



Wilson Perumal & Company's
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▶ ***The Shockproof Supply Chain:***

Eliminating the sources of catastrophic risk
in today's global supply chain



The Shockproof Supply Chain:

Eliminating the sources of catastrophic risk in today's global supply chain

Today's supply chains are more vulnerable to risk than ever before, yet in many organizations the sources of critical risk remain unknown, ignored or viewed as permanent fixtures. As a result, few companies focus on engraining a proactive risk management capability throughout their organizations. This is unfortunate because complexity is largely increasing. And with ever more complex supply chains supporting a growing number of products and offerings, the opportunity and impact of critical supply chain failures has grown exponentially. Whether it is a material shortage at a key supplier, a natural disaster that shuts down shipments across a continent, a quality issue resulting in product recalls, or any number of other potential failures, the likelihood of supply chain disruptions is now greater than ever. Without change, that combination of increased severity and likelihood makes crippling failures in supply chains—the lifeblood of organizations—more certain. These crippling disruptions can lead to production shut downs, lost sales, delayed product launches and lost customers.

In this article, we discuss our systematic approach to improving supply chain reliability. The objective: develop the capability to prevent failures through proactive actions and to quickly and smartly respond to any failures that do occur.

In recent years there have been several high-profile examples of supply chain failures resulting from risks inherent in modern supply chains (see sidebar on Characteristics of Modern Supply Chains):

- ▶ During the development of its 787 Dreamliner, Boeing outsourced design and engineering for major sub-components to its suppliers. Boeing then coordinated

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with these suppliers and acted as the final assembler. This gave Boeing the benefit of shifting the investment in design outside the company and allowing specialized suppliers to focus on what they do best. However, with the increased complexity, the communication needs and coordination effort were substantially greater. And Boeing struggled. The initial delivery was delayed over three years and cost overruns ran into the billions.

- ▶ Natural disasters are devastating to the people in their wakes. And the impacts can be felt around the world through disruptions in the supply of raw materials, components and finished goods. The 2010 Eyjafjallajökull volcano eruption in Iceland shut down most European air travel for five days.

The combined Japanese earthquake and tsunami in 2011 shut down computer component manufacturing and halted Japan's automobile industry. A global supply chain increases the chance that a natural disaster will impact the company since only one supplier need be affected.

- ▶ Toyota's unintended acceleration issues in 2010 can be traced back to a brake component manufacturer in the US. Because of Toyota's strong ties with its supply base, this company supplied components to almost all of Toyota's North American Camry and Lexus ES production. Therefore, an issue with that one supplier not only shut down all production of those models, but resulted in a recall of a huge number of previously built vehicles.

These failures could have been mitigated if WP&C's High Reliability Supply Chain methodologies were in place.

Evaluating Supply Chain Reliability – look several nodes deep for complete understanding

Number of suppliers – more suppliers require more resources to manage and create more opportunities for a failure; too few can result in single point failures

Number of supplier tiers – more tiers create more separation between you and your suppliers, result in more WIP, slow information flow and increase the number of potential failure points

Concentration of suppliers – more concentrated supply bases may be cheaper and easier to coordinate, but a failure at a large supplier can be more damaging and long-lasting

Location of suppliers – distant suppliers make quality monitoring more challenging, create more WIP and slow response times

Coupling – tightly coupled supply chains, with little inventory and capacity slack, are at more risk than loosely coupled supply chains as there is less ability to handle the small fluctuations that occur

Complexity – supply chains in which activity is sporadic and not clearly defined are subject to greater variability and make it challenging to know and react when deviations occur

Inventory – inventory centralization typically decreases stock levels but also slows reaction times—inventory levels and location must be balanced to ensure customer needs are met, obsolescence is minimized, reaction speeds are acceptable and costs/resource use are minimized

High Reliability Supply Chains

High Reliability Supply Chains (HRSCs) operate such that potential issues are identified and addressed before impacting the organization. And when those issues cannot be recognized in advance, HRSCs have the resources in place that can quickly recognize an issue and react real-time. The challenge lies in building an organization that is able to do this successfully. Increased complexity, with webs of interdependent suppliers, makes it difficult to understand the impact of events or actions. Absent this knowledge, the risk of a catastrophic failure increases.

Failure Mode and Effects Analysis (FMEA) is often a first step to understanding supply chain risks. When done well, they provide great insight into the top risks demanding the organization's attention. However, FMEAs have their limitations, they are: time and resource intensive, lead to a snap-shot view of risks, and typically are either locally focused and miss cross-organizational risks or broadly focused and do not leverage local knowledge.

Organizations must move beyond using tools like FMEA—it is impossible to fully understand the complexity and interactions within a supply chain from one initiative. This system must be learned and understood over time. Every operation, interaction and transaction within a supply chain is an opportunity to learn and deepen the organization's understanding of itself and how its components interact. Similarly, it is impossible to know and prepare for every potential failure, and organizations must also be able to quickly and effectively react to unanticipated failures. Having a deep understanding of the supply chain is critical in developing the ability to address failures, both proactively and reactively.

Characteristics of an HRSC

High Reliability Supply Chains must develop the traits required to have an unrelenting focus on reliability and avoid catastrophic failures. These characteristics can be traced back to the guidance provided by the 5 Pillars:

Preoccupation with failure

Focusing on potential failures forces supply chain employees to sense the unexpected and be able to identify and respond to weak signals.

Drive to go deeper than symptoms

Often employees will settle for the easiest, most convenient answer when something appears amiss. Employees in an HRSC delve deeper and seek to identify and understand the real root cause.

Sensitivity to operations

HRSC employees truly understand what actually happens in the field with their suppliers and how they interact, not just what is supposed to be happening.

Commitment to resilience

The organization encourages questioning and the exchange of information between all types/levels of employees. It focuses on developing a true understanding of the issues.

Deference to expertise

Corporate hierarchy does not matter in HRSCs when it comes to identifying issues and making decisions—employees at all levels are empowered to take action when necessary.

Characteristics of Modern Supply Chains

Key trends impacting supply chains today:

Supply Web/Network

Supply chains can now be more accurately described as supply webs or networks—producers rely on a broader range of suppliers who support a variety of different customers

Long, Dispersed Supply Chains

Longer, more complex supply chains with suppliers spread around the world necessitate additional Work-in-Process inventory, slow reaction times, inhibit information flow and make overseeing supplier activities more difficult

Design & Engineering Outsourcing

Shifting design and engineering work to the supply base saves on investment and takes advantage of suppliers' expertise, but results in lost control, coordination issues and loss of knowledge and capability

Supply Concentration

Suppliers in some industries have been able to develop and/or dominate a niche to a point that they control the production of a certain component, technology or raw material—this supply concentration gives them power and limits options during a supply disruption

Tight Supply Chains – No Slack or Second Source

Just-in-Time delivery is the model of efficiency, but eliminates the slack necessary to absorb supply disruptions. Second sourcing, a common risk mitigation strategy, is expensive and often the victim of cost-cutting measures.

SKU Expansion

Evolving consumer tastes, expanding geographic reach and market segmentation have all led to a dramatic increase in the number of SKUs most companies must offer—this puts financial and operational pressure on both ends of the supply chain, complicates demand planning and increases finished goods inventory.

Channel Expansion

Consumers' expectations of availability and speed of delivery have also changed in recent years, with the shifting of sales transactions to electronic mediums (web and mobile), customers expect to know immediately if a product is available and to have it delivered in a short amount of time.

Establishing a learning culture creates the foundation for developing an HRSC.

Learning organizations have four fundamental features. They:

- harness the best known approaches to build a system of dynamic discovery;
- solve problems as they arise and proactively prevent their reoccurrences;
- disseminate knowledge rapidly through the organization; and (see side bar for descriptions)
- develop managers who ensure the continual improvement of everyone in the organization.

High Reliability Supply Chain Organizations share key traits:

- preoccupation with failure
- reluctance to simplify
- sensitivity to operations
- commitment to resilience
- deference to expertise

These characteristics demonstrate the ability of a supply chain organization to learn, deeply understand its ecosystem, anticipate and address known issues and prepare for unknown threats (see Sidebar on Characteristics of an HRSC). The journey of transforming a supply chain into an HRSC exhibiting these traits is a long one, requiring commitment and organizational alignment. Certain capabilities, knowledge and behaviors must be learned by members throughout the organization.

The next step we take is to use the 5 Pillars of High Reliability Organizations (HRO) to develop those traits. Our 5 Pillars of High Reliability Organizations, adapted from the US Nuclear Navy, provide guidance along the journey and are the foundation to develop and sustain a HRSC. The 5 Pillars are:



- **Level of Knowledge** – The company has well-trained employees with a deep knowledge of internal & supplier operations. They know how the supply chain fits together to identify issues and understand how actions can propagate through the supply chain;
- **Questioning Attitude** – Employees must operate in an environment where they can apply their knowledge and understanding. They must feel comfortable questioning what is going on around them. Managers must encourage and reward this behavior since those closest to the operations are most likely to quickly identify potential failures;

- **Forceful Watch Team Backup –** Beyond a questioning attitude, High Reliability Supply Chains need all employees, regardless of level or seniority, to question and, if needed, stop actions or decisions that may be putting the supply chain and company at risk;
- **Formality –** Formal communication and processes are key to maintaining a High Reliability Supply Chain. Roles are clear, and processes are well established to ensure information and feedback are communicated in a timely manner;
- **Integrity –** Integrity and accountability foster an environment of trust and encourage proper behavior. Without them, employees will be tempted to cut corners and not act in the best interest of the company.

Supply chain failures can seemingly come out of nowhere and inflict catastrophic damages. Complexity is increasing in all aspects of supply chains, with the consequence that anticipating the sources of failure becomes ever harder, if not impossible. A different approach—and mindset – to risk is required. To operate in this dynamic environment and be in a position to proactively address supply chain risks, organizations must transform themselves in to HRSCs. At the heart of this transformation is a powerful framework that any company can leverage: the 5 Pillars. We encourage you to begin today by embracing the reality that tomorrow will be more complex than today, and yesterday's approach to risk-mitigation is outmoded.

Increased complexity, with webs of interdependent suppliers, makes it difficult to understand the impact of events or actions. Absent this knowledge, the risk of a catastrophic failure increases.

Why do we look to the Nuclear Navy for lessons in high reliability?

The US Navy's Nuclear Propulsion Program is cited by many as the preeminent High Reliability Organization (HRO). The Program has operated more nuclear reactors, for more years, than any other organization, civilian or military, and has done so without a single reactor accident. Over five decades the Program has stood in stark contrast to commercial nuclear power plants and other technical programs—following the loss of the Space Shuttle Columbia, the Columbia Accident Investigation Board looked to the Nuclear Navy for lessons.

Even before the emergence of a commercial nuclear power industry, Admiral Rickover, the “Father of the Nuclear Navy,” realized the fantastic benefits of nuclear power at sea, but he also recognized that putting nuclear power plants onboard submarines, operated by young crews in often harsh conditions,

was a fantastically more complex endeavor than anything the Navy had done before. He recognized that it would require a different way of operating—early sensing of potential issues at all points of the operation and continual learning of the Program as a whole were essential for safe and reliable operation. Gone were the military stereotypes of not asking questions and doing what you are told, being replaced with a questioning attitude balanced with formality. The result has been an unblemished safety and operational record, with each submarine that goes to sea now representing the cumulative learning of over 6000 reactor-years of operation.

We have found these lessons are not only applicable but essential to high-reliability in any endeavor in a complex operating environment.

High Reliability Organizations (HRO)

Reducing risk and creating a High Reliability Organization (HRO) are not just important to supply chain managers and the US Navy; it applies to all companies and all industries. Operational risk grows geometrically with complexity - as complexity continues to grow in all aspects of a company's operations, risk will grow at an even faster pace. The challenge in complex systems is that not all risks can be truly known and therefore cannot be proactively managed.

This leaves organizations vulnerable to accidents and major events resulting from a combination of seemingly innocuous non-conformances. It is the low-likelihood, but potentially catastrophic events that traditional risk management approaches struggle to tackle. The solution is to instill the practices, behaviors and disciplines outlined in WP&C's 5 Pillars to develop a High Reliability Organization that proactively manages and prepares for risk, and quickly responds to failures.

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About Wilson Perumal & Company:

Wilson Perumal & Company is a premier management consulting firm and the leading advisor on how to manage and capitalize upon the complexity of today's world. To learn more, visit www.wilsonperumal.com.

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