

Lessons Learned from the Japan Earthquake

By **PATRICK BRENNAN**

On March 11, a magnitude 9.0 earthquake rocked the main island of Honshu Japan. The earthquake, tsunami and its aftermath caused devastating human, social and economic damage. People around the world were stunned by video of exploding nuclear power plant buildings, demolished cities and personal accounts of the tragedy.

The earthquake also heavily disrupted global manufacturing supply chains. My discussions with electronics and aerospace companies since March as well as public sources have exposed commonalities in manufacturer experiences and revealed important lessons for reducing losses during future supply chain disruptions.

Manufacturers Deployed Global Teams to Limit Potentially Massive Losses

All the electronics and aerospace manufacturers interviewed had a significant supply chain presence in Japan so it was immediately apparent that there was a high risk of widespread supplier parts outages. Their company executives met on March 11. Each company suffered little or no damage to their own facilities in Japan. Still, when supply chain staff reached out to suppliers in the earthquake region, the initial reports were grim. They informed their executives of the possible loss of many dozens to hundreds of critical parts from their suppliers. The resulting estimates of potential revenue lost were staggering.

Executives immediately directed their staff to apply all available resources to assess and mitigate the damage, accepting that other priorities would suffer. In the end, cross-functional, global teams

worked a month of very long, very intense days including weekends initially.

The first challenge was to determine which suppliers had factories in the earthquake zone. Most manufacturers had not mapped that information before the earthquake and obtaining the information took weeks.

“The shortages of components from our tier one suppliers were bad news as each component is generally used in multiple products. Still, the real nail biter was the possibility that a raw material deep in the supply chain could be unavailable,” related a supply chain manager. “A raw material outage can affect hundreds of supplier parts and thousands of our products. It was nerve wracking having to wait weeks for news to percolate up from the sub-tiers where we had so little visibility.”

The teams reprioritized daily to account for changes in supplier factory status. They translated damaged factories to the parts produced there, checked parts inventory and calculated the resulting revenue at risk. Once parts were prioritized by rev-

enue at risk, supply chain managers accelerated purchases where possible, sped the qualification of new parts and alternate sites and made emergency product mix changes.

No option was off the table in meeting customer needs. One component manufacturer said that if a standard part could not be made due to missing components, his company readily recommended a competitor to their customers and found their competitors doing the same for them.

Teams finished their work late each night, handing tasks to their colleagues in other time zones so that work could continue around the clock. Then they started again early the next day. Communication was critical with daily status reports sent to hundreds of internal stakeholders. Supplier status information had to be handled carefully on a need to know basis in order to avoid unnecessarily disseminating confidential information. Status communications to customers were vetted by corporate communications and crisis management personnel. After the initial month, a smaller core team continued work at most manufacturers interviewed and isn’t expected to wrap up its mitigation work until this Fall.

Counting the Cost

It has been several months now, and as the people of Japan continue the recovery effort, the world is still trying to unravel the economic consequences of the event. The World Bank estimates it to be the cost-

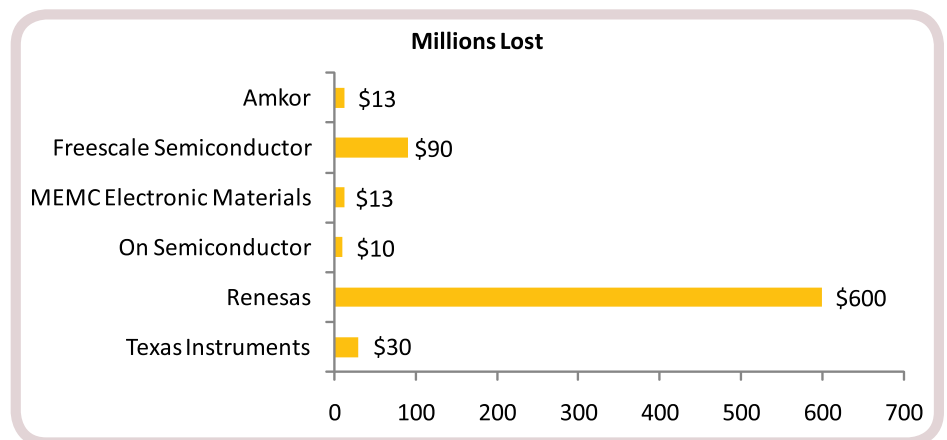


Figure 1. Earthquake Losses at a Sample of Semiconductor Companies as of May 2011. Data collected from published company reports and online sources.

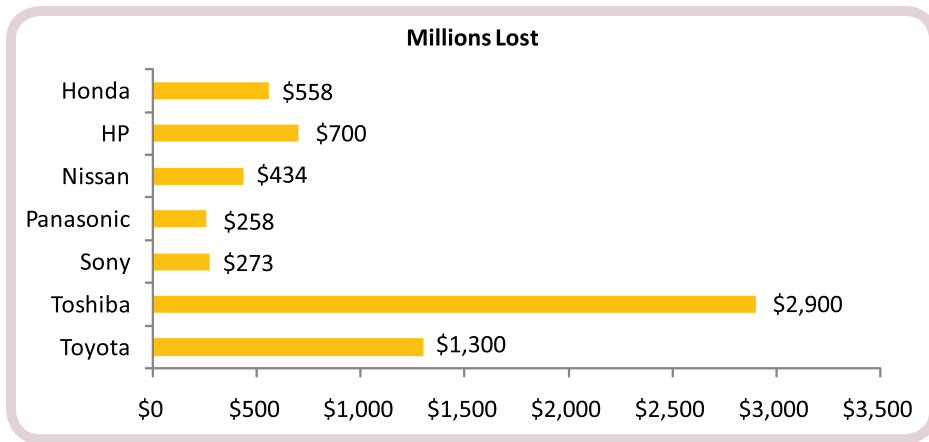


Figure 2. Earthquake Losses at a Sample of Electronics and Automotive Companies as of May 2011. Data collected from published company reports and online sources.

liest disaster event since tracking began in 1965 with economic damage estimated at \$235 billion.

The severity of the earthquake and its aftershocks, combined with rolling blackouts, delayed production recovery especially for Japanese manufacturers such as semiconductor companies whose products demand great precision and a consistent electrical supply. Figure 1 (on the previous page) shows financial losses due to the earthquake for a sample of semiconductor companies.

Losses further along in the supply chain were often larger as shown in Figure 2 (above). Since each supply chain tier adds value, a shortage of raw material or an inexpensive component early in the supply chain can make it impossible for companies later in the supply chain to build their \$30,000 car or computer server.

Lessons Learned

In the immediate aftermath of the Japan earthquake, risk professionals, operations and supply chain managers focused on mitigating the impact on revenue and production. Now companies are questioning their existing crisis management approach and investigating how to make it more streamlined and effective. Their experiences provide lessons which manufacturers must take to heart if they are to survive and remain competitive when future crises occur.

The events in Japan have shown us that it can be weeks or months before a manufacturer learns the full effect on their supply chain. When a company discovers

too late that they are missing parts, they have lost critical time in securing limited inventory or sourcing alternatives that their competitors may lock up before they do. Slow response places significant revenue at risk.

Through conversations with electronics and aerospace companies since March and in our research, we identified the following as essential lessons learned from the Japan earthquakes of 2011.

Lesson 1: Don't Apply the 80/20 Rule to Supply Chain Disaster Preparedness

Having worked with many global manufacturers, it's our experience that the typical supply chain risk program only covers the top 80 percent of spend which equates to roughly 20 percent of suppliers.

The problem with this approach is that many of the 80 percent of suppliers overlooked are absolutely essential to a company's production sourcing and its revenue. When the lack of availability of a \$1 part prevents a company from making a \$30,000 product, something needs to change.

For a number of manufacturers, the catastrophe in Japan shined a glaring spotlight on this flaw. Companies realized that a significant portion of revenue cannot be generated without the other 80 percent of critical suppliers. That includes single source and sole source suppliers and those with unique capabilities, regardless of spend. Yet manufacturers chose to operate this way. Why?

The main reason is the limited internal

resources available for managing supply chain risk in a comprehensive and consistent way across all vendor managers. As a result, some top-spend suppliers are reviewed in great depth while the disaster preparedness of other critical suppliers has not been reviewed in years. In the end, revenue remains at risk from critical single/sole source suppliers with no factory risk analysis, no disaster recovery plan testing, no alternate site, etc.

Unfortunately, many manufacturers learned the hard way from the Japan earthquake that it is imperative to maintain current information on the preparedness of all of their critical suppliers. The challenge is how to do this without tying up too much vendor manager time.

Lesson 2: Identify Supplier Factory Locations before a Crisis Hits

After the great earthquake hit, supply chain managers from a major manufacturer scrambled to determine which suppliers were potentially impacted. The CFO asked for the revenue impact. Customers needed to know fast if their production would be impacted.

The electronics manufacturer searched its database of supplier locations. Among its problems was having multiple addresses for suppliers but no way to tell which of the addresses, if any, indicated a factory location. For some smaller single source suppliers, they found only invoicing addresses and were unaware of their factory locations.

There was no way to narrow down their supply chain to a smaller set of suppliers and be confident in capturing all suppliers with factories in the crisis area. As a result, significantly more time and effort was required just to assess the crisis impact before actually being able to react. This was despite the fact that they had collected business continuity plans from top suppliers for years. Once again, the lack of accurate supplier factory information became the Achilles heel in reacting quickly to reduce the damage from the disaster event.

In some cases, dual sourcing policies gave a false sense of security when factories for both supplier sources were damaged in the disaster area. In fact, this is common for large disaster events since many countries have specific regions

that account for significant global market shares of certain materials and products. For example, Japanese manufacturers account for 23 percent of global production of the semiconductor chips. In addition, Japanese manufacturers have a 55 percent market share of the materials that are used in semiconductor chips. In fact, just two disrupted plants in the earthquake region account for 25 percent of global production of silicon wafers essential for the production of semiconductor chips. Clearer visibility to factory location proximity of suppliers can highlight this risk and allow for early contingency planning.

Lesson 3: Visibility into Supply Chain Sub-tiers Remains a Key Challenge

Many manufacturers cited the challenge of gaining visibility into supply chain sub-tiers. Locating information about suppliers two or more tiers deep in a supply chain is slow and arduous. Often manufacturers do not have much visibility into their supply chain beyond direct suppliers, resulting in unknown risks in sub-tiers of the supply chain. Toyota, for example, found that critical parts in their suppliers' supply chains came from an unexpectedly small number of suppliers. "We thought our supply chain was pyramid shaped, but it turned out to be barrel-shaped," said a Toyota Motor Corporation spokesman in a recent Japan Times article.

The difficulty of gaining visibility into supply chain sub-tiers was a key reason why manufacturers said that the full impact on their operations was not known for months. In addition, many sub-tier suppliers were uncertain themselves about when they would be back in business due to the day-to-day nature of their business environment, including when electricity would be restored, when the earthquake aftershocks would settle down and the status of the TEPCO nuclear power plant for suppliers in that area. Visibility and timely status of the sub-tier suppliers remains a key crisis management challenge.

Lesson 4: Large Crisis Events Shift Market Share among Competitors

The strategic importance of supply chain risk management is all the more obvious due to profound changes in market

share from this disaster. For example, GM is poised to regain its former position as the automotive company with the largest market share, a title that Toyota held since 2007. Likewise, in the electronics industry, companies are getting a rare chance to displace competitors disrupted by the earthquakes. For example, Digitimes reports that Thinking Electronic is gaining orders at the expense of Murata due to the earthquake.

Once an alternate supplier gains more share in an account, it is not always clear whether the disrupted supplier will regain all its former business. The alternate supplier has now gained an opportunity to establish relationships with engineers and supply chain and the customer may want to hedge its bets.

Weakened Supply Chains Are at Greater Risk

While the media focused on the worst of Japan's earthquakes, in reality 34 earthquakes of magnitude 6.0 or greater occurred off the coast of Japan in March 2011. In April, another six magnitude 6.0+ earthquakes hit and two more of that size struck in May.

It is important to realize that supply chain threats are cumulative. While the supply chain is repairing its damage from the Japan earthquakes, it is weakened and at increased risk from other events.

According to the Annual Disaster Statistical Review, 392 natural disasters happen on average (2000-2009) around the world each year with Asia (41 percent) and the Americas (45 percent) incurring the vast majority of the economic damage. The USA was singled out this year by Colorado State University researchers due to the heightened potential for severe hurricanes. Other potential sources of supply chain threats include volcanoes, floods, tropical cyclones, tornados, political unrest, economic weakness, supplier bankruptcy, supplier fire and a combination of the above.

Infrastructure in many countries is at risk. According to xinhuanet.com, about 20 Chinese provinces have rationed electricity in 2011 hampering many manufacturers, and electricity shortages are expected to grow this summer. In addition, UN chief Ban Ki-moon said that most countries have prepared inad-

equately for major disaster events. Most governments omit the long term planning needed to reduce the impact of major disasters that happen every few decades. Developing countries are particularly ineffective in preventive steps like building code safety.

Many global manufacturers are ill prepared for disaster events. Supply chain or distribution failure in addition to business interruption ranked in the top ten business risks for technology and aerospace industries per a Q4 2010 Aon survey. Likewise, a 2011 survey by BDO found that supply chain issues are considered a top risk factor by 86 percent of the 100 largest publicly traded technology companies analyzed.

The potential consequences of these events cannot be ignored, and yet they often are.

The Need for Immediate Change

Natural disasters and supply chain disruptions are inevitable. To protect their revenue and marketing share, manufacturers must work proactively with all their critical suppliers to know supplier factory locations and to ensure that suppliers have adequate disaster preparedness in place. That visibility needs to extend into their supply chain sub-tiers as well.

The manufacturers interviewed set the goal to have an up-to-date list of supply chain factory locations so that they can quickly hone in on critical suppliers with factories in a crisis area. This allows the rapid shift from damage assessment to triage, resulting in more options for safeguarding supply and locking in limited alternatives before competitors do.

It takes many months for supply chains to fully recover from large shocks like the Japan earthquake. During the recovery period, a weakened supply chain is at greater risk from other events that might not otherwise lead to supply chain failure, accelerating the need for better supply chain risk management now.



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