

Breaking the Chain

Catastrophes or even threats of catastrophes can knock out critical links in chains of supply and distribution.

By Lee Coppack

Ports, roads, railway lines and airport runways are all highly vulnerable to natural catastrophes. In a major catastrophe, even if the firm's own facilities are unaffected, there will be widespread disruption to infrastructure and heavy competition for those transport services that are functioning. Port security has been intensified since the attacks on the United States in 2001.

However, timely delivery and continuity of supply have become increasingly important in modern commerce. Shipping delays can result in significant losses because:

- The goods are perishable and have deteriorated
- The goods are time sensitive and their value is much reduced – for instance, fashionable clothing
- There is a contract penalty for failure to deliver on time
- Lack of availability gives an opening to competitors

Probably the clearest illustration of the potential for delay and disruption resulting from a natural catastrophe is the 1995 earthquake at Kobe, Japan. Measuring 7.2 on the Richter scale, the earthquake destroyed the 21 container terminals that handled 70% of the international freight at the port of Kobe. Kobe is one of the largest container ports in the world, serving both direct trade and trans-shipments for other parts of the Far East.

The catastrophe modelling firm EQE commented in a report shortly after the event: "Just-in-time production methods employed by large manufacturing firms appear to be vulnerable to widespread transportation disruption. Four auto manufacturers and a motorcycle manufacturer reported production cutbacks and partial or temporary shutdown of operations in plants outside the shaken region (as far away as Tokyo) because parts could not be obtained from or transported through the affected area. Japan's largest automobile manufacturer cut back production by 20,000

cars and closed plants throughout Japan for several shifts because of the difficulties in obtaining supplies.”

Other ports

The risk is not unique to Japan. Many natural ports are the result of seismic activity, and ports and harbours are often developed on artificial fill, possibly placed over mud or other loose soils which amplify earthquake shaking. Further damage may result from fire or tidal wave, tsunami.

The 1989 Loma Prieta earthquake in California damaged the port of Oakland, the largest in Northern California, primarily as a result of liquefaction of the hydraulic fill. As the Association of Bay Area Governments (ABAG) explained, “Ports consist of bulk storage facilities and warehouses, cranes to move large containers (typically on rails), and rail and other facilities that serve to connect the port to the land-side transportation system. Liquefaction can cause large areas to sink below the water surface. Rails can buckle, become misaligned, and rotate. Pavement surfaces also buckle, often in ways similar to roadways and airport runways.”

Less information is available about the effects of the devastating 1976 Tangshan earthquake in China, which killed 250,000 or more people, but reports indicate that the nearby port of Tianjin was severely damaged to the extent that it was closed to visitors for two years afterwards. Today, Tianjin port is the largest artificial harbour in China, and serves the capital Beijing, some 170 km south.

Floods and storms

Flood is a serious and increasing problem. In 1993, record flooding affected the US Mississippi River and most of its tributaries from Minnesota to Missouri from late June to mid-August 1993. Transportation and industry along the Mississippi was disrupted for months. Damages to surface and river transport in the region were the worst ever incurred in the US.

Roads and railways that border rivers clearly have a high flood and erosion exposure. Damage to bridges, however, can be more serious, and a study on flood by Bermuda based reinsurer PartnerRe explains that flooded rivers often carry debris that can lead to blockage of narrower parts of rivers and cross-sections under bridges. This leads to almost immediate overflow of the river banks and “can cause severe damage to, or total destruction of, bridges.”

Severe storms also delay shipments. Hurricane Mitch in October 1998 is one of the strongest Atlantic storms on record and devastated parts of central America. In addition to direct damage to essential crops such as bananas, sugar and coffee, impassable roads added to the problems. Even where coffee bushes were little affected, continual rain speeded up the ripening of coffee beans, which rotted because they could not reach processing mills in time.

The windstorms Lothar and Martin brought havoc to France in December 1999. Because of the number of trees and power lines that fell on the track, the railways system was completely halted across much of western and northern France for about a week after the windstorm Lothar, as well as the whole of southwest France after Martin. Even ten days after the storm, three major railway lines through central France remained closed.

Transport of terrorism

Nearly 50% of all US imports by value arrive in containers. However, this trade depends on fast turnaround in ports. The events of September 11 have crystallised fears that terrorists could use shipping containers to take nuclear or “dirty” bombs directly into an important part of a country’s infrastructure with negligible risk to themselves. An attack or even high security alert could result in substantial port congestion and delay to inward and outward bound containers.

If a vessel is confiscated or arrested because customs authorities have found a suspicious device, the consequences are even more serious. Cargo waiting to be loaded on the ship will have to find an alternative carrier. The delay could result in extra expenses, storage charges while the goods are awaiting shipment and penalties for late delivery.

The effect of delays due to increased security can be surprisingly rapid. The Great Lakes ports of Detroit and Huron are important commercial routes for the transport of just-in-time delivery of auto parts to American motor manufacturing plants from Canada and elsewhere. US Senator Carl Levin told a Treasury Postal and General Government sub-committee hearing on 3 October 2001 that increased security following the September attacks resulted in delays of up to 12 hours. “This has meant that the just-in-time delivery systems that the manufacturers rely on have broken down. As a result, assembly plants in the US do not have the necessary parts and many have shut down. Others may have to shut down soon for lack of parts.”

Risk management

US Customs is clearly aware of the implications of security delays on commerce, and has proposed a four-part Container Security Initiative (CSI) which aims to make maritime trade more secure without compromising commercial efficiency. The programme's pillars are:

- establishing security criteria to identify high-risk containers
- pre-screening containers before they arrive at US ports
- using technology to pre-screen high-risk containers
- developing and using smart and secure containers.

A critical element in the success of this programme will be the availability of advance information to perform sophisticated targeting. As a first step, US Customs has determined the top 10 "mega-ports" that send the largest quantity of containers to the US, and will contact the governments in these locations to solicit their participation in the CSI. By the end of June 2002, the ports of Rotterdam, Antwerp, Singapore, Bremerhaven and Hamburg had agreed to allow US Customers to station agents at their ports to work with their own customers officers.

John Eltham, director of broker Miller Insurance Group in London, points out that in the event of a broad catastrophe, such as an earthquake, there will be heavy competition for alternative means of transport and prices will go up. Relief supplies and personnel are likely to take priority at ports. One method of planning for this eventually is to arrange services from alternative carriers in advance. "You cannot make a contingency plan in a vacuum," he commented.

Mr Eltham recommends the following steps to reduce the risk of delay and loss of revenue from disruption to shipping from catastrophe or threat of catastrophe:

1. Map your supply and distribution chains and understand the pressure points
2. Use reputable shippers
3. Make sure there is a shipping audit trail.
4. Insure contract penalties and other material losses.

Shippers should not count on recovering losses due to delay from a carrier. Marine contracts of carriage are drawn tightly, and the carrier will not be liable for losses to cargo resulting from delays when the reasons for the delay are clearly outside its control. On the other hand, cargo insurance generally will not cover business interruption type losses where there has been no physical damage.

Trade disruption insurance (TDI), however, is a coverage specifically designed to protect shippers' financial position when there is disruption in the trade route due to an insured peril, such as blocked or damaged port facilities, or the emergency closure of a road, airport, or railway line. A TDI policy can pay the costs of alternative shipment methods, additional costs of alternative supplies and consequential loss of profits.

Mr Eltham and Mark Girouard, now at broker Tyser, in London worked on the creation involved in the development and marketing of TDI insurance. Mr Girouard explained that it was created by bringing together elements of contract protection insurance from non-marine policies with cargo policies.

However, TDI remains a small class of business, although available for at least ten years. It is highly customised and written only by a few Lloyd's syndicates. Said Mr Girouard: "Although many corporations see it as a very good idea conceptually, the need has to be demonstrably great before they will spend the money to buy it."

Nevertheless, Mr Eltham stated: "The policy does work and has successfully responded for many millions of dollars of losses to supply chains worldwide including some arising from events described in this article."

Many catastrophes are reasonably predictable, ranging from a few days' notice for landfalling hurricanes to some time within a number of years for earthquakes. However, using routes in an area which has recently suffered a serious loss may be better than one which has not, because of the raised awareness and because replacement facilities may be built to more resistant standards.

As PartnerRe commented, "Since in many areas, flood events occur infrequently, it is not unusual for people to forget about the enormous potential for damage and loss. Clearly, this mentality may lead to an inadequate degree of emphasis being placed on planning control to minimise damage."

Said ABAG, "Because of damage during Loma Prieta, earthquake awareness at the Port of San Francisco has improved significantly."

Finally, the firm that really wants to identify the critical links in its supply and distribution chains can use dependency modelling. This is a process widely used in engineering in which the organisation identifies the elements of a complex process that are critical to its success and then the risks that could cause any of them to fail. Having done that, the organisation can assess and apply controls and countermeasures to reduce its vulnerability.

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