Supply risk management

Weathering the storm

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Bouncing back quickly from a supply chain disruption requires careful planning and design, strong supplier relationships and a flexible culture

By Yossi Sheffi

Disruptions to supply chains come in many forms. There are natural disasters such as hurricanes and earthquakes, and disasters perpetrated by humans, such as terrorist attacks. And there are dislocations that have more to do with the nature of business. Globalisation is stretching supply chains internationally at a time when market volatility is increasing, exposing companies to greater uncertainty. Port stoppages, customs delays and transportation capacity constraints are just some of the dangers global companies face every day.

The disruptions resulting from these occurrences are often compounded by the way organisations – particularly government agencies – react. Take the foot and mouth disease (FMD) outbreak in the UK in 2001. The British government's response to the crisis created greater disruption than the event itself. It closed down the countryside, halting tourism and ordering the slaughter of cattle, to demonstrate that it was in control of the situation. What it did not realise, however, was that the impact on tourism was more damaging than the loss of the cattle. The government did not consider the fact that the UK was no longer an agricultural country.

But the British government is not alone in "overreacting". Following the 9/11 terrorist attacks, the US government tightened security at borders and shut down US airspace. The intermittent plant closings by Chrysler in the following weeks and the 13 per cent reduction of output at Ford Motor Company during the fourth quarter of 2001 were not the direct result of the terrorist attack. They resulted from the shutdown of the Canadian and Mexican borders for truck movements and subsequent delays because of tighter border security. The US government's reactions disrupted numerous just-in-time manufacturing systems that depended on reliable international shipping.
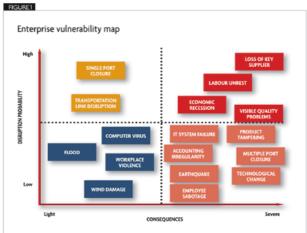
To be fair, governments have to act quickly in crisis situations, often with limited information, to instil public confidence. The result is that companies have to account for this when they prepare for disruptions, which may be magnified as a result of the response from government or other organisations.

Companies can mitigate these risks by becoming more resilient. A resilient enterprise is better able to endure the vagaries of global trading. Moreover, such an organisation can actually gain competitive advantage from its preparedness, by being one step ahead of the competition when a disruption hits and a fast recovery is crucial to a healthy return to normality.

Resilience – a notion borrowed from the materials sciences – describes the ability of a material to recover its original shape following a deformation. For companies, it measures their ability to, and speed at which they can, return to their normal performance level (production, services, fill rate, and so on) following a disruption.

There are a number of ways to become resilient, and many companies start the journey by working to identify and prioritise the type and level of risk they face. The consequences arising from a disruption can be classified according to a quadrant of how likely the event is (high or low) and how bad the consequences will be (light or severe) – see *figure 1*. For example, some disruptions are highly likely but have low consequences, whereas others are unlikely but have devastating consequences. General Motors has noted that even though individual events in the latter category have a low probability of occurring, across a large global enterprise such as GM there is likely to be a serious disruption of some sort somewhere in its supply chain almost every week.

Enterprise vulnerability map

Companies also face low-probability/high-impact disruptions that are intentional. These include not only terrorist attacks but also wildcat strikes and sabotage. Such disruptions are likely to hit at the worst time in the worst place, since they are designed to inflict maximum damage. Because all disruptions, and in particular the intentional ones, are unexpected, companies should think in terms of building a resilient organisation that can withstand and bounce back from any type of disruption, regardless of its source.

How resilience can be achieved
Resilience can be achieved through redundancy or building in flexibility. The standard use of redundancy includes safety
stock of material and finished goods. Such inventory can give a company time to plan its recovery.

Indeed, many companies have increased inventories when preparing for a disruption, such as the extra parts accumulated by New United Motor Manufacturing Inc, a joint venture between GM and Toyota, as labour relations on the West Coast of the US deteriorated in 2002, leading to the east coast ports lockout.

Extra inventory, however, is expensive to hold. Furthermore, as demonstrated by "lean" and Six Sigma processes, it can lead to sloppy operations, resulting in increased costs and reduced quality. By contrast, increasing supply chain flexibility can help a company not only to withstand disruptions but also better respond to the day-to-day vagaries of the market.

To build in flexibility for resilience, companies must involve many facets of supply chain design by:

- developing the ability to move production among plants, use interchangeable and generic parts in many products, and cross-train employees.
- using concurrent processes of product development, ramp up and production/distribution.
- designing products and processes for maximum postponement of as many operations and decisions as possible in the supply chain.
- aligning their procurement strategy with their supplier relationships.

These principles create supply chains that are not only resilient but also flexible and can respond to day-to-day demand changes. One begets the other, because a supply shortage and a demand spike are, at their core, a problem of supply/demand mismatch. Companies that have built their supply chains to respond to significant demand fluctuations have also built in the ability to respond to supply shortages.

How exactly do these supply chain principles increase resilience? Postponement and built-to-order operations allow for diversions of parts and semi-finished material from surplus areas and products to satisfy shortages. Thus, with only a few days of committed orders, Dell fared much better than Apple during the 1999 Taiwan earthquake, which disrupted the worldwide supply of memory chips. Hewlett-Packard sells printers to all European countries and faced the problem of having, for instance, too many printers for the Danish market and not enough for Hungary. Using the concept of postponement (delaying the final configuration of a product until as late as possible in the supply chain when more accurate demand information is available), HP builds "vanilla" printers that include everything but the power supply, the wall plug, the decals and the language of the instruction manuals.

Once HP receives orders from particular countries, it adds that country's power supply, plug and language materials through a clever access hole in the side of the box and sends it to the country. This creates resilience because it is easier for HP to respond to supply/demand mismatches.

The use of a small number of commodity parts not only simplifies operations and concentrates the procurement outlays, it also creates flexibility to move the business among suppliers. When Intel's Systems Group reduced its mix of 2,000 different types of resistors, capacitors and diodes to only 35 types, it not only simplified procurement and reduced costs but also increased Intel's ability to respond to demand changes and supply disruptions.

Reducing time to market also means that the time to recover from disruptions is likely to be short. To this end, Lucent created a special supply chain network organisation in 2001. Cutting across the company's engineering, procurement, manufacturing, distribution, and even sales divisions, the network increased the company's agility.

The use of multiple suppliers with different characteristics allows HP not only to have redundancy but also builds in flexibility. HP's choice of supply plants for its printers division means that during ramp-up and end-of-life it can use its agile (yet more expensive) plant, but during the steady demand period of each printer it can use the more efficient plant.

Supplier relationships are key to a company's resilience. Indeed, unsound supplier relationships can pose a major threat in any business. British carmaker Land Rover learnt this lesson in 2001 when its sole supplier of chassis for the popular Discovery vehicle went bankrupt. Land Rover eventually had to pay some of the supplier's debts to restore supplies, suffering severe production delays in the process. The car manufacturer was unaware of the impending disaster because its supplier relationship was dysfunctional.
The same mistakes are being made today. For example, this summer, British Airways' operations at Heathrow Airport ground to a halt when its ground workers staged a sympathy strike with laid-off workers at its core catering supplier, Gate Gourmet. The airline was caught off guard by Gate Gourmet's actions and failed to anticipate the response of its own workers. The result was cancelled flights, irate customers and negative publicity. Having a close relationship with Gate Gourmet may have alerted BA to its impending actions and their possible effect on BA's workers, giving it time to prepare and possibly stop the strike before it started. Yet Willie Walsh, the company's newly arrived CEO, said the August strikes had "nothing to do with British Airways" and BA could not have seen it coming.

On the other side of the Atlantic, General Motors is paying dearly for its flawed relationship with supplier Delphi Corp. The enterprise was spun off from GM in 1999, and with annual sales of $28 billion is a major supplier. Since it cut loose from its parent, Delphi has been unable to compete effectively with leaner competitors and recently filed for bankruptcy. In addition to the possibility of losing a supplier that makes products ranging from brakes to satellite radios, GM is under pressure to take on some of the company's pension liabilities.

Contrast this with the approach taken by Toyota to its suppliers. The highly successful Japanese carmaker holds stock in many of its suppliers, and they reciprocate by holding Toyota shares. Respective companies are bound together by mutual interest and are committed to the long-term health of their businesses. For instance, one parts supplier, Aisin, part of the Japanese company Aisin Seiki Co, customarily shares testing sites with Toyota to help the automaker cut costs.

Astrong, stable supplier network greatly enhances market resilience, and companies can lay the foundation for such a network by forging the right links with suppliers. With a small group of core suppliers, they need to have a deep knowledge of each vendor because the unexpected failure of one could be disastrous. In the case of arm's length relationships, the company's knowledge of its suppliers is relatively shallow and there is greater risk of a surprise failure. Hence, the supplier network needs to be extensive so that the company can find an alternative source quickly should one of its vendors become problematical.

Neither approach is right or wrong; the point is to commit to one and develop the appropriate strategy. Note that this is not an "all-or-nothing" proposition. Dell, for example, has strong single-supplier relationships with its processors and boards vendor (Intel) and its operating systems vendor (Microsoft), but has several vendors for other components.

Why culture matters
The most important factor that clearly distinguishes between companies that bounce back from a disruption and those that do not is the corporate culture. Organisations such as Nokia, Toyota, UPS, Schneider National, FedEx, Dell and the US Navy have cultures that make them flexible and resilient. While on the surface Dell and the US Navy may not seem to have much in common, a closer look shows these resilient organisations share several common traits, especially within their corporate culture.

A flexibility culture is one where communication is pervasive and continues. Dell executives receive production reports every two hours on their pagers, so that everybody is continuously aware of what is going on.

Another characteristic of a flexibility culture is giving even low-level

employees the power to make decisions. For example, any employee on the Toyota assembly line can stop the line if they notice a quality (or other) problem. Similarly, any sailor on the deck of a US Navy carrier has the power (and the responsibility) to halt flight operations if he or she senses something is wrong.

Unfortunately, culture is difficult to define and even more difficult to change. But it is not impossible. The success of the quality movement in the 1980s and the safety campaign in the early part of the last century serve as strong examples of how corporate culture can change dramatically. Several corporate turnaround cases, such as that of Continental Airlines under Gordon Bethune, also show the importance and the plausibility of changing corporate culture.

These successful cases should serve as blueprints for companies striving towards resiliency, because the right culture means the entire organisation is deputised to serve as the eyes and ears of corporate security efforts, and can take the necessary actions to recover from any disruptions when the normal hierarchy is not operational.

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