

Disruptions in Supply Chain

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Abstract

The paper aims to study some of the supply chain disruptions that occurred around the globe. In the article, various supply chain disruptions and their causes have been discussed. It also puts some light on the definition of the supply chain and how it works.

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I. Introduction

A supply chain is a network that connects a corporation with its suppliers in order to manufacture and deliver a specific product to the end user. (KEN- TON (2021)) The network consists of many activities, entities, resources, and information. The supply chain also consists of all the steps that it takes to get the product or service from its initial state to the customer. In a sophisticated supply chain system, used products can re-enter the supply chain at any point in the supply chain. Supply chain management is based on the premise that businesses and corporations participate in a supply chain by exchanging information about market changes and production capacities. A diagram of a supply chain is shown below in Figure 1.

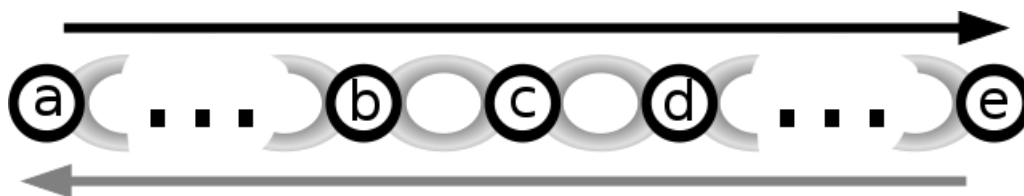


Figure 1: A supply chain is depicted in this diagram. The grey arrow symbolises the flow of information and backhauls, whereas the black arrow depicts the movement of materials and information. (a) the first supplier (vendor or plant), (b) a supplier, (c) a manufacturer (production), (d) a customer, and (e) the end user are the elements. This image was taken from Wikipedia contributors (2021).

Supply chain management is an essential process because a well-optimized supply chain can lower costs and improve the rate of production. Many of the exchanges that we see in the supply chain occur between different companies. These companies serve their own interest and maximize their revenue but may have little to no knowledge or interest in other players in the supply chain. Suppose all the appropriate information is accessible to any relevant company. In that case, every company in the supply chain will have the ability to help optimize the entire supply chain instead of optimization done only in self-interest. This will lead to better-planned production and distribution, which can decrease costs and give a product that has better sales. This will lead to better overall results for the involved entities.

The main goal of supply chain management is to meet consumer expectations by making the best use of available resources, such as distribution capacity, inventory, and labour. In theory, a supply chain aims to match demand with supply while keeping inventory to a minimum. Liaising with suppliers to eliminate bottlenecks; strategic sourcing to strike a balance between lowest material cost and transportation; implementing just-in-time techniques to optimise manufacturing flow; maintaining the right mix and location of factories and warehouses to serve customer markets; and using location allocation, vehicle routing analysis, dynamic programming, and traditional logistics optimization to increase the efficiency of distribution, are few of the aspects of supply chain optimization.

One of the pillars of supply chains is inventory management. Professionals can use this to keep track of their resources and ensure that they are well stocked to run their businesses. However, inventory management

involves a number of procedures, and performing them manually can consume a significant amount of time and reduce efficiency. This is why it's concerning that many firms, particularly small and medium-sized businesses, are still operating without inventory management systems. Furthermore, some don't even have a system in place to keep track of their inventory. The good thing in this scenario is that many manufacturers are interested in implementing advanced warehouse management techniques or purchasing inventory management. Supply chain management has indeed evolved and changed in the past few years. For example, the role of supply chains in promoting a company's productivity has increased in significance because modern businesses are fast-paced. Today knowledge is power, and the availability of the latest knowledge of a company's supply chain can make or break a company. Today, with the advancements in the field of automation, AI, and data analytics, the processes involved in supply chain management can now be more efficient than ever. However, the benefits can only be seen in the companies that are accepting digital transformation. Considering this, the companies that did not adopt the supply chain management struggled when the COVID-19 pandemic hit. 56% of retailers experienced moderate disruption from the pandemic. With recent digital innovations and the current state of the economy, businesses and companies should arm themselves with the latest supply chain statistics.

II. Examples of Supply Chain Disruption

There have been multiple instances of supply chain disruptions in the past, even before the covid-19 pandemic. A few of them have been discussed here in this section.

2.1 The great KFC chicken shortage of 2018. (Friday (2018))

On February 14, 2018, a seven-vehicle accident took place on the M6 between junctions two and three. To investigate, police closed off the area between the two intersections. A pair of vehicles collided shortly after near junction one. These three intersections were close to DHL's only warehouse, which was in Rugby. As soon as the vehicles departed the depot, they became trapped in traffic. The deliveries were delayed because DHL had no other warehouse from which to send the shipments. This incident caused a chicken shortage in KFC restaurants, leading to the closure of many of them. As of February 18, out of 870 KFC's, only 266 of them were open in the UK and Ireland.

2.2 Automakers face paint shortage after Japan quake. (Seetharaman (2011))

On March 11, 2011 there was an earthquake in Japan which led to Tsunami and a nuclear disaster. Many factories closed down. This led to a shortage of a particular pigment, Xirallic pigment that gives cars a glossy finish, automakers had to temporarily halt orders for specific shades of black, red, and other colors. The Xirallic pigment is used by major automakers such as Chrysler Group LLC, Toyota Motor Co, General Motors Co, and Ford Motor Co. Only one factory in the world produced this: the Onahama plant at Japan's Fukushima-Daiichi nuclear power plant. This plant was operated by the German chemical firm Merck KGaA. Toyota had to halt production at all of its 12 Japanese assembly factories. These series of accidents exposed faults in "just-in-time" manufacturing, which relies on having small quantities of materials and supplies on hand to avoid excessive costs.

The data for specific colored cars produced around the world may be difficult to come across. So we can see the data on how the earthquake affected car production in Japan. The information is shown as graph in figure 2 and figure 3. In the graphs, we can see a massive dip in car production in March 2011. The figure 3 is a zoomed in version of figure 2.

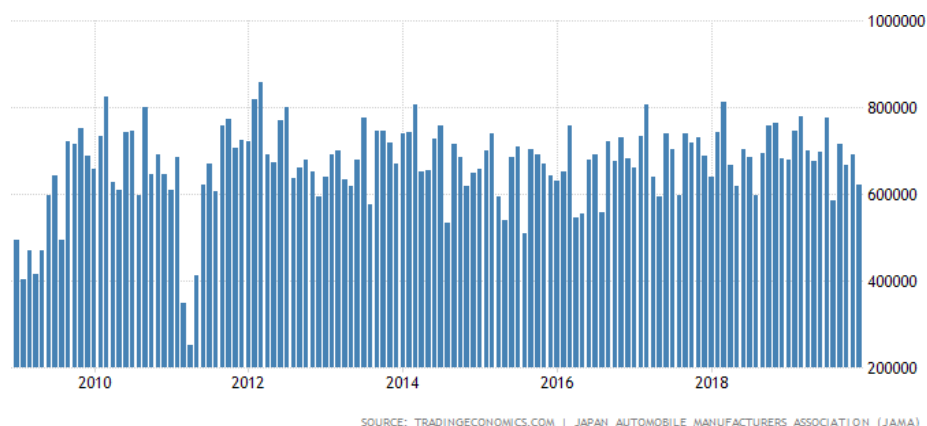


Figure 2: The graph shows cars produced in Japan between 2009 to 2019. A zoomed figure of this graph is shown in Figure 3. (Source: Japan Automobile Manufacturers Association (JAMA) (2021))

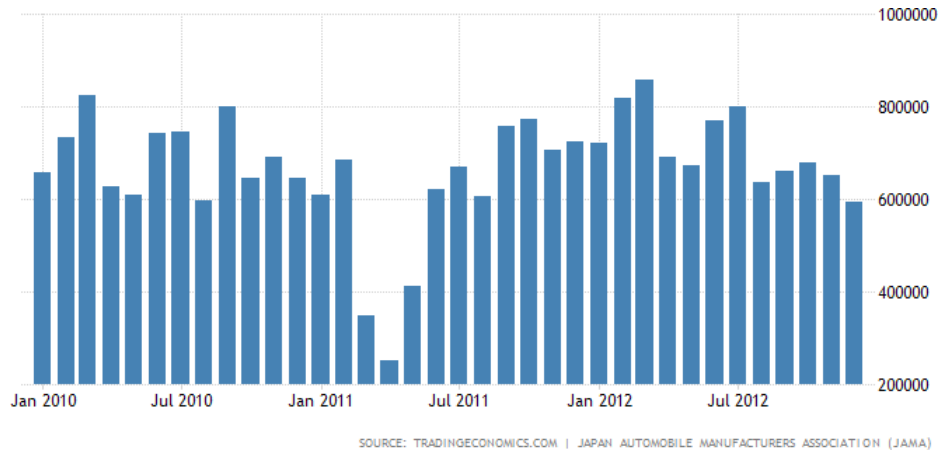


Figure 3: This car shows cars produced in Japan between 2010 and 2012. (Source: Japan Automobile Manufacturers Association (JAMA) (2021))

2.3 Disney races to restock Frozen merchandise. (Ri- eti (2015))

On November 27, 2013, Disney released a movie named 'Frozen.' Disney underestimated the film's success, and hence order for less number of frozen merchandise was put in. The movie turned out to be a very successful one, which resulted in massive demand for the movie merchandise. Some consumers had spent over \$1,500 US for an Elsa dress. To meet the demand, Disney rushed to restock.

2.4 Playstation 2 stuck in Suez canal during Christmas. (By Valerie Elliott, Consumer Editor and Mike Theodoulou (2010))

During the winter of 2004, a ship carrying Sony's PlayStation 2 console got stuck in the Suez canal. This resulted in shortage in supply of PlayStation 2. It being Christmas time, the demand for PlayStation 2 was very high. So to curb the shortage to some extent, Sony hired giant Russian Antonov AN24 cargo planes to transport PS2s directly from China to Britain. As shown in Figure 4 the sales of PlayStation devices was minimum in 2004 in the last 4 years.

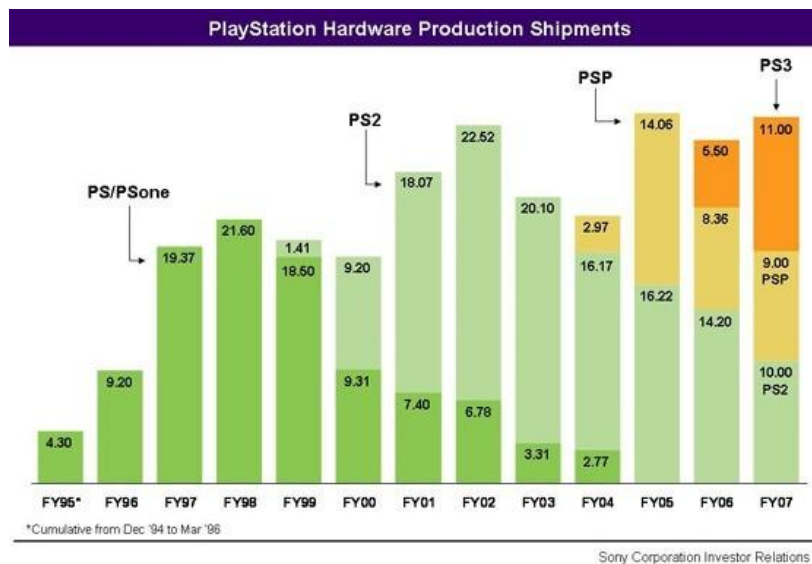


Figure 4: This graph shows yearly sales of different PlayStation released by Sony. FY04 contains sales data for full year of 2004. In the graph number of sold units is in millions. (Source: Sony Corporation Investor Relation (2021))

III. Some Statistics on Supply Chain

Before Pandemic hit:

- Supply chain management, according to 57 percent of businesses, gives them a competitive advantage that allows them to expand their operations. (GEODIS (2019))
- The factors that increased supply chain spending in 2018 are cutting costs (25%), supply chain automation (25%), and market expansion (23.7%). (Reuters (2018))
- Improving service quality, concentrating on performance management, and investing in data analytics were among supply chain businesses' top objectives in 2018. (APQC (2018))
- One of the major drivers of supply chain analytics initiatives, according to 36% of supply chain professionals, is inventory management optimization to match supply and demand. (Logility (2018))

After Pandemic hit:

- The pandemic caused minor disruption for 32% of global retailers, whereas it caused substantial disruption for 12% of shops globally. (RetailNext (2020))
- 56% percent renegotiated contracts, while 64% altered their supply chain for e-commerce. (RetailNext (2020))
- Global inventory distortion in the retail sector was severe in 2020. Out-of-stock items were projected to be worth \$1.14 trillion. There was just \$626 billion in excess inventory. (IHL (2020))
- Inventory distortion costs in the worldwide retail business were valued at \$580 million at the shop level, \$512 million at the supply chain level, and \$677 million at the manufacturer level in 2020. (IHL (2020))

IV. Conclusion

Businesses must manage the financial and operational obstacles of coronavirus while meeting the demands of their employees, customers, and suppliers as quickly as possible. Supply chain leaders can transform huge complexity and supply chain disruption into significant change by taking the proper steps.

The COVID-19 pandemic isn't merely a passing fad. It will have long-term consequences for how people work and how supply networks operate. Businesses must now establish long-term resilience in their value chains in order to manage future problems.

This necessitates a holistic approach to supply chain management. Companies must include enough flexibility in their plans to guard against future disruptions. They should also think about putting together a solid framework that includes a risk management operations capability that is both responsive and resilient.

That capability should be driven by technology, with platforms that support applied analytics, AI, and machine learning. It should also ensure supply chain transparency from beginning to end. Risk response will need to become an intrinsic element of business-as-usual practices in the long run.

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