

# Immediate Impact of a Catastrophic Event

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The devastating Japan Tohoku Earthquake of March 11 led to a series of events, each in and of itself a significant disaster, which collectively created a catastrophic situation. In this article, we will discuss the details of the event, the response effort and the importance of supply chain resilience. The second article will focus on the global impact from the Tohoku Earthquake with the third discussing supply chain risk mitigation strategies.

In any form of disaster, the importance of supply chains emerges as a priority for response efforts. Their roles expand to provide key products and services to victims, help businesses regain operations, and assist in the recovery of the overall economy. There are three primary sources for supply chain disruptions: physical sources (e.g. weather related), geopolitical sources (e.g. man-made), and commercial sources (e.g. failure of a vendor). The Japan crisis became an example of supply chain disruptions being triggered by all

three sources. This had a rippling effect on the recovery effort that was essential for supporting individual victims, reactivating businesses, and the overall commerce and government functions.

We will begin by analyzing the events of the first 24 hours. On March 11, 2011 at 2:46 p.m., a 9.0 magnitude earthquake occurred off the coast of Eastern Japan. The earthquake was extremely strong and unusually long, lasting approximately four minutes. There was structural damage in the vicinity close to the eastern coast and more than 4 million buildings without power. Within an hour, the tsunami caused by the initial earthquake made impact on the eastern coast. The 30-foot wall of water swept away cars, boats, trains, and many buildings. The tsunami also disabled the emergency system at the Fukushima Daiichi Nuclear Plant causing damage to the cooling system. To complicate matters further, large numbers of fires began to occur because of the popular use of gas stoves and heaters with no supporting infrastructure to handle this problem.





Ginza District in Tokyo before and during rolling blackout

As the news of the devastation spreads across the nation and the world, most normal daily activities stopped. Many businesses released their employees to return home but the trains, the main form of transportation, were not working. Further devastation occurred just after midnight when a dam broke in the Fukushima prefecture flooding the area and causing significant damage as the nation continued to experience strong aftershocks. Concerns were now mounting about the critical situation at the Fukushima Daiichi Plant as the nation focused on search and rescue in the tsunami area.

These series of cascading events raised the severity of the situation from a disaster to the possibility of a catastrophe. The radiation fears, power outages and uncontrolled fires were by-products of a domino effect all adding to an exponentially growing problem (incidents within incidents). The continuation of the falling dominos created a downward spiral of infrastructure failures. However, the worst failure would be that a slow and prolonged recovery would have a very serious impact on the psychology of the people. Fortunately, this was not the case. The world watched as the resilience of the Japanese people was unwavering by the impact of the earthquake, tsunami, dam failures, and radiation. Many nations contemplated the resilience of their own nation if they were to experience similar events.

Since Japan sits on or near the boundary of four tectonic plates, it is labeled as one of the most seismically active areas in the world. The country accounts for about 20 percent of the world's earthquakes of magnitude 6.0 or greater and on average an earthquake occurs every five minutes. With a history of devastating earthquakes and tsunamis, there is an obvious need for extensive preparation.

Japan is one of the world leaders in disaster preparedness, as evidenced by having the world's most sophisticated earthquake early-warning systems. Japan Meteorological Agency (JMA) uses the EEW system, which is a network of about 1,000 seismic stations around the country, to detect the approximate source and magnitude of an earthquake, communicate public alerts via TV, radio, and cell phone within one minute of detection, and transmit signals that can automatically shut down computers, stop elevators at the nearest floor, halt factory production lines, and place nuclear power plants into emergency status. In the case of March 11, the residents of the Sendai, closest to the epicenter, received the warning in 8.6 seconds and the region in 31 seconds following the 9.0 magnitude earthquake. The warning gave residents a lead time of between 10 to 30 seconds before they felt the first tremors.

Along with the extensive detection, Japan has employed many other measures for the protection of residents. Construction has strict government requirements to withstand most earthquakes. On Japan's east coast, where tsunamis frequently hit, Japan has constructed hundreds of earthquake and tsunami shelters, tsunami walls, and floodgates. In addition, the government has conducted extensive education and training on disaster preparation. Many schools start the first day of school with earthquake and evacuation drills. Also, public and private organizations practice similar drills.

Did all of this preparation increase the resilience needed to support victims, business operations and the needs to re-establish the working of the country? In a presentation by the office of the Prime Minister of Japan and his Cabinet, the government outlined the response to create swift and immediate actions to provide urgent support to the citizens in harm's ways and on restoration of vital infrastructure requirements. As search and rescue operations continued, Japan began working with the private sector supply chains to provide food, water pharmaceuticals and other essential mass care needs. In addition, the coordination with the private sector for the following infrastructures restoration efforts:

- **Tohoku Expressway**

Damage: 215 out of 419 miles (over 50%)  
 Completed restoration: March 24th (13 days)

- **Tohoku Railway**

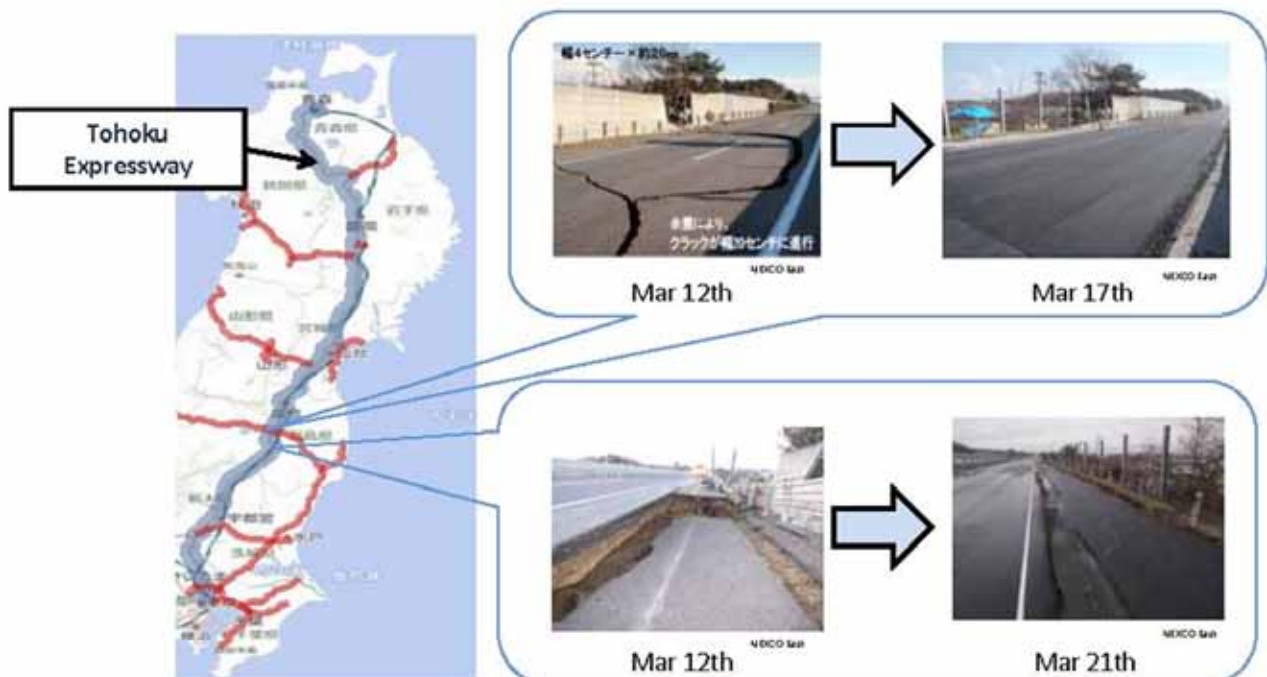
Damage: minor (but strict requirements for shinkansen, bullet train)  
 Completed restoration: April 29th (49 days)

- **Sea Ports between Aomori to Ibaraki**

Damage: facilities and equipment damage, flooding  
 Opened: March 24th, but still recovering

- **Sendai Airport**

Damage: significant with major flooding  
 Completed restoration: April 13th (33 days) with help from the U.S. Armed Forces



Another damaged infrastructure of major concern was electricity. The Fukushima Nuclear Plant sustained major damage and was the cause of concern for many, but the loss of the energy source created problems for many residents and businesses in a large area, including Tokyo. The Japanese people again stepped up by conserving as much energy as possible, by not powering the store signs and billboards, by forcing customers to take the stairs instead of the escalators, and other conservation steps. Rolling blackouts were also instituted for a short time, but were discontinued by March 29th with the reinforcement of the power supply.

As these main infrastructures were being restored, the government monitored the recovery of businesses. With some businesses providing key resources for response efforts to the survivors, the speed of recovery of production facilities was essential. By mid-April, more than 60 percent of damaged manufacturing facilities were recovered. About 90 percent of manufacturing facilities were estimated to recover by the summer.

Businesses in the private sector that survived and that offered critical resources experienced a significant surge in demand. Excavation equipment manufacturers had difficulty meeting orders with their limited stock. A manufacturer of steel jaws to remove debris and look for people said, "I feel like it's my mission as a Japanese citizen to deliver this equipment as quickly as possible." Used car sales experienced double the normal sales for inexpensive mini-trucks to haul cargo, but were again limited by supply. With the inherent shortage of power, portable power generators were in high demand. "We're completely out. We ran out three days after the quake, but we've been receiving orders from hospitals and factories every day." As the response efforts shifted to the recovery stage, construction and appliances began experiencing the high demand including many specific products and services that were needed from refrigerators to building inspection services. These key resources were needed from the private sector for the response and recovery effort.

### **So what have we learned from the events of the Tohoku Earthquake?**

- Japan has become an example to many countries about the importance of preparation to mitigate the impact of any type of disaster and to minimize the domino effect of growing problems. The impact of the Tohoku Earthquake would have been even more catastrophic if the country had not been as prepared and if there were not the financial resources to drive the government and private sector response effort.
- Other countries without preparedness processes similar to that in Japan would have had experienced far more loss of life and a much longer recovery period from damage to critical infrastructures and key supply chains.
- The private sector's response played a vital role in the recovery effort. The priority placed on public and private sector coordination response effort enabled the required supply chains to support the needs of mass care and to re-establish business operations and the economy.

The Japan Tohoku Earthquake has demonstrated the importance of building risk mitigation strategies that are built on public and private sector coordinated efforts. These efforts are focused on increasing the resiliency of supply chains that save lives, regain commercial operations, sustain society, and recover back to a version of "normal."