal fluctuations that are not properly handled, can have a significant impact on the operation of your business as the changes accumulate. Excess and obsolete inventory and poor customer service can be experienced if these are not effectively managed.
- ▶ **Rapid growth:** This sounds like a nice problem to have...and it is. But handled incorrectly it can cause significant impact to your profits and to your corporate reputation. Poorly executed moves to a new or expanded facility can impact production. Increased and changing product range can impact quality and can drive variability in demand that you may be unaccustomed to. And big customers are great, but can be very demanding.
- ▶ **Changes to the supplier base:** Suppliers come and go; cost structures change; delivery and quality performance can degrade; and suppliers go out of business. All these can have significant impact on your business.

¹FM Global Supply Chain Risk Study: [China and Natural Disasters: Case for Business Resilience](#), FM Global, November 2011

The “big” events – Supply chain risks

On March 11, 2011, a powerful 9.0 earthquake hit northeastern Japan. This was followed by a tsunami which also triggered a failure of the Fukushima Daiichi reactor causing the worst nuclear disaster since Chernobyl.

During the 2011 monsoon season, severe flooding inundated Thailand resulting in 65 of 77 of Thailand’s provinces being declared flood disaster zones. In human terms, 13.6 million people were impacted. In financial terms, the flood is estimated to have cost \$45.7 Billion US in damages and lost revenue. Thailand is one of the centers of hard disk manufacturing in the

world, responsible for 25% of global hard drive supply. As a result of the flooding, hard drive costs have increased significantly and computer sales have been impacted. Thailand is also a major automotive manufacturer and Honda, Nissan, Toyota, Ford and Mitsubishi all have had to stop production.

The 2010 Eyjafallajokull volcano eruption in Iceland. While it had a small direct effect on manufacturers, it had a significant impact on logistics, especially those companies that relied on air transport to move goods. Fedex had to cancel over 100 flights, relying instead on ground transportation to move goods.



Figure 1 – New cars ready for shipment destroyed by the tsunami following the 2011 Japan Earthquake²



Figure 2 – Honda factory at Ayutthaya province in Bangkok (Thailand flood)³

- ▶ **Changes to IT systems:** Companies spend millions of dollars on suites of software only to find that deployments can go wrong, software doesn’t perform as expected and that new systems are incompatible with current business practices. These systems are used to run the business. When things go wrong, they often go wrong in a big way, have huge cost implications and can significantly impact operations performance.
- ▶ **Counterfeit and contaminated products:** What goes into your product becomes your product. In early 2012, Bed Bath and Beyond recalled toilet paper tissue holders that contained cobalt-60, a radioactive material that is used in medical devices. The metal used to make the holders came from contaminated scrap metal that erroneously found its way back into the supply chain. Electronics companies have been struggling with keeping malware (viruses) out of their components. And counterfeit components can appear to be identical to the original item but in fact don’t perform to the same level. All of these issues become the problem of the manufacturer as they need to provide warranty and support services to their customers.

²Tundra Headquarters, [Japan Earthquake Will Hurt Toyota Sales, Effect U.S. Automakers Too](#), March 14, 2011

³Sakchai Lalit, October 16, 2011. As published on HuffingtonPost.com, [Thai Floods: Honda Under Water](#), 11/10/11

EXHIBIT 1

Statistics on Supply Chain Disruptions

Based on a sample of 885 disruptions announced by publicly traded firms, companies on average experience:

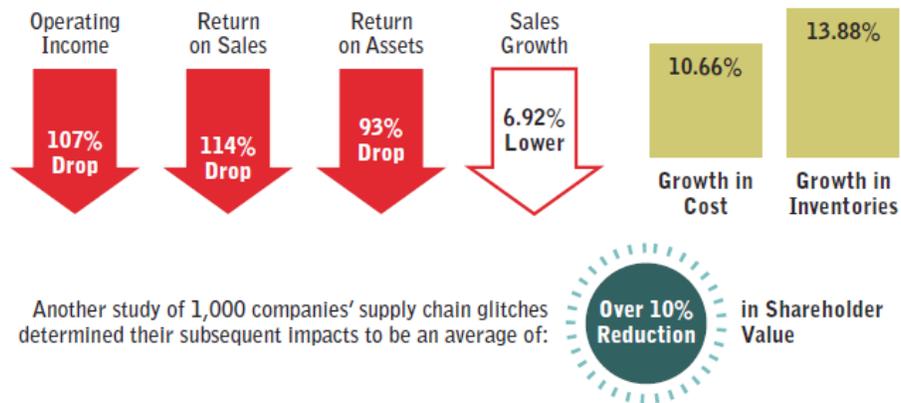


Figure 3 - Impact of Supply Chain Disruptions on Key Metrics⁴

When supply chain events occur, the impact on a company can be staggering. A study was conducted of the long term effects of significant supply chain disruptions on corporate performance as a result of over 800 instances of supply chain disruptions experienced by publicly traded firms. You can clearly see that key fiscal metrics are significantly impacted by a supply chain disruption, which all but guarantees supply chain risk management will be of high interest to any organization looking to survive and thrive in today's marketplace.

How business processes can drive supply chain risk

Evolving supply chain practices have changed both the nature and level of supply chain risk:

- ▶ **Low cost country sourcing:** Companies have been seeking locations with cheap labor in which to build product. However, long lead times, exposure to political, security, regulatory, currency risks often offset many of the savings. Companies are often guilty of seeing the cost savings, but not the risk.
- ▶ **Outsourcing:** Companies have outsourced more and more of their manufacturing and operations activities. This can improve operations performance and service levels, but limits supply chain visibility and coordination. Outsourcing has taken direct manufacturing control out of the hands of manufacturers and placed it with other companies.
- ▶ **Lean and just-in-time:** These strategies streamline operations but mandate little if any buffer stocks. This can work well under stable operating conditions but escalates the risk of stockouts and disruptions due to supply and delivery glitches. The recent events in Asia combined with an unrelated shortage of a special plastic that is impacting automobile production, has caused automotive companies to rethink their just-in-time strategy.
- ▶ **Supply base rationalization:** Companies continue to reduce the number of suppliers. While this is a reasonable approach to reducing the cost of managing suppliers, narrowing the supply base such that only a single supplier is used increases risk if that supplier can't meet requirements.
- ▶ **"Siloed" business processes:** While lack of communication and disjointed business practices are not typically a business strategy, it is the unfortunate result of poor organizational structures, evolved combative cultures, and supply chain tools that don't foster communication. At best, departments don't know what other departments are doing and at worse they work against each other (for example, Marketing kicks off a promotion that Manufacturing can't support).

⁴From [ChainLink Research](#), as published in Risk Management: Welcome to the New Normal, Gregory L. Schlegel and Robert J. Trent, Supply Chain Management Review, January / February 2012 issue, page 12.

4 Steps to analyzing and mitigating supply chain risks

Visualize and understand risks

The first step is to assess supply sources to determine which ones are most critical to the business. The most effective approach is to evaluate which suppliers contribute the most to top level revenue. From an analytics perspective, a tool is needed that will identify the ultimate parent of each component, then assess the component's revenue contribution. Further, the assessment must be deep as well as broad. The assessment can't stop at the contract manufacturer. The assessment must also evaluate components that the contract manufacturer uses. A low risk contract manufacturer that uses high risk sources is still a high risk. This broad and deep analysis requires visibility to the entire extended supply chain, including lower tier suppliers.

Once the supply base is prioritized in terms of their contribution to revenue, the risk factors that apply to each supplier need to be assessed. This assessment is typically first done against the suppliers that contribute most to revenue.

Suppliers and manufacturing facilities aren't the only elements of your supply chain that can be impacted by an event. You also need to consider logistics too. You must look at how materials flow between the nodes of your supply chain. Ask what would happen if a major port were shut down for an extended period of time? What alternative supply routes are available? How long would it take to re-route goods and what impact would that have on your business?

Supply chain risks can come in many forms (financial, environmental, political, regulatory). It is the responsibility of the risk assessment team to make sure that any risk analysis considers and understands all possible risks.

"Risk-assessment processes typically expose only the most direct threats facing a company and neglect indirect ones that can have an equal or greater impact."⁵

Measure and prioritize

Risk factors need to be applied to the supply base such that each supplier is scored according to the risk factors outlined above. With the scoring of the suppliers and the assessment of the impact each supplier has on the business, the supplier can be plotted on a risk matrix similar to the one shown here.

The colors indicate the relative urgency for risk mitigation. Red indicates that a risk mitigation strategy should be developed and implemented immediately. Yellow, is less urgent and green indicates a low urgency.

Segmentation can be used to help understand how risks impact your business and what strategies would be most effective to mitigate that risk.

Segmentation can be studied on many dimensions; demand volume vs. demand variability, demand volume vs. supply chain risk, supplier demand vs. supplier risk; logistics routes volume vs. risk. In each case, you are segmenting your products, suppliers, logistical routes, then determining an appropriate strategy for each segment.

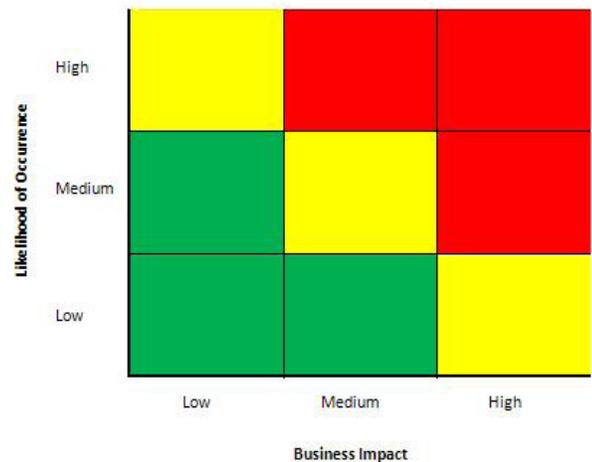


Figure 4 - Supply Chain Risk Management Matrix⁶

⁵Eric Lamarre, Martin Pergler, Risk: Seeing around the corners, McKinsey Quarterly, October 2009

⁶Based on: SCDigest Editorial Staff,, Supply Chain News: Understanding Supply Chain Risk Matrices, SupplyChainDigest, July 13, 2008

Take action

Once there is an understanding of the various risk factors, there is a need to determine where action must be taken. Not all risks will necessarily be addressed. For risks that fall into the green areas on the matrix, a company may decide not to develop a mitigation strategy at all. Further, different demand or supply segments (based on segmentation analysis) may have different mitigation strategies. Supply chain isn't a one size fits all environment; you may have a different mitigation strategy for a high value, low volume supplier than a low value, high volume supplier.

The mitigation strategies will vary depending on the situation. For risks related to the supply base, mitigation strategies could include;

- ▶ Sourcing from different suppliers
- ▶ Developing supply sources in other parts of the world
- ▶ Alternate modes of transportation or alternate routes
- ▶ Product re-design to use more standard components

For risks related to demand variability, mitigation strategies could include;

- ▶ Demand shaping
- ▶ Postponement strategies
- ▶ Buffer inventory

The mitigation strategies must be modeled and tested. Given a different source, how would the different lead times, costs, supply constraints, etc... impact corporate metrics? To test this effectively, the mitigation strategy is simulated and the results evaluated relative to other alternatives and relative to corporate goals. For this to occur, robust, flexible and user-driven "what-if" analysis capabilities are a must.

Monitor, review and maintain

As time moves on, risk areas will change as will the mitigation strategies. Both the risks and mitigation strategies need to be reviewed on a regular basis to ensure that new factors are considered.

Supply chain risk management should not occur as a project only a few times per year. It should be a continuous process with ongoing monitoring of supply chain risks, with an analysis of the trends not just the absolute numbers. Trends should be used as an early indicator to prevent risk situations from occurring. For example, procurement teams need to be trained in risk management so that when sourcing new suppliers, they can strive to add suppliers that reduce overall supply chain risk. Logistics teams need to be trained to understand what routes are at risk and when. Supply management teams need to recognize potential for inventory liability if demand for a product disappears.

Sales and operations planning (S&OP) is a logical home for risk management. This is a regularly scheduled meeting where supply and demand sides come together, where long term strategy is discussed and where decisions are made. By making risk management a regular part of the S&OP process, you can ensure that it gets the visibility it needs, it is reviewed on a monthly basis, and supply chain risk is considered in strategic and tactical supply chain decisions.

The need for response

Traditional supply chain risk assessment and mitigation are critical processes that must be implemented to address major supply chain risk. However, supply chain risk mitigation has a second component that many companies (and many risk management experts) fail to consider; the ability to respond.

When an event happens, you can't wait for days or weeks to understand the impact. You must assess, evaluate responses and implement immediately. The bottom line is that organizations need to know sooner and be able to act faster. When the flood in Thailand happened, companies scrambled to secure hard drive supplies. If you spent weeks evaluating your existing supplies, future demand and alternative sources, you would be hard pressed to secure any of the limited supply of hard drives.

Responding to supply chain events must happen quickly and with confidence. Traditional ERP systems weren't designed for responding to supply chain exceptions because it takes too long to model an event, calculate the impact and most importantly analyze the results. Because of this, many companies have tried to use spreadsheets as their stop gap, but spreadsheets are at best an approximation of what might be going on. They don't contain the level of detail or the analytics needed to truly understand the impact of an event or the best resolution.

An effective supply-chain risk management program must ensure that an enterprise and its partners implement appropriate measures to fully secure goods and their components from the point of origin to final destination.⁷

The ability to respond effectively to supply chain events requires a combination of capabilities that enable organizations to:

- ▶ Detect when an event occurs (and more importantly the impact of that event)
- ▶ Allow fast "what-if" modeling of the different resolution options
- ▶ Promote collaboration and communication (across multiple functions, even multiple tiers of the business) of the different resolution streams
- ▶ Provide clear guidance as to which resolution provides the best results (by evaluating and comparing scenario results against key performance metrics)

Depending on whether or not the disruption was anticipated or not, responding to supply chain events can take two forms;

1. Responding to an unanticipated supply disruption
2. Responding to an anticipated supply disruption by implementing the mitigation strategy

In both cases, the key element is timely alerting that an event has taken place. You can't respond if you don't know. The supply chain should be monitored and an alert triggered when a disruption has occurred so that those who need to respond are provided immediate notification. That being said, alerting on the event is not enough. The alert mechanism should be smart enough to alert you on the events that impact the business.

An unanticipated event is a disruption that despite best efforts was not foreseen and therefore does not have a mitigation strategy prepared. In this case, the speed with which the company can react and respond can mean the difference between an insignificant blip and a full scale crisis.

An anticipated event is a disruption for which a mitigation strategy has been prepared. In most cases implementation of the strategy goes as planned, but sometimes there are unanticipated problems; material shortages, capacity shortfalls, quality issues. In these cases being able to respond effectively can mean the difference between a fast recovery and a painful crisis.

Risk management planning efforts must be complimented by a strong supply chain response management competency.

The effectiveness of decisions and actions in response to supply chain disruptions:

- ▶ **Drive customer satisfaction and retention**
- ▶ **Dramatically impact inventory control and management**
- ▶ **Strongly influence business profitability or margin loss**
- ▶ **Have direct and profound implications to earnings per share (EPS)**

⁷Supply Chain Risk Leadership Council (SCRLC), *Supply Chain Risk Management: A Compilation of Best Practices*, August 2011

Capabilities needed for supply chain risk mitigation and response

Companies need tools to help them assess supply chain risk, develop mitigation strategies and respond to supply chain events — both big and small — both anticipated and unanticipated. But for real value, any risk management capability must be directly linked to the high level and detailed planning processes and systems. As such, the fundamental risk management capability need is not best served by a point solution, but rather should be part of a broader “Control Tower” type solution that helps you to see and orchestrate the activity of the extended supply chain, whereby risk monitoring and response is an innate part of managing the business. To accomplish this, a solution must provide the following capabilities;

What’s a control tower?

When risks are high, no one can afford to wait to make a decision. And making the wrong decision can cost...big. Fast and confident actions are the table stakes.

That means from one enterprise management system and across key business functions, companies must be able to quickly

- ▶ Get notified of unexpected events of concern
- ▶ Do deep, forward-looking “what-if” analysis
- ▶ Align cross-functional decisions as a team before taking corrective action

By combining key supply chain management (SCM) and sales and operations planning (S&OP) processes (as well as other associated business functions) companies achieve a control tower solution that drives overall orchestration of an enterprise’s operations.

The end goal is to compress the time to identify a variety of plan deviations, and more importantly, dramatically collapse the time to make profitable course corrections in response.

- ▶ **Visibility:** In order to properly assess supply chain risk and respond to events, visibility across the supply chain is required. This means integrating with and modeling the ERP analytics from multiple disparate ERP systems, including systems supporting the supply and distribution nodes. Beyond achieving a historical or current view of the state of the supply chain, a definition of supply chain visibility should also include the capability for forward-looking, predictive views of the supply chain. By enabling comprehensive visibility (multi-tier, multi-enterprise, past, present and future views) in a single unified system, many situations that could develop into a significant supply chain event can be identified and diffused long before they hit a critical state.

For example, consider a company which has a fixed supply of a key component from a given supplier. Imagine if Marketing is projecting a higher demand for an item that uses that component. In many systems, especially when forecasting exists in a separate module, this supply shortfall would not become apparent until much further down the planning timeline. If that demand and supply information co-existed in a single system, this potential risk would become obvious as soon as the forecast was modified.

- ▶ **Event detection and alerting:** The sooner a supply chain disruption is recognized, the faster the response. But too many times, event detection is based on the event itself. To be truly influential, alerts should be triggered based on the anticipated impact of the event. For example, if a supplier goes out of business, but the loss of this supplier doesn’t impact key metrics, an alert may not be necessary. Alternatively, a minor event may fall below a particular risk threshold, but the impact of it could have a significant business impact. As well, a series of small plan discrepancies may on their own be insignificant, but collectively create a much larger risk that can only be discovered if you look at the end impact rather than the individual event.

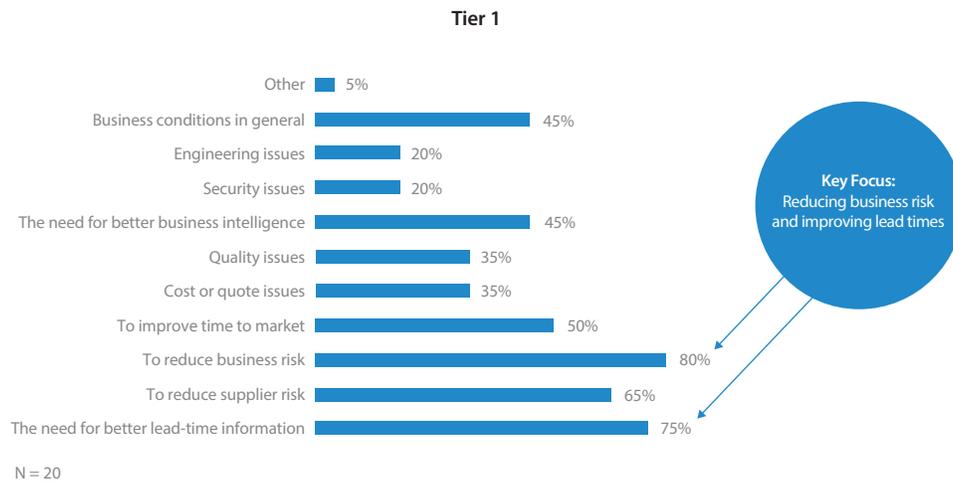


Figure 5 - Crisis events are driving MTSC adoption⁸

- ▶ **Analytics:** A full suite of supply chain analytics needs to be modeled to ensure the impact of a potential supply chain event is understood. When an event happens, analytics are used to model the event and determine their impact, as well as the impact of the potential decisions and actions taken in response to the event. Above all, these analytics need to be performed in real time, especially when responding to an unanticipated supply chain disruption. When an event happens, seconds count and a company can't wait days or weeks to analyze the impact or to identify resolution alternatives.
- ▶ **Simulation:** Simulation is critical to both sides of supply chain risk management. When assessing risks, "what-if" simulations help to model the various risk scenarios. Further, simulation is used to model alternative mitigation strategies to ensure that they are sound. Lastly, when responding to an unanticipated supply chain event, simulation is used to model and compare the various response alternatives.
- ▶ **Collaboration:** The risk management team will need to evaluate several possible mitigation alternatives. Members of the team will likely not have the intimate knowledge necessary to explore all alternatives in the detail needed to develop a robust mitigation strategy. The ability to bring other people into the evaluation process is critical both to validate the proposed strategy and to propose key improvements given their particular insight and area of responsibility. Similarly, when responding to an unanticipated supply chain event, collaborating with those with the detailed knowledge ensures that the response alternatives are feasible.
- ▶ **Scenario comparison:** In the process of developing mitigation strategies or executing responses, the team may develop multiple approaches that could potentially resolve the problem, but in differing ways. The team needs to make a decision on which mitigation or resolution alternative best meets the goals of the organization. One approach may extend lead times by 30 days, while the other may increase the cost of goods sold by 10%. The decision on which approach is best needs to be evaluated in light of corporate goals and specific key performance targets.

While the fundamental capabilities discussed above apply broadly, from a supply chain risk perspective, there are two specific strategies where these capabilities can come into play in a particularly focused fashion.

- ▶ **Prioritized demand:** In the case of a significant event, despite the best mitigation strategies and the fastest response times possible, you might not be able to recover your entire needed supply in time to satisfy demand. In this case, deciding which demands to satisfy then aligning your supply chain to meet this new prioritization is necessary. This taps the collaborative simulation and scenario comparison capabilities discussed above.
- ▶ **Integrated S&OP:** As discussed earlier, S&OP's structure, monthly meetings and supply chain focus make this the natural venue to manage risk processes. To make this work however, you need tight integration of all planning layers and functions—combining demand and supply planning, and volume and mix planning. Having visibility to the highest level demand signals (e.g. product family forecast) to the very lowest level raw material component, while simultaneously supporting near term and long term planning and simulation, makes this a ripe environment for risk analysis.

⁸Barger, R, North Rizza, M, Kraus, B, Multitier Supply Chain Visibility Improves Supply Chain Relationships and Reduces Risk, Gartner Inc., 12 August 2011

Summary

If the last few years have shown us anything it is that the supply chain is being exposed to more and more risk. Some of this risk can be managed through better supply chain design; assessing where supply “choke points” are and building in supply and logistical redundancy. Other risk, however, must be managed through better response capabilities because

- ▶ Even the best thought out mitigation strategy may fail when the time comes to implement
- ▶ Events that you couldn't have imagined (or considered too low a probability to worry about) during your risk assessment may in fact come to pass
- ▶ Small events, which may be considered insignificant on their own, but that taken in sum become a large risk consideration if not managed effectively

Your ability to respond quickly to these events can spell the difference between profit and loss. To be successful, organizations need to accept risk, not as part of an exception driven strategy, but as a key element of the ongoing management of the business operations. It requires developing a culture of risk consideration and adopting the enabling tools to allow one to manage risk as it happens and in its different forms.



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About Kinaxis Inc.

Offering the industry's only concurrent planning solution, Kinaxis helps organizations around the world revolutionize their supply chain planning. Kinaxis RapidResponse, our cloud-based supply chain management software, connects your data, processes and people into a single harmonious environment. With a consolidated view of the entire supply chain, you can plan expected performance, monitor progress and respond to disconnects when reality hits. RapidResponse lets you know sooner and act faster, leading to reduced decision latency, and improved operational and financial performance. We can prove it. From implementation to expansion, we're here to help our customers with every step of their supply chain journey.

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