

## Supply Chain Risk as a Barrier to Trade: A Concise Exploration

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**[Abstract]** The main purpose of this concise exploration is to probe into the supply chain risk as a barrier to trade, particularly focusing on the global supply chain aspect. Specifically, this article explores whether implementing a global supply chain enhances the possibility of supply chain disruptions and, therefore, becomes a barrier to trade. A conventional recommendation asserts that senior management must conduct a trade-off analysis to help evaluate the benefits of various supply chains versus the increase in costs due to supply chain disruptions. The structure of this article briefly presents the following components: introduction/background, global supply chain, disruption in the global supply chain, global supply chain risks, and conclusion.

**[Keywords]** supply chain, supply chain risk, global supply chain

### Introduction/Background

Since 1990, relaxation of tariffs and other cross-border restrictions, along with major advances in information and production technologies, have resulted in a major expansion of global supply chains. Consider the production process for a Barbie doll. From their introduction in 1959 until 1972, they were produced in Japan. From 1968 until 1970, they were also produced in Mexico. From 1970 until 1987, they were produced in Hong Kong. From 1970 until 1987, they were also produced in Taiwan. From 1973 until 1978, they were produced in Korea. From 1978 until 1988, they were produced in the Philippines. From 1986 until present, they are produced in China and Malaysia. From 1989 until 1990, they were again produced in Mexico. From 1992 until the present, they are produced in Indonesia (Barbie Dolls & Friends With A 1966 Date Mark, 2004-2021) (Tang, 2021). For the assembly in Indonesia and Malaysia: Barbie is designed in El Segundo, California, at Mattel's headquarters. Crude oil is refined and converted to ethylene in Taiwan. Its hair is produced in Japan. The material for its clothes comes from China. All the molds, paint pigments, and packaging are made in the United States. As mentioned, final assembly takes place in Indonesia and Malaysia. The dolls are quality tested in California to make sure they meet Mattel's standards. Once all that takes place, they are marketed around the globe (Tempest, 1996).

The story of Texas Instruments' high-speed telecommunications chip is similar. The chip was originally conceived by engineers in Sweden. The actual design took place in Nice. That design used software tools that were written in Houston. The chip itself was produced in Japan and Dallas. Once produced, the chip was tested in Taiwan (Burrows, 1995).

Consider cars "made in America." In 2017, the American car, a Ford Focus, had 40 percent of its parts made in the US and Canada with its transmission coming from Mexico. By contrast, the 2017 Honda Civic sedan had 70 percent of its parts from the US and Canada, and both its engine and transmission were made in the United States (How American Is Your Car?, 2021). In 2020, the total domestic content for US-assembled vehicles ranged from a low of 30 percent for Volvo to a high of 70.6 for GM (Made in America Auto Index 2020, 2021). The label "Made in ..." does not have the same meaning as it used to.

### Global Supply Chain

A supply chain includes all the activities involved with the flow and conversion of goods and services, along with the necessary information from raw materials to the ultimate end user. Examples of supply chain

processes include farming, mining, refining, designing, forecasting, manufacturing, quality assurance, packaging, transportation, and customer service. Since the supply chain is an integrated group of processes focusing on customer satisfaction to create value, it is the customer that pulls the products through the supply chain instead of the businesses pushing the products on the customer. During normal conditions, the supply chain can be simplified, as shown in Figure 1.

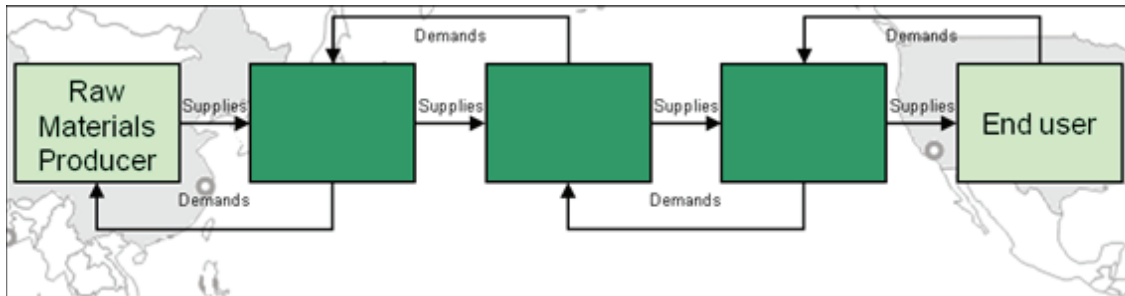


Figure 1. Regular Flow of Supply Chain

The end user continuously demands products, and the demand information travels up the supply chain until it reaches the raw materials producer. Then, the goods are transformed and moved from the raw materials stage to the end user. The complexity is multiplied in the global supply chains for products like the previously mentioned Barbie doll, the telecommunications chip, or the “American” car.

### Disruption in the Global Supply Chain

When the supply chain has a disruption, the normal conditions are no longer relevant. For example, there is a storm in the Pacific Ocean causing delays in shipments coming from China to the United States, as depicted in Figure 2. The disruption causes delays in the movement of goods to the U.S. port and for subsequent processes to the end user. The flow of demand information is altered because the delay of receipt changes the demand. All the effects from the disruption result in costly consequences to each business in the supply chain.

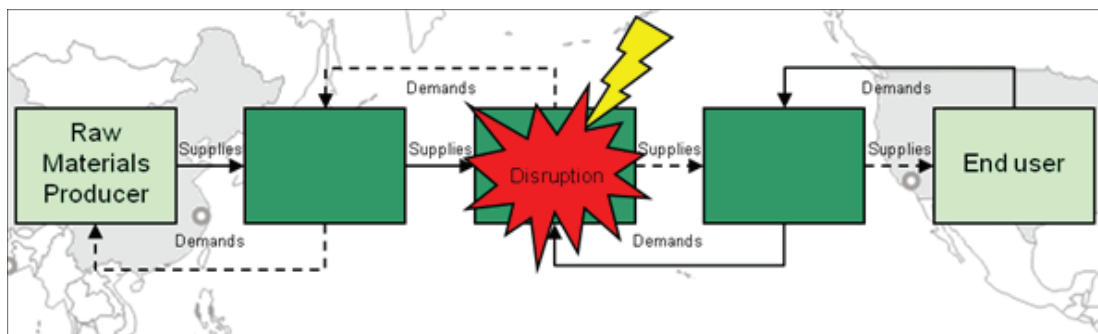


Figure 2. Disrupted Flow of Supply Chain

The global supply chain is extremely complicated since it adds the complexity of international business. Today’s global business environment means that the risk exposure to the supply chain is much larger and involves areas of the world where less news is available. As a result, senior management must have a comprehensive risk management program that, while emphasizing efficiencies, addresses a wide variety of risks as a barrier to trade.

Consider these recent costly events to the supply chain:

- In 2001, the 9/11 terrorist attacks disrupted exporting and importing to the United States. The trade of goods and services that quarter decreased 15.2 percent, and imports decreased 16.6 percent from the previous year (Davis, 2020).
- In September 2002, there was a strike at the port of Los Angeles, causing up to \$147 million per day of damages at the largest port in the United States (Kutalik, 2006).
- In Bristol, United Kingdom, a flu vaccine manufacturer experienced contamination in its processes, causing supplies to the United States to drop by 50 percent in 2004 (The Associated Press, 2004).
- On March 11, 2011, the Tohoku earthquake and tsunami that struck the northeast coast of Japan resulted in the Fukushima Daiichi nuclear disaster. This had a major negative impact on international supply chains due to the position of Japan in the global supply chains that form the back-bone of today's international trade in manufacturing (Altomonte, 2009). The supply chain disruption impacted the production of Apple, General Motors, and Peugeot Citroën, among others (Chu, 2011).
- Following a UK-wide referendum in June of 2016, the British Government formally notified the EU of their intention to withdraw from the EU. This would become known as Brexit (Brexit, 2020). The UK has more imports to and exports from the EU than any other country. The EU accounts for approximately half of both imports and exports. Many of these are intermediary products. This shows how strongly the UK is embedded in EU supply chains (Gysegom, 2019). While the impact of Brexit to supply chains is not yet know, it is expected to be large.
- COVID-19 emerged in late December of 2019 in China and rapidly spread to other countries (Li, 2020) in Asia, Europe, and North America. As a result, it was declared a pandemic by the World Health Organization (WHO) on 11 March 2020 (Remuzzi, 2020) (World Trade Organization Report, 1998). The total impact of COVID-19 and the resulting emergency measures on global trade and the world's economy remain to be seen. However, companies all over the world have faced substantial business and operational disruptions. These include everything from mitigating the effects of reduced delivery of raw materials to managing disruptions to their own logistics suppliers and the resulting hurdles in meeting their own contractual obligations to customers (Hedwall, 2020).
- On March 23, 2021, the cargo ship Ever Given became lodged in the Suez Canal due to high winds, stopping all traffic in both directions. The Suez Canal carries nearly \$10 billion worth of goods every day (Koenig, 2021). Just two days after the accident, more than 100 container ships were waiting for passage at each end of the canal (Leman, 2021).

Significant supply chain disruptions can reduce a firm's ability to produce goods and deliver services. This can reduce revenue, reduce market share, increase costs, and threaten production and distribution (Bosman, 2006). Supply chain disruptions are associated with an abnormal decrease in shareholder value of 10.28 percent (Hendricks, The Effect of Supply Chain Glitches on Shareholder Wealth, 501-522). Firms that experience disruptions report on average 6.92 percent lower sales growth, 10.66 percent higher growth in cost, and 13.88 percent higher growth in inventories and takes more than two years to recover (Hendricks, Association Between Supply Chain Glitches and Operating Performance, 2005). Companies lost more than 20 percent of their market value in the month after a supply chain disruption (Mahidhar, 2005). If the product is not what, where, when, and how the customer wants it, then the firm experiences detrimental effects.

### **Global Supply Chain Risks**

Global supply chains must all plan for the differences in economies, cultures, politics, infrastructure, and the competitive environment faced by the firm (Schmidt, 2000). Specific economic challenges include transfer prices, tax rates, duties, exchange rates, and inflation (Nelson, 1979). Political factors, including the stability of government, law enforcement, and policies, impact the supply chain structure and related costs. Infrastructural differences include available transportation modes, quantity, quality, type of documentation required, and the availability of intermediaries and facilitators. The competitive

environment creates significant challenges regarding customer service levels, anticipated cost structure, and desired profitability. Globalization has added new risks to supply chains, such as political and currency risks, cyber-attacks (including ransomware), failed communications with suppliers, timely delivery strategies, and even terrorism. Overall, global supply chains have more risk of delay with larger uncertainties.

Barriers to trade with China: As an example, China has integrated itself as a vital player in global supply chains. News reports in China have frequently reported stores of factories losing business from international companies because they failed to meet corporate social accountability standards (Lin, 2007). The most common external social accountability standard for Chinese manufacturers is SA8000, although the number of factories certified is relatively small compared to the total number of factories in China (Lin, 2007). There are two different opinions in China about the role of corporate social accountability standards in the global supply chain, and they are in competition with one another (Lin, 2007). The standards are widely viewed as either creating either a technical trade barrier in favor of developed countries or a way of entry into the global market (Lin, 2007). Furthermore, Lin (2007) unambiguously states that “Opponents criticize the protectionism, commercialization, and value-imperialism of these corporate social accountability standards. Proponents see these standards not as external pressure but as internalized values that promote sustainable growth.” China appears to be altering their system to adhere to social accountability standards, because it is a supply chain risk that dissuades businesses to involve China in their supply chain.

### Conclusion

Does implementing a global supply chain enhance the possibility of supply chain disruptions and, therefore, become a barrier of trade? Senior management must conduct a trade-off analysis to help evaluate the benefits of offshore supply chains versus the increase in costs due to supply chain disruptions.

Offshoring has its advantages and disadvantages. The main advantages of offshoring are lower costs, possibly increased revenues, and improved reliability. Manufacturers typically set up foreign facilities to benefit from low-cost direct labor, tariff and trade concessions, capital subsidies, and reduced transportation costs into foreign markets (Ferdows, 1997). Benefits include access to otherwise unavailable overseas markets and, therefore, the organizational learning by being close to customers and improved reliability due to the reduced distance to suppliers (MacCormack, 1994).

However, the experts point out that global supply chains are more difficult to manage than are domestic supply chains (Dornier, 1998). In 2005, both the Boston Consulting Group and Gartner predicated that fully half of the offshoring contracts that companies in North American firms had signed between 2001 and 2004 would fail to meet their expectations (Aron, 2005). Substantial geographical distances in these global situations increase transportation costs. However, more importantly, it complicates decisions because of inventory cost tradeoffs due to increased lead-time in the supply chain. Different local cultures, languages, and practices make clear communications difficult. They also diminish the effectiveness of business processes, such as demand forecasting and material planning. Similarly, infrastructural deficiencies in transportation and telecommunications in developing countries, as well as inadequate worker skills and education, supplier availability and reliability, supplier quality, equipment, and technology provide challenges normally not experienced in more developed countries (Meixell, 2005). Global supply chains also carry unique risks that influence their performance. These include variability and uncertainty in currency exchange rates, economic and political instability, and changes in the regulatory environment (Dornier, 1998). These difficulties reduce the degree to which a global supply chain provides a competitive advantage and, therefore, creates a barrier of trade.

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