SUPPLY CHAIN RISK: PROTECT YOUR BUSINESS WITH RISK MANAGEMENT
APICS sought to examine the role that supply chain risk management plays in organizations and how risk management will evolve. The goal overall of the supply chain risk survey was to determine the current real-world practice of supply chain risk at the level of APICS members and customers.

More than 9,000 professionals were invited to participate in the survey, which took place from June through July 2011. The survey results reflect an approximate 6 percent margin of error at a 95 percent confidence level.

The survey results reveal that risk management is still at an early stage of maturity and that there are gaps at the organizational-management level and the supply chain and operations management level. As supply chains become more complex, and as risk occurrence becomes potentially more costly, the importance of risk management increases.

This report is developed by the APICS Supply Chain Council (SCC). Its research reports are based on practitioner surveys that explore trending topics in supply chain and operations management. They include survey results, analysis, tips and best practices to keep you and your organization informed of insights and innovations in supply chain and operations management.
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**Additional Resources**

These programs and publications provide resources and detailed information about the topic.

APICS Risk Management Certificate Program
apics.org/risk

A full version of this report is available free to APICS Supply Chain Council affiliates and sponsors and APICS members. Log in to the website to access additional analysis and insights on this topic. If you aren’t an APICS member, join APICS today. Nonmembers may also purchase the full report.

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SUPPLY CHAIN RISK: PROTECT YOUR BUSINESS WITH RISK MANAGEMENT

Risk:

The *APICS Dictionary*, 14th Edition, defines supply chain risk as “Decisions and activities that have outcomes that could negatively affect information or goods with in a supply chain.”
EXECUTIVE SUMMARY

Combine random disasters and the economic challenges related to the cyclical nature of business—rising and falling demand, market uncertainty and varying levels of trust among supply chain partners—and anyone doing the math can see that business faces constant supply chain risk.

APICS invited 9,000 members and customers to participate in a survey to examine the role that supply chain risk management plays at an organization, encompassing both practical supply chain risk strategy and increasing risk management maturity. The survey evaluated the current state of supply chain risk management at organizations, and assessed how risk management will evolve.

The survey results reveal that risk management is still at an early stage of maturity and that there are gaps at the organizational-management level and the supply chain and operations management level. As supply chains become more complex, and as risk occurrence becomes potentially more costly, the importance of risk management increases.

Several trends emerged as survey responses were analyzed:

- Respondents have concerns about relationships with suppliers and customers. In contrast, distribution and warehousing showed the least risk. The areas of logistics, production and customers had more neutral assessment.

- Organizations reported the phenomenon that supply chain risk practice fades once perception of a risk disappears.

- Respondents reported they mostly knew their supply chains form end to end, including the flow of material into and out of facilities from each node in the chain.

- Many respondents indicated that they could map the physical flow of materials from suppliers, including the location of supplier production facilities, freight facilities and transportation methods used by each supplier.

- Most organizations assign responsibility for supply chain risk to supply chain and materials management departments, and buying and sourcing professionals. Somewhat less common are master planning, distribution and senior management.
**Breaking the reactive cycle**

Risk management strives to address risk proactively, in advance of problems and also in optimizing organization and supply chain response after a risk occurs. Without risk management, risk awareness and response tend to follow an ineffective reactive cycle:

Many risks appear to follow a lifecycle. Yesterday’s simple concerns become today’s risks. Today’s known risks become tomorrow’s lessons learned. This lifecycle reflects the process of human discovery, prediction and management of risk applied to the supply chain.

In contrast, a risk management manager or actor works steadily, proactively and wisely to position the organization and its supply chain against risk, both for tactical and strategic benefit.

The scope of supply chain risk management is extensive and spans all areas of the supply chain. At the tactical level, risk management is the continual activity of detection, measurement and evaluation of potential supply chain disruption caused by all varieties of supply chain risk, emanating both from within or outside the supply chain. Supply chain risk management seeks to manage, control, reduce or eliminate real or potential risk exposure to supply chain performance. Risk is the actual or potentially negative impact on supply chain performance. Effective risk management decreases cost by reducing the probability and impact of supply chain disruption and reduced performance.
**Risk management alignment**

Effective supply chain risk solutions depend on compatibility with an organization’s business strategy and mission statement, product families, markets and supply chain partners. For example, supply chain operations must align with the overall strategy of the organization, or else the supply chain generates risk for the entire organization. For a producer of low-margin commodities with stable, predictable demand, a long, slow and inexpensive supply chain may reduce risk when compared to a short, fast and expensive supply chain. The opposite would be true of an innovative electronics manufacturer serving a boom-and-bust market or customer. Lowering risk in one area of the supply chain may simply shift risk to another area. Due to these complexities, there is no one-size-fits-all approach to supply chain risk management.

Risk management covers the perspectives of both known and unknown risk. Examples of known supply chain risks include process breakdowns, supplier failure, poor material and component quality, and inadequate logistics and distribution capability. Other examples include excessive demand instability, criminal action and natural disasters. While known risks are too numerous to list, known risks are identifiable in advance of their occurrence and generally can be prevented with risk mitigation efforts.

**Root causes**

To eliminate a risk, a supply chain risk manager must discover the cause of that risk. With a known cause, developing a long-term, effective solution becomes possible. However, finding the cause of risk usually is a difficult task. High complexity, missing information and lack of communication are challenges. One strategy is to develop a history and future projection of the risk. Consider the following questions:

- When did the problem first appear?
- How and why was it noticed?
- Why did it not appear earlier?
- What enables this risk to persist?
- What dependencies (systems, processes, resources) does the risk have to maintain itself?

To project the risk into the future, ask more questions:

- What enables this risk to persist?
With a framework of past and future analysis of the risk in place, a common discovery is that today’s risks develop from yesterday’s solutions. Solving today’s risks might need to wait for tomorrow’s solutions. A cycle of solution-risk-solution may emerge. The way past solutions develop into new risk may reveal clues to root causes and blind spots.

For example, consider the problem of legacy mainframe computer systems. In the 1960s and 1970s, such systems were the solution to a tremendous number of operational and information flow problems. But such legacy mainframes gradually increased risks in later years. Aging hardware and programs could not flexibly handle rising data volumes or allow integration with newer systems or dates beyond the year 1999.

Replacement systems gradually eliminated the problem but introduced new risks along the way. The solution-risk-solution cycle of legacy mainframe computers may seem obvious today, but it was not clear for many years. Often, gradual problems or soft risk lack visibility and priority in organizational management.

In the mainframe situation, the supply chain manager must consider and address inattentive management as a cause of supply chain risk. Often, the same management culture may exist, and the supply chain manager must work to dismantle it.

**Addressing unknown risk**
Supply chain risk management must also address unknown risks. Good practice and preparation is key to improved responsiveness to what is unknown. Unknown risk may be framed or classified in two ways:

- Supply chain assets may face loss due to the unknown risk
- If loss occurs, the level of damage mitigation and post-risk response that is required also serves as a classification

For example, suppose an unknown sinkhole, impossible to detect in advance, were about to open up beneath the floor of a production facility. The sinkhole remains an unknown risk until it occurs. However, an organization that possesses risk management strategies that address (1) loss of use of the production facility, and (2) rapid replacement of production capability, could apply those plans to the sinkhole risk once it appears.
Preparing for and addressing unknown risks can partially occur by identifying soft risks, which are those risks that are difficult to clearly detect and measure, but which may increase the odds of negative impact or loss. Note: See the “Practice scenarios” section for more information about soft risk.

Using the sinkhole example, (1) a soft risk might be the cutback of physical facility inspections due to budget cuts, and (2) the expectation of sinkhole-related loss based on the history or statistical study of the types of building losses experienced in the area of the production facility. Post-risk mitigation efforts of all kinds generally improve when the supply chain has a track record of ongoing, effective levels of proactive and reactive risk management practice.

**New aspects of supply chain risk management**

Historically, costs devoted to supply chain risk reduction rarely exceed the cost of expected losses in the supply chain. There seemed to be little strategic added value for additional spending. However, this perspective is changing. Risk management increasingly is recognized as creating a strategic competitive advantage. It promotes an agile supply chain that:

- Outperforms competitors impacted by the same shared risks, thus boosting market share when a sudden common risk occurs
- Supports optimal supply chain design by reducing uncertainty and strengthening relationships and trust to reduce risk
- Continually detects, optimizes and reduces risk exposure and cost when compared to competing supply chains

Supply chain risk management develops the concept of co-destiny. The APICS Dictionary, 14th Edition, defines co-destiny as “The evolution of a supply chain from intraorganizational management to interorganizational management.” With regard to co-destiny, supply chain risk management pursues both prevention of risk and loss mitigation of post risk events. The entire supply chain benefits from risk discovery and reduction at every point.

The supply chain manager that considers risk must serve as the awareness champion of soft risk and gradual problems. To act as champion means to know risk cause and history, the threat over time, and the ideal way of addressing risks with minimal outlay bound by organization budget and strategy. Risk reduction frequently comes at the expense of resources and flexibility.
A supply chain risk manager must be able to demonstrate why reducing risk is worth the lost opportunity cost of resources or reduced flexibility, and how the risk mitigation tactic promotes organizational and supply chain strategy. To accomplish this, the supply chain risk manager must have an excellent understanding of organization and supply chain strategy and how risk reduction serves strategic needs. Note: See the APICS Supply Chain Strategy Folio: Make the Most of Supply Chain Strategy for additional strategy information.

**Current practice and maturity levels**
Supply chain risk management is not as advanced as other operations management disciplines. Standard forms of reporting, vocabulary, mapping and conceptualizing supply chain risk are not complete or have not yet been universally adopted. Even with easily measurable risk data, supply chain complexity makes it a challenge to gather a complete, intricate view of a supply chain’s total risk profile. Of course, not all supply chain risks are easily measurable.

Risk management may involve non-intuitive processes or analysis across many stakeholders. Nonetheless, the level of risk management’s visibility and integration in an organization is a sign of its maturity level. Integrating supply chain risk management with business continuity, security or planning departments may assist its integration, especially in an industry such as finance.

Most organizations find themselves somewhere in the middle of the following continuum:

- There is no supply chain risk management in place.
- Formal or informal risk management happens when a clear threat appears, but efforts fade as the hazard disappears.
- A formal position or positions address supply chain risk, but efforts are mainly tactical and focus on specific areas of the supply chain, not the entire supply chain. Visibility is not optimal across the organization or the supply chain. Supply chain risk management is not widely regarded as a strategic competitive advantage.
- There is a formal cross-departmental team or group to address supply chain risk across the entire supply chain. The team or group successfully maintains visibility and awareness with the rest of the organization and supply chain. Supply chain risk management is generally acknowledged as a strategic competitive advantage.
Getting started: Supply chain risk tools of the trade

Often, despite development of risk management plans and lists of risks and threats, supply chain operation remains unaffected. When a risk finally occurs, the typical stakeholder or manager response is, "How did this happen? Why weren’t we prepared?" These questions and similar cries for risk information should be answered well in advance.

The first step is building up risk awareness. Effective risk management develops risk awareness across elements of the organization—from senior management to department heads and middle managers.

Begin by creating a senior-management sponsored cross-functional, supply chain risk team that develops and reports across the organization. Reports should include a complete perspective of the organization’s business, supply chain dependencies and operations. The group’s purpose is to build an effective supply chain risk portfolio that includes:

- Supply chain risk profiles
- Practice scenarios
- Risk checklists
- Supply chain risk software and tools
- Emergency and crisis management plans
- Risk management tactics and strategies
Supply chain risk profiles
With an experienced and representative stakeholder group, a list of known supply chain risks can be compiled. Then, a risk profile catalog should be built, which is done by continuing the consensus approach. First, give each risk an initial priority pass, classifying each as important or not important and urgent or not urgent.

Important and urgent are different concepts. Plenty of urgent tasks demand immediate attention but are not important (for example, scratching an itchy mosquito bite). In risk management, urgent but unimportant tasks are usually distractions or interruptions, such as an email insisting on an immediate response to a minor issue. Likewise, important tasks may not be urgent. Completing a report on inventory loss may be important but have a due date of 10 months into the future. Prioritizing current and future risk management efforts requires attention to both important and urgent measurements.

Important and urgent tasks have a high priority. At this point, human nature tends to assign urgent but not important risks as moment-to-moment priorities, while ignoring important but not urgent risks. A risk management process helps overcome human nature and ensures important but not urgent risks receive a fair share of attention before they become important and urgent.

First, create a risk management list. Prioritize your list, and drop all risks identified as not important and not urgent. Then, classify each risk according to probability and consequence:

- High probability of occurrence
- Low probability of occurrence
- High severity of consequence
- Low severity of consequence

Then, add a time period and data to each risk.

Select risks that exist in a defined period of time (such as month, quarter or year), identify their owners, and include value-add estimates.
Quantifying risk profiles
A risk profile can be quantified by assigning individual posts such as (1) for low, (2) for medium and (3) for high, to both the probability of occurrence and the consequence of risk occurrence. Multiplying probability and consequence points results in total severity point value. This helps prioritize risk management efforts.

This table is an example of a current quarter supply chain risk profile for a fictional company.

<table>
<thead>
<tr>
<th>Risk name</th>
<th>Owner</th>
<th>Probability points</th>
<th>Consequence points</th>
<th>Total severity points</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT system fails</td>
<td>IT</td>
<td>Low: 1</td>
<td>High: 3</td>
<td>(1x3)=3</td>
</tr>
<tr>
<td>Key supplier strike</td>
<td>Buyers</td>
<td>Medium: 2</td>
<td>High: 3</td>
<td>(2x3)=6</td>
</tr>
<tr>
<td>Hail damage</td>
<td>Facilities</td>
<td>Low: 1</td>
<td>Low: 1</td>
<td>(1x1)=1</td>
</tr>
<tr>
<td>Obsolete inventory</td>
<td>Production</td>
<td>High: 3</td>
<td>High: 3</td>
<td>(3x3)=9</td>
</tr>
<tr>
<td>Unrealistic key customer demands</td>
<td>Sales</td>
<td>Low: 1</td>
<td>Medium: 2</td>
<td>(1x2)=2</td>
</tr>
</tbody>
</table>

It is simple to refine the risk profile to consider expected loss in currency, units of production or customer satisfaction. The team may choose to replace the simple high or low probability of occurrence options with actual percentage probabilities calculated from other sources—such as a 65 percent chance of occurrence rather than high or low.

Risk profile tables create historic, quantifiable data to chart and evaluate for repeating visits or risks correlated with seasons, suppliers, customers or other elements of the supply chain. Overall risk trends or a combined risk profile for the supply chain becomes possible with a variety of risk profile tables. Participants must ensure the risk profile process occurs frequently enough to track high probability and high consequence risks to prevent surprise among stakeholders and to provide timely mitigation opportunity among owners and stakeholders, who should be actively participating in the development. Consensus is key. Remember: A lack of involvement usually means no commitment to reduce or mitigate risk.
Practice scenarios

Practice scenarios are akin to fire drills. They simulate a risk occurrence and measure the performance of all participants. Their purpose is engagement, education and the discovery of lurking risks. Practice scenarios are particularly useful for risks that reveal themselves only in practice, but otherwise remain hard to spot. For example, when a hard risk manifests itself and causes harm or damage, there will be high demand for information, speed, communication, alternative analysis, damage assessment and mitigation, investigation and reporting. How do the stakeholders respond to this out-of-the-ordinary situation? Practice scenarios probe for weakness and help reveal less-than-optimal responses.

Practice scenarios are also effective on soft risks. Soft risks are those risks that are difficult to measure or perceive. Weak leadership on the part of senior managers is a typical example of a soft risk. While this type of soft risk is hard to identify, conducting practice scenarios results in the appearance of indicators such as confusion or lack of decision-making authority.

Practice scenarios show when a risk brings about harm or damage and likely will trigger additional risks, causing a ripple effect of increasing risk exposure. Rapid and coordinated damage control helps minimize this problem. Damage control should also be a function of practice drills and scenarios. What works and what fails becomes clear, as do differences between an optimal response and a less-than-optimal response.
Risk reduction checklists
Prepared in advance, risk reduction checklists ensure that an optimal sequence of tasks and stakeholders prevent risk and catalog risk prevention steps. Supply chain professionals should establish checklists for routine operations, such as evaluating performance and maintaining relationships:

- A record of a completed checklist on file can make a significant difference when investigating the causes of damage from an unknown or unexpected risk.
- Completed checklists help ensure soft risk mitigation and risk management culture remain ongoing priorities of an organization.
- Checklists ensure objective measurement of situations that may suffer from incomplete, faulty or subjective perceptions.

Consider developing objective, standards-based checklists for high-stakes or important supply chain tasks such as selecting and adding new suppliers. Checklists help make risks visible to everyone. When checklists are developed and shared with other parties in advance, clear expectations frequently replace misunderstanding.
Supply chain risk software and accreditation

Some organizations map their supply chains using flow-charting software. A variety of supply-chain flowchart templates help capture simple supply chain risk relationships. Currently, research and development is underway for tools that mine available transaction information, tracking supply chain components, near real time performance and materials flow. Still, relatively few organizations enjoy this capability because it requires extensive custom information systems development.

Government- and industry-sponsored supply chain risk standards and certifications programs create public-private models of supply chain risk framework and practice. These usually involve customs, law enforcement, border security or similar national officials. Tested or accredited supply chain participants typically agree to maintain program standards and pass information on the movement of goods before they leave or enter a region. These programs enable authorities and stakeholders across the globe to cooperate and carry out better risk analysis. For example, before or after goods arrive in the customs territory, general and specific risks are managed thanks to early availability of risk-related information.

The following are examples of these types of programs:

- **United States:** Voluntary Private Sector Preparedness Accreditation and Certification Program (PS-Prep) and Customs-Trade Partnership Against Terrorism (C-TPAT) [www.fema.gov/privatesector/preparedness](http://www.fema.gov/privatesector/preparedness)


- **Industry:** Transported Asset Protection Association (TAPA) and TSR-2008 accreditation [www.tapaonline.org/](http://www.tapaonline.org/)

- **Industry:** International Organization for Standardization (ISO), ISO 31000—Risk Management [www.iso.org/iso/iso_catalogue/management_and_leadership_standards/risk_management.htm](http://www.iso.org/iso/iso_catalogue/management_and_leadership_standards/risk_management.htm)
According to the *APICS Operations Management Body of Knowledge (OMBOK)* Framework, risk management covers supply chain risks that can be categorized across two dimensions:

- **Coordination risks:** Risks associated with the day-to-day management of the supply chain, which are normally addressed using principles such as safety stock, safety lead time and overtime.

- **Disruption risks:** Risks caused by natural or man-made disasters such as earthquakes, hurricanes and terrorism.

**Supply chain risk management is evolving**
Increasingly, there are formal roles devoted to risk management, or it becomes a formal responsibility of existing supply chains, materials and operational management roles. This trend stems from the rising visibility of supply chain risk. The natural disasters the globe has seen over the last several years, as well as increasing information technology capabilities, have demonstrated to business management the rewards that are available through the practice of risk management.

Particularly in challenging economic times, risk management can help an organization endure and even benefit from risk, at the expense of its competitors that are not so well versed in risk management. Consider the industry and media attention given to risk management after the major natural disasters of the last five to 10 years, from Hurricane Katrina to the earthquake and tsunami in Japan. Visibility of risk management tends to rise and fall with reported disasters. However, formal ongoing roles and responsibilities help counter the cyclical rising and falling attention given to risk management as risks occur.
Why is supply chain risk management Important?

- Risk management stimulates many supply best practices. For example, risk management is a key stakeholder in eliminating waste. The use of resources or assets creates inherent risk. Use or deployment of wasteful resources creates unnecessary additional risk to the organization, as well as to the supply chain. Risk to even a wasteful resource or asset may potentially compound losses in other assets should risk occur.

- Risk management generally improves supply chain partner relationships as joint risk sharing and risk information improve, and through increasing trust as risk management practice demonstrates commitment and capability the supply chain can count on.

- It provides visibility of supply chain-wide risk, ascertaining the reality of constant risk exposure not only within the network of a single organization’s facilities, but across a broader domain of geographies and capabilities.

- The reality of soft risk—risk that is difficult to measure—and its unintended consequences in business management. There is a need for constant awareness and vigilance toward decisions, processes, practices and goals that may unintentionally increase or decrease in the supply chain.

- Every business faces the balance point of risk and reward. Over the course of history earning a greater reward generally requires enduring a greater risk. Risk management ensures that risk exposure is optimally minimized while the organization seeks its greatest reward from its people, assets, capabilities and resources.

Gain competitive advantage through risk management

Improved risk management enables an organization to take market share from competitors when a common risk strikes, and leads to improvements in discovering, preventing and addressing smaller risks, which may cost effort, expense or time. These benefits increase when practiced across a supply chain. A supply chain practicing risk management is faster to spot risk, faster to respond to it and faster to claim advantages from these capabilities. Competitor supply chains and organizations may not have as well developed risk management practices. This becomes a key strategic competitive advantage even for commodity product producers.
Supply chain risk management maturity highlights

<table>
<thead>
<tr>
<th>Risk management practices and perspectives</th>
<th>Organizations practicing risk management less than two years</th>
<th>Organizations practicing risk management for more than 10 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does your organization have a formal supply chain risk management job role or position?</td>
<td>Yes: 3%</td>
<td>Yes: 30%</td>
</tr>
<tr>
<td>Does your organization simulate or role-play supply chain risk scenarios?</td>
<td>Yes: 18%</td>
<td>Yes: 40%</td>
</tr>
<tr>
<td>Which risk is most likely to affect your supply chain?</td>
<td>Lack of supply chain information sharing</td>
<td>Natural disaster disruption</td>
</tr>
<tr>
<td>Do you have a crisis mitigation plan in place right now?</td>
<td>Yes: 33%</td>
<td>Yes: 70%</td>
</tr>
<tr>
<td>What reports, measurements or metrics do you use to evaluate supply chain risk?</td>
<td>Information flow: 20% Inventory levels: 42%</td>
<td>Information flow: 60% Inventory levels: 85%</td>
</tr>
<tr>
<td>Have you personally experienced a major supply chain risk situation?</td>
<td>Yes: 32%</td>
<td>Yes: 48%</td>
</tr>
<tr>
<td>Are you always aware of supply chain risk?</td>
<td>Yes: 7%</td>
<td>Yes: 39%</td>
</tr>
</tbody>
</table>

Survey participants were asked the following question: “If your employer assigned you to serve in a supply chain risk role, what challenges do you foresee?” More than 60 percent of all respondents indicated lack of resources, useful tools, data or platforms to capture, analyze and integrate supply chain risk into the existing supply chain management processes.

Further, concern about soft risk—risk that is not easy to measure—was apparent. Between 25 percent and 50 percent of respondents indicated the following areas of concern:

- Growing uncertainty because of changing laws, regulations or liabilities.
- Slow supply chain performance compared to competitors.
- Focus on efficiency at the expense of risk responsiveness.

These results suggest operations management professionals are in a unique situation to influence the level of risk management maturity in their organizations. Their direct access to supply chain information and function combined with responsibility for risk management, position them to serve as formal or informal risk management practitioners.
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- Sustainability
- And other topics

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ABOUT APICS SUPPLY CHAIN COUNCIL

APICS SCC is a nonprofit organization that advances supply chains through unbiased research, benchmarking and publications. APICS SCC maintains the Supply Chain Operations Reference (SCOR) model, the supply chain management community’s most widely accepted framework for evaluating and comparing supply chain activities and performance. APICS SCC enables corporations, academic institutions and public sector organizations to address the ever-changing challenges of managing a global supply chain to elevate supply chain performance. APICS SCC is part of APICS, the premier professional association for supply chain and operations management.

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