



JAN. - MAR. '20

Preparing for Impact



SUMMER '20

OEM Production Capacity Returns to Normal



'21 - PRESENT

Building Resilience During Crisis



MAR. '20

Production is Disrupted



EARLY '21

Industry-Wide Shortages

Craft

The Evolution of the Auto Industry's Approach to Supplier Risk Management from 2020 to Now

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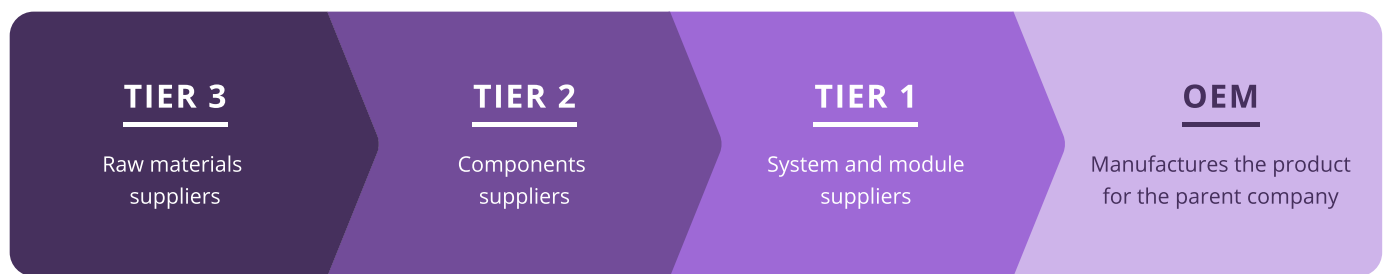
A Complex Supply Chain with Complex Risks

A global pandemic, geopolitical tensions, and rapidly transforming technology have reshaped the automotive industry and its approach to supplier risk in recent years. Below we take a look back at where the industry was before 2020, how various disruptions impacted the supply chain, lessons learned, and where the industry is headed today.

A Complex Supply Chain with Complex Risks

The automotive industry—and its production process—is uniquely complex. For instance, roughly 20,000 to 30,000 components go into just one car. That level of production requires multiple tiers of suppliers and manufacturers around the world to deliver the finished product, resulting in key dependencies and risks along the automotive supply chain that make it particularly vulnerable to disruption.

To understand these vulnerabilities, it is important to understand the multi-tier structure of automotive suppliers:



OEMs design, produce, and brand the car and usually dictate the relationship with downstream suppliers. In other words, OEMs are the final stage of manufacturing for the parent company, assembling all the component supplies into the branded product.

Tier 1 suppliers provide prefabricated systems or modules to be assembled by the OEM. These can include brake systems, car seats, and infotainment systems.

Tier 2 suppliers provide the basic parts and components that make up Tier 1 systems. For instance, the infotainment console includes screens, electronics, and other parts that Tier 2 suppliers provide. Tier 2 are rarely direct suppliers to OEMs. They are responsible for ensuring the specific components function but they are not responsible for the assembly and function of those components in a larger system or vehicle.

Tier 3 suppliers typically provide the raw materials that make up the Tier 2 and Tier 1 components.

A Complex Supply Chain with **Complex Risks**

Automotive's Risky Business

Because the OEMs depend on multiple tiers of suppliers, a delay or disruption in supply at any tier can mean major challenges in production. This risk is only amplified in today's global network of suppliers and manufacturers and the industry's commitment to lean on manufacturing and a just-in-time (JIT) supply chain strategy. Now, one severe weather event in China could disrupt final production downstream in Germany.

Within such a complex global supply chain, automotive companies must monitor and manage various types of risk:

SUPPLY RISKS

The risk of inadequate supply due to a supplier issue. If a supplier has trouble sourcing materials, ships the wrong volume of product, or has a delay in production or shipping, this can impact the final product and the parent company's ability to meet consumer demand and sales goals.

DEMAND RISKS

The risk of under- or over-estimating demand for product (and associated supplies). This can leave the company with surplus inventory they must pay to store and move or a shortage of products to meet customer demand.

MANUFACTURING RISKS

The risk of a critical component or phase in production being disrupted or delayed. This can be caused by rising costs of raw materials and commodities, shortages of raw materials, and disruptions in distribution.

FINANCIAL RISKS

Risks that can impact the business's financial health, such as supplier bankruptcy, inflation, fluctuating exchange rates, market volatility, and budget overruns.

TRANSPORTATION RISKS

Risks that can disrupt transportation within the supply chain, such as fuel prices, driver shortages, traffic, weather conditions, infrastructure outages, and even regulatory issues like customs rules.

MACRO RISKS

Large, external risks such as extreme weather events, geopolitical crises, climate change, regulatory changes, international trade relationships, pandemics, etc.

These risks often intersect with one another and can compound their impact on the supply chain. For example, manufacturing risks such as material shortages can lead to financial risks like budget overruns when the business invests resources into sourcing new suppliers or materials—often at great cost. Both of which can simultaneously eat into profit margins.

2020 and Pandemic-Induced Disruption: A Timeline



2020 and Pandemic-Induced Disruption: A Timeline

The complexity and operational dependencies that exist within the auto industry played a large role in the supply chain crisis and the domino effect the industry experienced following the 2020 pandemic. This crisis highlighted fundamental flaws and vulnerabilities in the automotive supply chain, which upended the way business and procurement leaders consider and manage risk.

Below is a brief overview of how the pandemic disrupted the automotive supply chain and the downstream impacts that had on the industry at large—effects that are still being felt today.

JANUARY - MARCH 2020

Preparing for Impact

COVID-19 was discovered in Wuhan, China in late 2019. As the virus spread in Asia, companies began preparing for potential disruptions in early 2020 by securing inventory and taking steps to maintain production.

China—and Wuhan in particular—is a major manufacturing hub for the auto industry. So as restrictions increased in the area, leaders understood there was potential for major disruption even before the virus had spread to Europe and beyond.

Some suppliers were impacted early on and began experiencing material constraints that had to be solved in order to keep production lines open. But what's interesting here is that as OEMs saw potential disruption coming, they actually *increased* their orders to heighten their inventory, further increasing demand on Tier 1 and Tier 2 suppliers. As a result, Tier 1 and Tier 2 suppliers initially didn't expect disruptions because the opposite was being indicated.

2020 and Pandemic-Induced Disruption: A Timeline

However, the Covid situation was getting worse throughout China and then Italy.

MARCH 2020

Production is Disrupted

Despite early preparations, by late March 2020, disruption had arrived. OEMs began to run out of certain components—partly due to the fact that employees were unable to come to the factories to work—forcing the companies to stop production.

This created another problem, though, because the original increased orders from Tier 1 and Tier 2 suppliers were already out for delivery. As a result, the OEMs were flooded with now-unusable components, so they started canceling orders. The challenge here was that the suppliers were often only given 1-7 days' notice of a refusal to receive new supplies due to the production stoppages.

This created massive challenges for the Tier 1 and Tier 2 suppliers, who then had to coordinate what to do with their now-surplus goods:

- Keep the goods they produced;
- Reroute/reship them because they were already on their way; or
- Decide what to do with goods that were refused by higher-tier suppliers.

Ironically, while supply shortages would eventually come to define automotive supply chain woes in the ongoing pandemic, in the beginning, the issue was not that there was a lack of materials but rather too many.

Uncertain when the economy would recover, many Tier 2 and Tier 1 suppliers reduced employee count, prepared to decrease stock levels, and readjusted forecasts to order fewer raw materials in the upcoming months to minimize losses.

SUMMER 2020

OEM Production Capacity Returns to Normal

After these initial disruptions, OEMs started steadily increasing vehicle production, beginning with orders already in the pipeline. By mid-summer, OEMs were producing at full capacity again.

Consumer demand returned and continued to grow over 2020, so OEMs placed heavier demand on Tier 1 and Tier 2 suppliers. This surprised the suppliers as many had readjusted their plans to reflect a more conservative forecast for the rest of the year. With their own capacity scaled down, this created a bottleneck in the supply chain and set off industry-wide shortages.

EARLY 2021

Industry-Wide Shortages

By Q1 2021, OEMs had returned to original production levels, but Tier 1, Tier 2, and Tier 3 suppliers were still playing catch up. In addition to the challenge of right-sizing capacity to meet the unexpected demand, suppliers were also facing a significant shortage of several key materials, particularly semiconductors, steel, and plastics.

Despite capacity and demand returning, these shortages forced automakers to cut production of new vehicles by an estimated 10.5 million units in 2021, and another 3.6 million in 2022.¹

AUTOMOTIVE NEWS

2021 – PRESENT

Building Resilience During Crisis

In the midst of these disruptions, carmakers and their suppliers set to work trying to de-risk and improve resilience in the supply chain. But this has proved difficult to do.

Automakers focused on three primary strategies for increasing resilience:

- 01 Resilience-oriented supplier selection.** This includes rigorous supplier assessments with a focus on financial and risk management evaluations.
- 02 Increasing production capabilities.** To meet increasing demand amidst deepening shortages, companies worked to expand their production capacity.
- 03 Increasing supply stock.** Lean manufacturing and JIT processes left automakers in the lurch when supplies were disrupted. Having extra stock in storage can help them temporarily meet unexpected spikes in demand or delays in supply chain without disruption to consumers.

However, increasing production capabilities is a challenge because it usually requires product changes or modifications. But at that point, suppliers can't change anything because the product being sent to Tier 1 or OEMs has gone through rigorous testing and approval. Those validations would need to be redone if production measures are changed.

¹ "The latest numbers on the microchip shortage: Automakers begin cutting 2023 production," October 2022, [Automotive News](#).

Supply Chain Disruptions Between 2021 – 2022

Additionally, increasing stock inventory and storage also introduces challenges. Limited storage space, increased costs for storage, and tied-up capital becomes a liability for the supplier. So leaders have to weigh the cost of extra stock of finished goods compared to the costs of non-supply.



Supply Chain Disruptions Between 2021 – 2022

While COVID-19 alone was disruptive enough, the auto industry has been impacted by other factors too.

Climate Change & Natural Disasters

Disruptions in the automotive industry have been further exacerbated by several major environmental events, including:

- A fire at Renesas' Japan semiconductor manufacturing facility in March 2021
- Severe weather in the Southwestern United States in February 2021
- Flooding in Malaysia in March 2021

The Impact:

01

The Renesas fire damaged a production line for 300mm wafers impacting global carmakers such as Toyota, Honda, and Nissan, as well as U.S. and European competitors.

02

Winter storm blackouts in Texas resulted in manufacturing facility closures and transportation delays due to road conditions. This included closures at three semiconductor suppliers (Infineon, NXP and Samsung Electronics), further exacerbating the global shortage.

03

Severe flooding in Malaysia closed roads and factories and led to mass evacuations and shipping delays. The region is home to multiple auto suppliers, including the Dutch chipmaking equipment supplier BE Semiconductor. Malaysia's semiconductor assembly industry makes up a tenth of global trade in the sector.

Supply Chain Disruptions Between 2021 – 2022

Russia-Ukraine War

Other indirect factors have had substantial impacts as well, such as Russia's war on Ukraine, starting in February 2022.

The region is a significant player in the auto industry, supplying key raw materials and manufacturing capacity. For instance, Russia alone has 34 auto manufacturing facilities, most of which have suspended production due to shortages, sanctions, and delivery issues at the border.

The Impact:

01

The conflict has contributed to spot shortages of certain components, including windshield wiper motors (Ford) and wiring harnesses (VW), as well as other vital components automakers rely on.

02

The war also impacts chip shortages as Ukraine supplies more than 90% of US semiconductor-grade neon, and Russia supplies 35% of US palladium and 20% of global production of semiconductor-grade nickel.²

03

Many OEMs, including Toyota, Ford, Volvo, General Motors, and BMW, ceased export operations to Russia.

How OEMs are Mitigating the Chip Crisis

To manage the ongoing shortage of semiconductor chips, OEMs are:

- Prioritizing higher-margin vehicles
- Using fewer semiconductors where possible in their vehicle designs and models
- Implementing longer supplier contracts or paying in advance to secure supplies
- Increasing vertical integration of production lines to minimize supplier disruptions

While these strategies don't resolve the shortage itself, companies like Tesla have successfully navigated the crisis deploying these tools in the meantime.³

² "The impact of the Russia-Ukraine war on the auto industry," [KPMG](#), 2022.

³ "Tesla's vertical integration and preparation were keys to avoiding chip shortage: Reuters," [Teslarati](#), 2022.

ESG-Related Impacts on Production & Consumption Trends

A global pandemic and other major environmental factors are not the only major disruptors on the scene. ESG regulations and a broader consumer shift towards greener products have also impacted auto production and subsequent supply chain management.

As a result, auto manufacturers are starting to shift away from traditional gas-powered engines to zero-emission, carbon-neutral autonomous and electric vehicles (EVs). And the impacts are already being seen.

Even as the overall auto market shrank in 2020, electric vehicle sales actually increased—making up 4.1% of total car sales. By 2021, global sales of electric cars hit 6.6 million, making up nearly 9% of all new car sales—more than double the market share from 2020.⁴ And S&P Global predicts that demand for EVs will increase 10 times over by 2030.⁵

S&P Global predicts that demand for EVs will increase 10 times over by 2030.

S&P GLOBAL

To meet this increasing demand, OEMs will have to build a new ecosystem of partners to supply the parts and materials for these new vehicles.

Digital Transformation and a Modern Supply Chain

The move to electric and autonomous vehicles coincides with a greater shift toward digital technology in the auto industry. With cars themselves becoming more high-tech and intelligent, the manufacturing industry is adopting digital technology such as 5G, AI and robotics to create smart factories and modern supply chains that are more connected than ever before.

Increasingly connected by technology, leaders will have a wealth of data they can leverage to:

- Identify and mitigate business risk
- Uncover potential supply issues
- Increase efficiencies
- Provide accurate information to customers

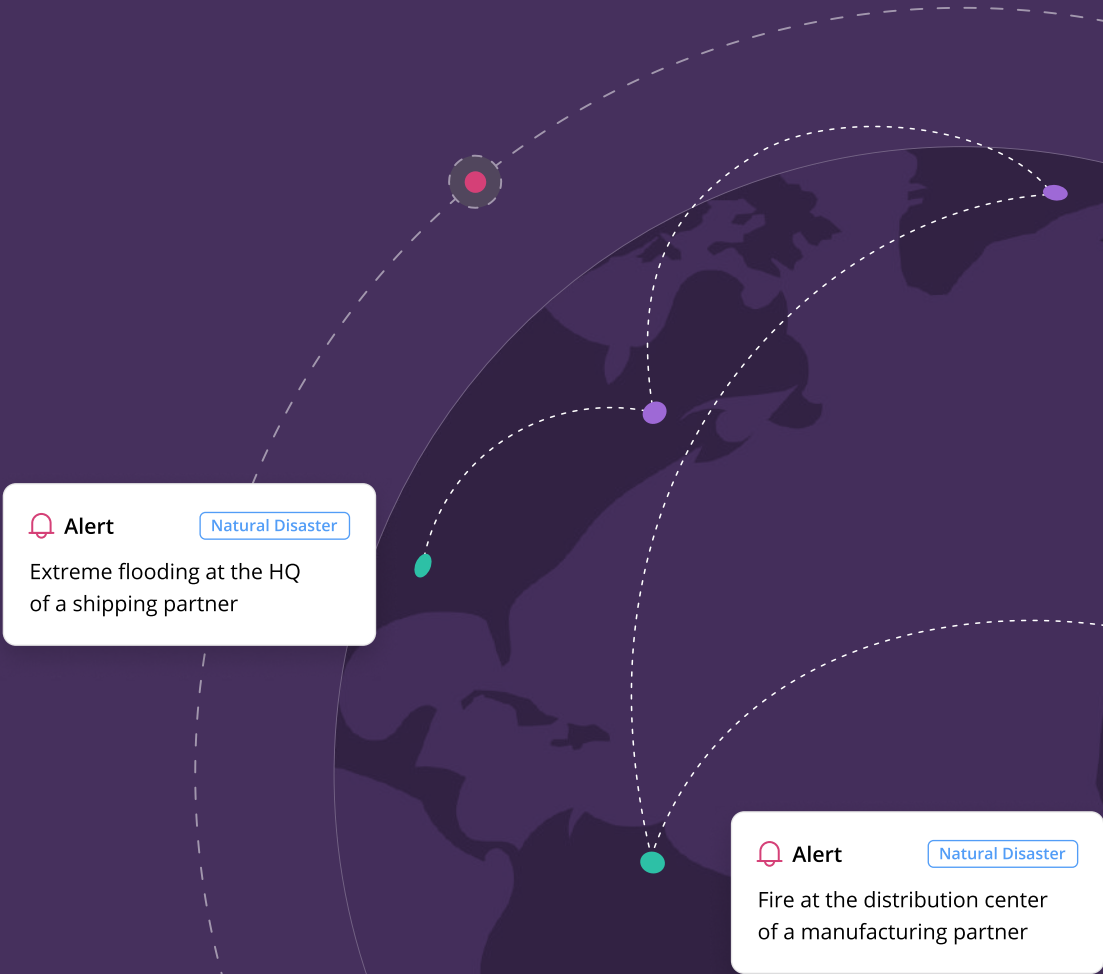
As manufacturers modernize the supply chain to increase resilience, supply chain intelligence will be more important than ever to help leaders anticipate risks and respond proactively.

⁴ "Electric cars fend off supply challenges to more than double global sales" [International Energy Agency](#), 2022.

⁵ "Fuel For Thought - Can the dealer of today serve the EV customer of tomorrow?" [S&P Global](#) 2022.

Lessons Learned

The pandemic—and subsequent crises—revealed deep-seated vulnerabilities in the automotive supply chain. Nearly four years on, supply chain strategy and risk management look much different than they did pre-2020.



Here are a few lessons learned:

Re-Engineering the Supply Chain

Globalization and JIT manufacturing resulted in complex supply chains with little flexibility or visibility. This meant manufacturers were especially vulnerable to even minor disruptions from upstream suppliers. Often, those suppliers were headquartered in remote locations, making it difficult for the OEM to coordinate.

After the disruption of 2020 and beyond, car companies increased their focus on selecting and working with more resilient suppliers.

These efforts included:

- Deeper vetting of suppliers and ensuring that suppliers are more risk-proof.
- Relocalization or bringing suppliers closer to headquarters and manufacturing facilities to reduce cost, increase sustainability, and mitigate multiple risk factors.
- Moving away from a purely JIT strategy to create more slack in the supply chain.
- Increasing safety stock in the event of shortage or disruption.
- Increasing suppliers' capabilities to produce goods and reduce reliance on other lower-tier suppliers.
- Re-engineering assembly lines to handle different products and increase manufacturing flexibility so downtime isn't as costly.

Deeper Supplier Collaboration

In the wake of 2020, it became clear that closer communication, collaboration, and information sharing were needed across suppliers—both upstream and downstream—to manage the ongoing crisis of the pandemic and other disruptive events.

This includes:

- Demand planning together with suppliers to coordinate forecasting and production strategy.
- Increased check-ins and regularly scheduled calls between suppliers to improve planning, forecasting, and coordination.
- Risk sharing and risk hedging enable collaboration between OEMs and their suppliers to discuss production stoppages, high inventory storage, limited material supply, etc.

The result of these efforts is more flexibility, agility, and transparency within and along the supply chain for both OEMs and their upstream suppliers.

Unlock Resilience with Enhanced Supplier Data

To drive efficiency, agility, and resilience, OEMs need deep supply chain visibility. Complex supply chains like the auto industry—and the increasing risks they face in today's disruptive world—highlight the need for greater supplier data and insights.

Craft's comprehensive supplier intelligence technology tracks multiple risk domains at once with real-time data paired with reliable machine learning models that are informative, customizable, and prescriptive.

Predict and contextualize supplier risks and opportunities with a 360-degree view of your supply chain.

With Craft, you can:

- Understand your supplier landscape beyond Tier 1 with N-tier mapping and analysis.
- Track multiple risk domains simultaneously, including ESG, regulatory compliance, cybersecurity, and operational risk, to understand your overall risk.
- Take action at the first sign of trouble with customized, real-time alerts.
- Integrate Craft directly into your current ERP for seamless management and centralized workflows.

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the company data you care about?

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