THE AFTERMATH OF THE TIANJIN EXPLOSIONS:

A Global Supply Chain Impact Analysis — It’s Far Worse Than You Think

August 2015
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Overview

The global supply chain impact of the August 2015 Tianjin, China explosions extends far beyond that of a significant but routine logistics disruption. Don’t believe official media reports one week after the event indicating that business and Port of Tianjin operations will shortly return to normal.

In the week following the Ruihai International Logistics chemical warehouse explosions, over 100 hundred civilians were reported dead and even more injured. More than 50 still remained missing. Exposed warehouse chemicals threatened the safety and health of residents and businesses in and around the explosion site. Inbound shipments to the Port of Tianjin—especially those containing hazardous materials—were deterred or rerouted. More than 30 sites within a 10-mile radius of the explosion site faced supply chain disruption potential.

Such unfortunate realities in the immediate aftermath of the Tianjin explosions offer only a small glimpse of the global supply chain impact that can be expected. The less apparent and less visible ripple effects will be felt weeks, months and even years to come.

This report provides critical analysis the event’s economic relevance and its repercussions on the global supply chain. Specifically, this report identifies the immediate effects of the Tianjin explosions and projects the short-, mid- and long-term global supply chain impact of the events.

The report also articulates the factors that will impact recovery speed for the commercial zone and affected companies. Key factors include: 1). the Chinese response in terms of regulatory actions and its consequences for global commerce; and 2). the supply chain risk management (SCRM) and resiliency strategies and maturity of effected companies. The analysis concludes that SCRM leaders who take proactive measures to mitigate the risks of the Tianjin event and have crises response playbooks in place, will recover faster, and in doing so, achieve an immediate competitive advantage.
1. Introduction: Asia and Tianjin Commercial Area in Context

Home to more than 80% of the world’s disaster events¹, the Asia-Pacific region is continuously plagued by droughts, floods, earthquakes, cyclones and tsunamis. However, Asia also experienced its fair share of man-made disasters, some of which were a result of business non-compliance with regulations and standards, or insufficient safety measures or plant procedures. And the numbers are staggering. Industrial accidents in China claim about 70,000 lives annually.²

Tianjin is one of the four municipalities directly controlled by the federal government alongside Shanghai, Shenzhen, Chongqing and the nation’s capital. The economic importance of Tianjin commercial zone is enormous. Close to 12 million people³ call Tianjin home. The coastal city, located 30 minutes by train from Beijing, is a vital logistics and manufacturing hub for northeastern China. Key global industries dependent on the Tianjin commercial area include electronics, aviation & aerospace, automotive, petrochemicals, equipment manufacturing, and biotech.⁴

The Port of Tianjin is the third largest in the world by cargo volume, and the tenth largest in the world by container traffic, with half of its U.S.-bound cargo sent to either Los Angeles or Long Beach, California. Its total cargo throughput in 2014 amounted to 445.78 million tons and includes 14 million TEUs of containerized cargo and 280 million tons of non-containerized cargo. Non-containerized cargo may include (but is not limited to) metal ore, coal, automobiles, steel and crude oil. Outbound containerized cargo is comprised of raw materials, components and products for the global manufacturing market. Inbound cargo supplies the hundreds of factories in the Tianjin export processing zone.

¹ UN Backs Disaster Resilience Plans for Hotels in Asia and the Pacific, 2015, The United Nations Office for Disaster Risk Reduction (UNISDR): http://www.unisdr.org/archive/45258
⁴ Understand China: http://understand-china.com/province/tianjin/
Ports near the largely-affected Tianjin area served as a backup for inbound shipments turned away from the Port of Tianjin in the immediate week following the blasts.

Established in December 2014, the Tianjin Port Free Trade Zone is the largest free trade zone in northern China, as well as the only free trade zone in northern China. The Port is connected to multiple railway lines, with 15 scheduled freight train routes heading to northern and western China, including Chengdu, Xian, Taiyuan and Urumqi. International train routes cover the borders of Kazakhstan, Mongolia and Russia.

Tianjin is also the second largest Vehicle Processing Center (VPC) in China for importing and exporting cars. Some of the companies with automotive supply chains in Tianjin include Tianjin Feng Ai Automobile Seat Parts Co. Ltd., Wallenius Wilhelmsen Logistics (WWL), Tianjin FAW Toyota Motor Co. and Bridgestone. Tianjin has 4 billion tons of explored geological reserves, in addition to 130 billion cubic meters of natural gas reserves, an annual total of 2.5 million tons of high-quality sea salt and two oil fields that can yield 12 million tons of crude oil per year.

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6. [Understand China](http://understand-china.com/?manufacturing=tianjin-logistics)
7. [Nangang Industrial Zone Attracts the World’s Largest Chemical Companies, Forbes Custom](http://www.forbescustom.com/EconomicDevelopmentPgs/TEDANangangIndustrialZone.html)

*Toyota, Renault, VW, Hyundai and Mitsubishi were of the few companies with evident supply chain disruptions as a result of the explosions. Image courtesy Telegraph Media Group Ltd.*
Other areas of relevance to Tianjin’s economy include the:

> TEDA Western Zone: Located in the western part of TEDA between the Port of Tianjin and Tianjin International Airport, it covers an area of approximately 19 square miles.

> Tianjin Tanggu Marine High-Tech Development Area: Encompasses several thousand companies including new materials, oil manufacturing, modern machinery manufacturing and electronics.

> Tianjin Binhai Hi-tech Industrial Development Area: One of the first national Hi-tech industrial parks established in 1991.

> Nangang Industrial Zone: Still in development, this is Tianjin’s heavy industry and chemical industry base and harbor.

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2. Immediate Impacts of Ruihai Chemical Explosions (0-2 weeks)

Two massive explosions occurred Aug. 12, 2015 in Ruihai International Logistics' warehouse, which stores and transports chemicals, located in the Port of Tianjin. Founded in 2011, Ruihai Logistics specializes in moving hazardous cargo, handling about one million tons of cargo annually.

The first explosion occurred around 11:30 p.m. local time and registered as the equivalent of 2.3 magnitude earthquake, according to the China Earthquake Administration. The second blast, felt 30 seconds later and even more powerful than the first, measured at a magnitude of 2.9, roughly the equivalent of 21 tons of TNT. The explosions devastated an area of about two square miles and were felt as far as 10 miles away. The impact of the blasts was detected by a USGS monitoring unit in Beijing 100 miles away.1

What Caused the Blast?

The cause of the blasts continues to be investigated. What emerged in the aftermath is that Ruihai, the company which owns the warehouse, was storing hazardous chemicals without proper permissions and was not in compliance with China's safety regulations. The quantities of material found were far in excess of the allowed levels and stored perilously close to residences in the area.2 Chinese work safety rules require such storage facilities to be at least 1,000 meters away from residences, public buildings and highways.3 However, according to the Associated Press (AP), an online map searches show the Ruihai International Logistics warehouse was within 500 meters of both an expressway and a 100,000-square meter apartment complex.

The warehouse contained calcium carbide, potassium nitrate, ammonium nitrate, calcium cyanamide, potassium chloride, and sodium cyanide. These chemicals are highly reactive and can cause explosions if not handled properly.

sodium cyanide, toluene diisocyanate (TDI) and some other hazardous chemicals, potentially including CNG and butanone. Calcium carbide is used in the production of PVC plastic, while potassium nitrate and ammonium nitrate are used to produce fertilizer and dynamite. Butanone is an industrial solvent and welding agent. Its derivative, MEK peroxide, is a catalyst for some polymerization reactions such as cross-linking of unsaturated polyester resins.

The Ruihai Logistics facility contained about 700 tons of sodium cyanide—70 times the allowed amount. At 8 of 29 testing sites inspected within the blast zone, the amount of sodium cyanide stored was found at levels up to 28 times those considered safe, according to Bao Jingling, chief engineer of the Tianjin Environmental Bureau. One CNN report confirmed that a sodium cyanide reading in one spot was more than 356 times the allowed amount. The blast site had a variety of other chemicals including caustic soda, hydrogen iodide, sodium hydrosulfide and sodium sulphide, among others. Officials failed to confirm when the clean-up process will be complete.

Immediate Impacts Reported

In the week following the explosions, impacts and losses that were reported or initially anticipated were both significant and diverse in nature and scope:

> 114 people were reported dead, 700 others injured and more than 50 still missing.
> The blasts damaged 17,000 homes affecting 30,000 people.
> In the two-mile blast zone radius, buildings including warehouses, port buildings and processing facilities were extensively damaged.
> Tianjin Mayor Huang Xingguo confirmed 176 companies located in areas of the

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6 Resilinc EventWatch™ 24x7 Global Event Monitoring Service Research

7 Resilinc EventWatch™ 24x7 Global Event Monitoring Service Research
explosions.  
> Environmental officials expressed concern that recorded levels of sodium cyanide in the explosion zone were as much as 350 times higher than the safety level.  
> Cyanide levels in the waters around Tianjin port rose to 277 times the acceptable levels. Thousands of dead fish washed ashore the Haihe River near Tianjin.  
> Most of the sodium cyanide scattered on the ground, which can be highly toxic, was cleared from the blast site, however, some still remained in containers.  
> Factories, warehouses and other services in the Port of Tianjin faced extensive damage.  
> Thousands of shipping containers were damaged beyond salvage. Specifically, Evergreen’s subsidiary, Kingtrans International Logistics—which was located 500 meters from the explosions— reported that they could face tens of millions of renminbi in financial losses as the plant and shipping containers it owns have been almost completely destroyed.  
> Toyota Motor Co., Ltd. and Deere & Co. shut down operations in Tianjin.  
> Environmental hazards can be expected to negatively impact labor availability as evacuations or illnesses, school closures or other health concerns and fears keep employees at home.  
> The explosions destroyed the equivalent of nearly half of the monthly polyethylene (PE) imports through the port.  
> The two Ruihai explosions suspended operations at two of Tianjin’s port terminals. Ships were barred from entering the central port zone close to the site.  
> Any ships carrying oil, crude or other dangerous cargo were turned away from Tianjin. Such measures were taken to prevent further safety risks, following concern that upcoming rain forecasts would cause calcium carbide to create acetylene, a highly explosive chemical and one speculated to be responsible for the original Tianjin blasts.  
> Road and rail infrastructure in the vicinity suffered damage. Line 9 of the subway system serving TEDA shut down as a result of the extensive damage sustained.

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15. Resilinc EventWatch™ 24x7 Global Event Monitoring Service Research
Costly equipment in the port terminals suffered damaged.

Utilities, power lines, communications and other critical infrastructure in the vicinity also experienced damages in the explosion zone.

While we do know that TEDA water supply is from a reservoir almost 50 miles away (free of contamination), the extent of damage sustained by the water lines in the region was unknown in the week following the explosions. Rebuilding this type of infrastructure can be a massive and time-consuming undertaking.

Four new fires broke out nine days following the Tianjin explosions. One of the combustion points was reported to be the logistics site for automobiles while the other three were confirmed at the central blast.16

Following the blasts, the Chinese government conducted nationwide inspections of facilities handling dangerous chemicals and explosives. In Beijing alone, 85 out of 124 sites handling dangerous chemicals were deemed unsafe. More than 100 chemical firms across seven provinces were asked to suspend operations or shut down due to safety violations.17 That includes 19 companies in Hubei province, 26 firms in Anqing city in Anhui province, 2 in Beijing, and 39 in Zhejiang province. Three oil and gas firms close to residences were told by authorities in the cities of Hangzhou and Shenzhen to halt operations.

Initial Prospects for Recovery

Initial reports indicated that the port was slowly returning to normal. However, the logistics center which processed paperwork for the port operations did suffer damage. One source confirmed, “That’s where the whole community—forwarders, haulers and the rest—were doing all the other administrative activities. It was very efficient and now companies have to go directly to their respective individual terminals to get this done,” according to an industry report.18 There remains doubt as to whether the individual terminals have the administrative infrastructure to deal with the upsurge in paperwork in the interim period.

The blasts occurred in an area surrounded by logistics and manufacturing operations close to the port. Resilinc has mapped over 30 sites in the 2-10 mile radius of the blast. Analysis shows that these sites will likely experience difficulty resuming normal operations for longer than 6-8 weeks, even if they have not experienced substantial damage directly to their buildings.

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18 3PLs Eye Alternatives Due To Severe Road Access Limits Following Tianjin Explosion, 2015, Supply Chain 24/7: [http://www.supplychain247.com/article/3pls_eye_alternatives_due_to_severe_road_access_limits_following_Tianjin](http://www.supplychain247.com/article/3pls_eye_alternatives_due_to_severe_road_access_limits_following_Tianjin)
One reason for this is concern from workers in these facilities regarding the environmental impact of the chemicals in the vicinity of the evacuation zone. School closures and transportation disruptions may potentially keep people from work. Road blocks or obstructions may prevent inbound raw materials to the factory, or prevent the 1,000-plus firefighters and 200-plus environmental experts from converging on the port area to aid in safety efforts. Trucks in the area may be tasked with clearing the debris and therefore, may not be available to move product in and out of factories. Recovery may be further extended if inbound raw material suppliers located in the vicinity are themselves unable to recover quickly and, in turn, impact the normal operations of factories that depend on these suppliers.
3. Near-term Impacts (3-4 week outlook)

As the Port of Tianjin focuses on damage containment and initial emergency response immediately following the Tianjin explosions, port operations will only begin to properly resume approximately mid-September (or five weeks following the initial explosions). Shippers in and out of the port should plan for the scenario that any goods on containers at the port will be inaccessible for the next two months, even if they are as yet intact and not destroyed by the explosion.

Ripple Effects

Disruption ripple effects become more apparent in the near-term impact window (3-4 weeks out).

> Even those who are able to get shipments rerouted to other ports may experience several weeks of delay as these ports see a major surge in cargo lining up for processing. For example, during the 2004 Longshoremen strike in California, mega shippers like Wal-Mart and others activated capacity options on alternate lanes. As a result, the disruption timeframes were further extended to large and small shippers. The occurrences of similar scenarios are highly possible in China as well during this time.

> Based on this information and on the volume of goods moving through other ports, extensive delays in the near term can be expected for not only the companies in the immediate vicinity of the explosion area, but for all companies and sites moving products through these ports. Of course, even regional manufacturing sites that don't move product through these ports, but depend on raw material and parts from suppliers located in the impact zone, may also be impacted.

> Suppliers within 15-30 miles of the impact zone may want to presume they will experience 4-8 weeks of delays, in addition to the logistics disruptions. In a worst-case scenario, should any equipment damage be experienced, the timing can be extended much longer. Some equipment replacement timeframes can be 12-26 weeks, and that does not include installation, setup and qualification time before volume production and other operations can resume. In some industries, original custom equipment may be used, in which case the original supplier may no longer be in business, or does not have the capability to manufacture the custom equipment or tooling.

These estimates could shift depending on the IT system recovery and the effect of immediate regulatory actions related to environmental impact. The recovery time for individual suppliers and shippers will vary dramatically based on their disaster/crises management strategy in place prior to the event. These three factors are discussed further below.
The Role of IT Systems

The extent of IT systems damage will need to be known before a proper assessment can be made of when near-normal recovery may be expected. Due to the logistics center and IT systems infrastructure outage, manual workarounds will be necessary to process transactions. The centralized processing center will need repairs and perhaps new equipment which will take time to get back in place. In the meantime, decentralized processing of shipments will be executed at the individual terminals which begin operating. However, due to the sensitive nature of the documents needed for import/export transactions, such operations cannot realistically scale to cover all shipments. As a result, processing will be prioritized to only allow certain types of critical cargo and not be possible across the board. Even if applicable to all cargo, the speed will be greatly reduced.

Regulatory Action Impact

As port operations begin to flow, initially, the backlog will need to clear and new regulations on all dangerous cargo will need to be adhered to. Thus, logistical delays should remain an expectation for the next several months. Due to the environmental impact, and the evacuation zone timeframe for decontamination, this timeline could shift as more information becomes available.

The processing times will be further extended because all shipments of hazardous cargo have been re-routed to ports other than Tianjin. In general, the additional scrutiny will require longer processing time for this type of cargo and delay processing times for all shipments in general.

Shippers of materials classified as hazardous cargo should fully expect further delays. The Chinese government announced stricter regulations and punishments for non-adherence to local laws for safe handling and storage of this cargo. Chinese President Xi Jinping confirmed “severe problems in the work safety sector,” according to a report from the Xinhua news agency. The State Council Work Safety Commission also cited a “lack of safety awareness among businesses, lax implementation of safety regulations, irregular practices among workers and weak emergency responses to incidents,” according to the report. From now until September 10, the State Administration of Work Safety will monitor all dangerous substances across the country, targeting industries related to dangerous chemicals, explosives, fireworks, elevators, non-coal mines, public transportation and ports.

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Prospect for Individual Supplier Recovery

Recovery times for individual suppliers depends more on their supply chain risk management (SCRM) strategy than dumb luck. While laggards fail to invest in proactive SCRM strategies and tools due to failures in leadership, experience, cultural or other factors, leaders respond and recover quickly—and even view disruptive events as an opportunity to achieve competitive advantage.

Key characteristics of leaders are as follows:

> Leaders monitor global supply chain events 24x7 using internal resources or third-party services and as result are aware of events like the Tianjin explosion within minutes.

> Leaders have their critical suppliers, sites, and parts mapped and can identify suppliers, sites and parts flowing in the impacted region quickly.

> Leaders have taken proactive measures working with tier 1 suppliers to ensure they have a clear advantage in securing available inventory and capacity from alternate sites including brokers and distributor facilities for low to no premiums.

> Leaders have taken other proactive risk mitigation actions including having redundant manufacturing in place for their highest revenue/margin products and 10-16 weeks safety stock distributed at various points in the outbound supply chain.

> Leaders also have redundancy built into their logistics and transportation operations. Such redundancies may include developed ongoing relationships with backup freight forwarders, road haulers, shipping lines and logistics operators. While this can be an expensive approach to routine operations—especially for lower volume transactions—companies who have these relationships already established will have an advantage over companies who are attempting to establish brand new routes, lanes or relationships with third-party logistics providers.

Additional Near-Term Recovery Action Recommendations

Whether your company is a laggard or a leader or somewhere in between, the time is now for action. Companies with their own manufacturing sites within 15 miles of the explosion zone may consider conducting extensive assessments of their facilities, direct ingress and egress accessibility, transportation in the vicinity, personnel health and safety as well as availability. If manufacturing operations and equipment is operational, and inventory onsite and within reach is intact and accessible, companies may:

> Begin assessment of timeframes when shortages will be experienced;

> Identify parts and suppliers needed to be replenished;

> Assess their status; and

> Conduct a complete assessment of expected lines down.
Companies without confirmation of supplier impact may want to assume their suppliers are affected. For any suppliers within 2-15 miles of the Tianjin explosions impact zone, companies may presume 12-16 weeks of delays. For example, Deere & Co. reported facility damage to their site which was located about four miles from the explosion zone.\(^3\) Motorola, Samsung and Vishay each have their factories in the TEDA area and were impacted by this event. They may have experienced some facility damage or damage to utilities and other connections that are needed to operate smoothly. Some of the impacted companies initially notified customers that lead times would be three months. Some of these notifications did not go out until one week to 10 days after the event first occurred.

Following are companies identified publicly as having been impacted as a result of the explosions. Understand the role of these companies in your supply or demand chain:

- Vishay (rectifiers, transient voltage suppressors and transducers)
- Motorola
- Panasonic
- Toyota (more than 50 employees injured)
- Caterpillar
- Toyota, Renault, VW, Hyundai, Mitsubishi vehicles decimated
- Sinomach Auto (state-owned and $479 million worth of damage)
- Deere (agricultural and construction equipment as well as engines)
- Volkswagen (inventory; plant OK 20 miles away)
- GlaxoSmithKline (factory for consumer health products)
- Airbus
- Singamas Container Holdings
- Emerson (electronic and electro-pneumatic control valves system)

\(^3\) Deere to Resume Tianjin Port Operations Later This Week, 2015, Thomson Reuters: [http://www.reuters.com/article/2015/08/17/china-blast-deere-and-co-idUSL1N10S1A620150817](http://www.reuters.com/article/2015/08/17/china-blast-deere-and-co-idUSL1N10S1A620150817)
The figure below shows the Resilinc mapped sites in the entire Tianjin region. The clusters demonstrate the concentration of companies who have manufacturing, warehouse and distribution locations in this important economic hub.

Yellow clusters represent the numbers of sites concentrating in region is between 10-100 pins; blue clusters represent the numbers of sites concentrating in region is less than 10 pins; circles depict the ripples of impact that can be expected to flow as the disruption waves expand over time beyond the immediate impact zone. Image courtesy of Resilinc.
4. Short-term Impact (1-3 month outlook)

At about this point, the focus will shift from response and recovery to cleanup, rebuilding and other recovery processes. The competition between companies located in the 15-mile zone will be for repair technicians and other cleanup and restoration service providers. Due to premiums being paid in Tianjin area for trucks, it is likely that carriers will move trucks to serve Tianjin demand where premium prices can be commanded. Thus, available trucks will slowly increase and help ease the constraints. This will enable product to flow in and out of factories more predictably.

Leaders Separate Themselves from the Pack

Companies will still be grappling with logistical delays, however, some transactions will get cleared and shipments will begin to move again, even if slowly. Inventories, however, will remain low or run out, and companies may start to go lines down if their raw materials and parts have not been replenished. This is a dangerous time as lack of supply chain visibility issues now become apparent. For example, unanticipated suppliers — which may not have been previously considered to be impacted — may begin to default on POs or notify that allocations are going into effect. Companies that have not yet mapped their tier 1-2 relationships will be caught off guard when a tier 2 supplier makes a tier 1 supplier go lines-down or declares allocation. Leaders will have mapped the tier 1-2 relationships, and also identified where the tier 2s are located.

Laggards who did not have a proactive supply chain mapping capability, may be scrambling to put the picture together. They are now finally completing their assessments of which suppliers are in the impact zone. These companies will now enter the fray to buy inventory and capacity. By now, there are many others vying for the remaining available inventory and capacity. They will pay hundreds of thousands of dollars to secure inventory and pay premiums to expedite inbound and outbound freight.

Mapping supply chains in areas affected by environmental disasters can better prepare companies to avoid logistical delays. Image courtesy Resilinc.
Chinese Government is the Wildcard

Due to the restrictions on available information by the Chinese government, much is still unknown a week after the explosions. The worst-case scenario here is that the environmental impact is larger than anticipated, and that rains and other conditions degrade or expand the impact zone. For example, if the water table is contaminated with potentially poisonous chemicals, then a human life crisis could follow and all timeframe scenarios presented here could be further extended. There is the potential of many residents permanently moving out of the area—despite government assurance regarding safety of the area. Such actions may result in labor shortages, particularly for skilled laborers in factories in the 30-50 mile radius of Tianjin. Depending on the type of environmental crisis (e.g. whether contamination is air- or water-based), different types of recovery scenarios and outcomes can play out.

One month after the disruptions, the Chinese government may be reacting to the internal and international outcry, over its handling of the crisis, and public and media criticism about the irregularities in compliance and safety standards as they pertain to Ruihai's operations. As a result, the Chinese government may enforce strict new regulations and rules for items classified as dangerous. Companies whose products have not currently been classified as dangerous in China, but are classified as dangerous or hazardous in the U.S. or Europe, may consider preparing for an expansion of the compliance standards. This is in the event that they experience some disruption because of new rules, regulations and possibly the need to pass inspections at all their sites in China where they make and store these products.

An incident that occurred in 2014 may be instructive. A metal polishing factory accident killed 70-plus workers due to lax safety standards and resulted in a lot of media and public criticism. In response, the Chinese government instituted new audit and compliance requirements affecting about 300 similar factories. After completion of these audits, the government immediately shut down hundreds of sites overnight.¹ Many of these factories came back online over the coming weeks but some never resumed business due to an inability to pass inspection.

Again, leaders who were able to initially react and respond quickly to regulatory actions and who secured materials to keep lines running are now able to sell their products at premiums as demand for their products increase as competitors go lines down and place customers on allocation. Companies that instituted worldwide uniform adherence to strictest safety and compliance standards will find they pass government inspections audits quickly because they will be in compliance to new standards. Those that took precautions by locating themselves inland and outside the cluster of industrial parks and manufacturing hubs near the port will also find easier access to people, transportation routes and be able to get business back up and running, assuming a key supplier was not impacted.

The laggards, on the other hand, may find themselves in their war-rooms working overtime to try and find inventory to keep supply lines going. They may be on allocation with multiple suppliers for parts and raw materials, and struggle to meet customer demands. Some of their customers have not been notified yet regarding the potential breakdown in supply. Such companies may find themselves caught continuously off guard because they didn't realize tier 1 suppliers were all buying critical raw materials from the same sub-tier source located in the impact zone. As a result, they start to feel the latent ripple effects of the tiered supply chain.
5. Medium-term Impact (3-6 month outlook)

Three months after the Tianjin blasts, some of the logistical backlog is starting to clear and products are moving faster through the recovery supply nodes and ports. Most likely, companies have depleted any buffer stock by now. Although normal operations may not have yet resumed, inventories have begun to be replenished, even if some allocations are ongoing. During this recovery window, key challenges include further changes in the regulatory landscape as environmental impacts become clearer and lines down risks resulting from lingering inventory vulnerabilities due to low buffer stock levels. Also, characteristic of this recovery window is that SCRM leaders start to reap the rewards of their investments in the form competitive advantage.

Regulatory Hangover

During this medium-term impact window, potential long-term environmental impacts or implications on population health may begin to manifest as a result of several tons of dangerous chemicals polluting the air supply and water table in the region. Such ramifications could forever change the regulatory landscape for companies operating and utilizing these chemicals worldwide. They could also lead to the possibility of having to relocate altogether. Fitch Ratings confirmed that the insured losses following the Tianjin explosions could go upwards of USD $1-$1.5B.\(^1\) Another report confirmed that some companies impacted by the explosions already proceeded in filing claims.\(^2\)

Lines-Down Risks

Short of an environmental impact of the scale alluded to above, the worst-case scenario in this medium-term recovery window is that many companies face a looming lines-down situation if they have not been able to obtain inventory for all components and materials needed to resume manufacturing. In the past, we have seen many such disruptions where premium cars were held up in manufacturing as a result of a shortage of inexpensive parts such as a seat belt thread or cup holders. To resume manufacturing or in order to ship a product, the smallest, cheapest and simplest part needs to be available. As a result, sourcing organizations may realize that it is not sufficient to manage 80% of spend that is pertaining to 20% of parts. Single-sourced parts, previously hidden in the low-spend bucket, can easily emerge here as high-impact parts with the possibility of shutting down multiple lines. At this point, some key new suppliers may extend lead times or go on allocation. Others, who previously indicated they were not impacted, may now find that their suppliers have been affected. As inventories dwindle at various tiers, these notifications can continue to trickle in.

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\(^1\) Tianjin Explosion Insurance Losses Likely to be Material, 2015, Fitch Ratings: [https://www.fitchratings.com/site/fitch-home/pressrelease?id=989581](https://www.fitchratings.com/site/fitch-home/pressrelease?id=989581)

\(^2\) China Blast Losses Could Reach $1.5BN, 2015, Insurance Times: [http://www.insurancetimes.co.uk/china-blast-losses-could-reach-15bn-credit-suisse/1415138.article](http://www.insurancetimes.co.uk/china-blast-losses-could-reach-15bn-credit-suisse/1415138.article)
A factory going lines-down can be a very expensive proposition. A company could continue to deplete its financial resources, keep employees on payroll, have money tied up in Work-in-Process (WIP) and other raw material that is ready to be kitted. Utilities and building leases are expenses that would continue to incur. An automotive OEM Chief Financial Officer estimated that the cost of lines down at one factory can be as high as $300 million a week.

Some companies in the impact zone may have still not resumed operations and their customers are working on qualifying alternate facilities or sources. Depending on the industry, this can be a fairly expensive and cumbersome process. For industries regulated by the U.S. Food & Drug Administration (FDA), this process can take months and even years to complete. If the primary supplier is in an impact zone and cannot support customers for an extended period of time, the company may lose months of revenue once their initial raw material and finished goods inventory buffers dwindle. Many FDA-regulated companies have very high inventory levels for certain raw materials, for this very reason. However, it is impossible for anyone to cover two years of demand on all parts/materials at all times.

Finally, when inventories are gone and lines are down on certain products, companies could look at notifying their own customers that they will not be able to ship. This can sometimes trigger long-term impact to business relationships, a loss of customer confidence, and put a competitor at a huge advantage. For example, during the Thailand floods—which impacted most of the Hard Disk Drive (HDD) providers—Seagate signed long-term contracts with as much as a 35% increase in prices with customers who previously purchased from other HDD companies.

**Leaders Achieve Competitive Advantage**

The leaders are fully leveraging the robust supply chain mapping and a 24x7 global event monitoring system for competitive advantage. In the chart above, these companies have given themselves a 1-6 week lead over competitors by virtually eliminating the entire impact discovery stage. These companies go from notification straight to knowledge.
of exactly which suppliers are in the impact zone and which materials come from these sites within minutes or hours of the disruption occurring. By also mapping sub-tier linkages, they are able to anticipate which tier 1s could potentially experience a disruption and work with them proactively. While other companies may have still been focusing on the event as just a logistics disruption, these leaders took the opportunity to contact all suppliers, brokers and distributors within the 15-30-60 mile zone and secured available inventory and capacity for the most critical and highest revenue-impacting components and raw materials. They also immediately contacted their outbound logistics partners, 3PLs, channel and distribution partners, and received commitments for control over inventory in the outbound distribution channel. Finally, they activated their sales network and contacted customers who have given business to competitors letting them know they are not impacted by this event.

Below is what the impact profile looks like for leaders:

![Impact Profile](image-url)

Pictured above is what the impact profile represents for leaders prepared for the mid-term impacts that supply chain disruptions can cause. Image courtesy of Resilinc.
6. Long-term Impact (6 months to years that follow)

The long-term consequences of such man-made disasters such as the Tianjin explosions can be devastating to impacted companies and still hard to completely quantify or predict in the years following such an unnatural event. The Chinese media reported that long-term economic impact of the Tianjin crisis could be as high as $8 billion.

Five years after the 2010 Deepwater Horizon oil spill in the Gulf of Mexico, for example, some scientists confirm it is too early to tell about the long-term environmental damage, according to the National Geographic Society.¹ In March of 2015, BP released its Gulf of Mexico five-year report, which largely concludes that the Gulf has fully recovered.² However, officials of the Natural Resource Damage Assessment (NRDA) called BP’s report “inappropriate as well as premature.”³

Longer-term impacts may be framed in a variety of ways:

> Stock price. Depending on the extent of a supply chain disruption, such events can also negatively affect a company’s stock price performance for years. A 2003 report from the Georgia Institute of Technology studied the long-term stock price effects and equity-risk effects of supply chain disruptions over several years.⁴ Among the many findings, is that companies do not recover as quickly as presumed from the negative effects of supply chain disruptions. One year after a supply chain disruption, two-thirds of affected companies were still behind their peers in stock price performance, according to PwC findings.⁵ The data also shows

Companies experiencing falling stock prices following events that caused supply chain disruptions is a common scenario. Image courtesy of PwC.

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³ Five Years after the Gulf Oil Spill: What We Do (and Don’t) Know, 2015, CNN: http://www.cnn.com/2015/04/14/us/gulf-oil-spill-unknowns/
that over a two-year period, the average stock return of those companies was nearly 19% lower relative to the benchmark group.

> Exporting/Importing of Regulations. Years after the Tianjin explosions, supply chain operations — both local and global — are more likely than not to be heavily affected by new regulations and heavier fines for federal noncompliance. This may go beyond the federal and local regulations already imposed to businesses worldwide and across all industries.

For example, in Sept. 2014, the Financial Supervisory Commission (FSC) announced that listed companies in specific industries in Taiwan—such as food processing, chemical and financial services—and those whose paid-in capital is above NT $10 billion, are required to issue a standalone CSR report.⁶

Implemented by the European Chemical Industry Council (CEFIC), numerous iterations to the Seveso directive—following the 1976 Seveso Dioxin gas leak in Italy—continue to be regularly updated to ensure the European chemical industry continues to prevent and control major industrial accidents involving dangerous substances.⁷

An increase in regulations related to man-made risks, such as labor and wage disputes, could also be an evident long-term result.

> Industry-Specific Effects. Chemical industry players may face tighter legislation for hazardous material storage. Stricter supply chain safety standards could also suggest cost structure changes around China’s energy and petrochemicals industry, which would indefinitely affect a company’s multi-tier global supply chain.

> Cost Increases. Predictions of long-term effects following the Tianjin explosions will also be based heavily on how long and to what extent the Port of Tianjin is disrupted. Rate increases in property and cargo may be implemented to offset the costs caused by destroyed containers during the Tianjin explosions or other ramifications of the events.

> Insurance Coverage. Property and casualty insurance may impose stricter rulings based on extensive damage already witnessed in the immediate aftermath of the Tianjin explosions. Another long-term prediction is with regards to disciplinary actions.

> Executive Fallout. The consequences of measures taken by governments against executives of companies who did not meet proper regulations or industry compliance for materials or operations within their business may increase in severity.

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⁷ Process Safety and Seveso, European Chemical Industry Council (CEFIC): http://www.cefic.org/Policy-Centre/Environment--health/Seveso/
Conclusion

Disasters such as the Tianjin explosions often have consequences which are much more severe than originally contemplated. And the full impact of such events can takes years to unfold. Some companies will never fully recover—or recover at all. The good news is that global SCRM and resiliency practices and tools can not only help companies proactively mitigate the risks posed by disasters, but they can help transform such threats into opportunities to help companies achieve a sustainable competitive advantage.

The right SCRM practices and solutions allow companies to:

> Map the global dependencies inherent within their supply chains
> Identify the interlinkages between the first tier, second tier and third tiers of suppliers
> Quantify the potential for any region to be impacted and develop effective playbooks for response
> Proactively protect the highest impacting and most vulnerable areas of the supply chain
> Transfer some of the risk to insurance providers for areas which are vulnerable but too expensive to mitigate
> Receive alerts of supply chain threats before they occur or unfold
> Address the level of risk severity specifically to their supply chain
> Understand the true nature of the man-made disaster beyond media reports or coverage
> Quickly and properly assess any potential damage done to their company at the multi-tier level of their global supply chain
> Execute a response strategy beyond just the logistical disruption challenges
> Take the right steps to secure alternative routes related to production, shipping, sourcing and the related costs to each of these supply chain elements
> Better understand the long-term effects of the event, both on their company and industry

Such decisions to implement proactive SCRM practices and solutions to navigate—versus react to—such events as the Tianjin explosions will have the greatest long-term positive impact on a company's performance, longevity and prosperity.
For More Information

Additional information and materials with regards to Supply Chain Risk Management (SCRM) and Corporate Social Responsibility (CSR) solutions, and global supply chain resiliency can be found at Resilinc.com. Learn how global supply chain event monitoring services such as Resilinc’s EventWatch can provide you with business impact insights from disruption events. Request a demo today, or contact us to learn more about how Resilinc can help you implement a supply chain strategy to mitigate risk.

About the Research

Resilinc’s analysis as found in this report is based on the company’s experience with multiple events in the past two decades, and includes some assumptions. Resilinc’s guidance is based on available information as of this day, and the company approach is to assume supply chain situations are worst case scenarios to better plan for it. Resilinc assumes no responsibility for decisions made based on our guidance and analysis.

About Resilinc

Resilinc is the leading cloud provider of supply chain resilience and risk management intelligence and analytics. Industry leaders like Amgen, GM, and EMC rely on Resilinc to mitigate risks end-to-end, while achieving long-term competitive advantage, and building brand and shareholder value. Resilinc’s flagship SupplyIntel™ solution platform and services deliver the fastest time-to-value and the lowest resource impact. It accomplishes this by providing the world’s largest repository of supplier and part intelligence leveraging the power of our “LinkedIn” supplier community; the most robust set of dashboard visualization and patent-pending analytic functionality for pro-active planning and risk quantification; and the only solution that personalizes your impact analysis by automatically connecting incidents with your supply chain map so you don’t have to. For more information, visit www.Resilinc.com.

Contact

Resilinc
1900 McCarthy Boulevard, Suite 305
Milpitas, California 95035
408.883.8053

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