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Supply chain disruptions and their effect on suppliers and consumers in the marketplace

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Abstract: Supply chains are essential for businesses to stay afloat and to create operational efficiency. Without them, it becomes difficult to maintain customer value and to serve with a competitive advantage. Supply chain disruptions are always expected to occur due to the demand for certain products either decreasing or increasing. In recent years, we have experienced a mass supply chain disruption that has affected businesses worldwide. The COVID-19 pandemic took the economy by storm and has changed the way business owners view the marketplace. Market uncertainty was at an all-time high, leading business owners to reassess their operations. Both consumer and supplier behaviors were changing the way these markets were fluctuating. The intensity of consumer purchasing behaviors was beginning to shift the demand curve. Localization of supply became a more seemingly popular way to counteract product shortages. The creation of new technologies will also help industries to be more prepared and manufacture products more efficiently. Furthermore, supply chains can be unpredictable, and there are many ways in which the marketplace can be ready for those moments of uncertainty. The past few years have really opened a new lens and given businesses a new point of view on what can be expected. As for now, preparing for the future is a great place to start and will help us continue a path to a successful economy. Thus, the goal of this research is to identify and explore different businesses tactics and procedures to help explore the effects of the supply chain disruptions on the public.

Keywords: supply chain disruption; competitive advantage; market uncertainty

1. Introduction

Supply chain disruptions have a way of developing frightening situations and uncertainty for businesses and consumers alike. The disruptions bring to light our dependencies on these supply chains that the public is not even aware of until the disruptions happen. During our recent history in the United States, no one would have ever imagined that grocery stores would have shelves that were empty due to a supply chain disruption. In this paper, we will be identifying and exploring different businesses tactics and procedures to help explore the effects of the supply chain disruptions on the public. We will delve into different areas such as strategic games, bargaining, getting employees and divisions to work in the firm's best interest, adverse selection and moral hazard, managing vertical relations, disruption and pricing, and strategic games.

Methodology

To capture the ways in which a supply chain disruption may impact consumers' behaviors in the marketplace, this analysis takes on a methodology that reviews a research-based approach and the ways a disruption can impact both suppliers and

consumers. This methodology seeks to explain the different approaches that both suppliers and consumers play when a disruption to the supply chain occurs. It is through this methodology that impacts on the supply chain come into perspective and how different parties involved truly are impacted.

2. Literature review

Froeb et al. [1] offer insight into how different subject matters in this paper impact the supply chain and different resources. Previous research by the Economics Observatory [2] uncovers how companies will typically set prices to ensure that they receive a profit above their cost. Research suggests that over half of consumers are responding to the shortages by choosing not to purchase “elusive products”, while price increases and delivery delays discourage buying activity [3]. With this concept in mind, Under Armour used lessons learned from the pandemic to accelerate inventory, pricing, delivery, and production initiatives to improve both efficiency and effectiveness [4].

This type of disruption has also been impacting oil prices, so much so that during COVID-19, the oil prices were hitting negative digits [5]. Prior research suggests that oil prices will increase in 2022 and 2023 due to Russia invading Ukraine. Barrels of oil will be predicted to increase from \$120 per barrel to \$150 per barrel, and research indicates that the increases in price can impact the supply chain and how goods are transported [6]. With the increase in the barrel prices, it is noted that gas prices will be increasing to close to \$5 per gallon, impacting many different sectors in the supply chain [7]. The literature review on ExxonMobil and Southwest Airlines goes into depth on how these companies do not control the gas prices and how they fear their image will be portrayed otherwise [5,8].

The research then continued to conclude how firms engage in strategic games. Strategic games investigate finding economic advantages that find the least expensive and most-productive sources of supply, and through this game, they try to secure the most profitable outcome [9]. Research provides evidence that an answer to the supply chain issues is to reform the international supply chain. This would be both costly and time-consuming and would cost firms over \$1 trillion over 5 years [10].

Further research then led to examining the Bangladesh Clothing Factory Fires, which explored the treacherous conditions that workers dealt with in those factories and how unsafe it was in those factories, and how it caused a production bottleneck when the factory burned down [10]. Duhadway [11] investigated the understanding of risk management through whether the disruptions were intentional or inadvertent in the supply chain. Additional research by Yang [12] concentrated on the relationship between manufacturer and supplier. When the two of them are using asymmetric communication, there can end up being supply distribution disruptions, and this can happen through the supplier using nonregulated backup suppliers.

It was reported in the literature how the future of the global supply chain predicts positive outcomes learned from the pandemic for certain companies and how they are using the information they learned to improve [4]. The research further examined how complications are caused by the internationality of the supply chain and the dangers of interdependence [9]. This research then led to reviewing how firms are testing to

circumvent global supply chain disruptions [10]. A morning consult article discusses how consumer spending during supply chain disruptions has changed and even ended. A previous survey was conducted to see how consumers are navigating through disruptions and the effect it has on demand [3]. Macaluso (2022) discusses how price inflation increases through the supply chain.

Finally, Wong et al. [13] discovered that “six main constructs for the enablers of alignment are identified and defined: organizational structure, internal relational behavior, customer relational behavior, top management support, information sharing, and business performance measurement system”. These methods boil down to the minimization of outside goals with the added pressure from management to align the goals of the workers to the goals of the company. Franke et al. [14] explain how the misalignment of goals may act as an inverse catalyst when meta-knowledge is centralized, thus triggering politics and reducing performance. The reduction in performance can lead to other issues outside of a company. The last part of this research goes into depth on Pervaiz’s study on goal alignment. Through this study, four main concepts were discovered as different contributors to behavior and different relationships between power and goal-setting participants [15].

3. Pricing, costs, and profits of supply chain disruption

In a supply chain disruption, suppliers and consumers may be affected by the same disruption but see different effects. When looking at pricing during disruptions, it is important to understand how pricing and demand are connected. Normally, as quantities of demand increase, it is linked to prices decreasing [16]. During a disruption in the supply chain, demand increases, but prices are not necessarily decreasing. This can be explained by understanding that if something other than price causes an increase in demand, then we restate this by stating that we experience “demand shifts” to the right, or rather “demand increases”; thus, consumers purchase more at the same price [16].

When a supply chain disruption occurs, suppliers are looking at additional costs that may affect production and other factors driving up costs, which drives up the price. Longer supply chains lend to a higher input price effect as each stage in the chain compounds the inflationary impact of both raw materials and the finished good [17]. Companies will typically set prices to ensure they receive a profit above their cost. Taking marginal costs and marginal revenue into account, companies will price according to their goals. When a disruption occurs in the supply chain, company costs increase. Companies must navigate through increasing costs to cover their costs and break even, or to increase costs above the break-even point to make a profit. A company has even more to evaluate when supply chain disruptions occur for extended periods, opposed to a short disruption that is rectified quickly.

In a situation with no disruptions, consumers tend to find more alternatives when they notice more price increases, resulting in more substitutes, causing demand to become more elastic [16]. When supply chain disruptions affect an entire industry, substitutes become fewer, and consumers look to find any option they can. When this occurs, prices tell consumers they need to slow down on consumption while telling suppliers to increase volume. During supply chain disruptions, there is less volume for

more consumers. “More than half of consumers are responding to the shortages by choosing not to purchase elusive products as price hikes and delivery delays discourage buying activity” [3]. In these situations, companies must plan and execute new ideas to increase volume and try to achieve market equilibrium. An exemplar may be observed by Under Armour when they use the lessons learned from the pandemic to adjust inventory, pricing, and production to improve efficiency [4]. By doing so, Under Armour continues to find ways to increase profits through disruptions to continue to offer products to customers. If Under Armour can find ways to increase price while also decreasing costs, they will benefit from both angles. Changes in buying will affect company profits and demand for items as well. As companies are negotiating their pricing models and increases, they must account for their industry changes and how consumers choose their buying behaviors.

4. Supply chain disruptions on a global scale

A supply chain disruption affects geographic regions differently through each occurrence. Some disruptions can be minor, while others can affect global business. Since exchange rates are controlled by supply and demand, countries must also consider what can happen to their economy during a supply chain disruption. Inflation rates can be affected by disruptions and can also cause costs to increase for companies or consumers.

4.1. Disruption on pricing

After a disruption to the supply chain, both suppliers and consumers react differently to price. One of the most recent examples of a disruption to the supply chain was COVID-19. During this time, it impacted the price through the supply chain in multiple ways. Rapier [5] discussed how a price increase is beneficial to the company, while elaborating on how over the past couple of years, the Organization of the Petroleum Exporting Countries (OPEC) has been taking actions to increase the price of oil. In April 2020, OPEC, along with a group of 23 oil-producing countries, had a huge supply cut due to the disruption in the supply chain. Covid-19 sent people into lockdown, which led to the purchase of oil as an afterthought.

With this change, U.S. oil producers saw shares plunge, and the oil prices at one point were noted to be negative [5]. One of the questions to consider when facing a supply chain disruption is: how can other countries, or even monopolists, directly or indirectly price discriminate? Rapier [5] develops an in-depth look at how President Trump at the time made a deal with both Saudi Arabia and Russia to get roughly 15 million barrels. When reviewing pricing, both countries are monopolists and would be able to price the goods sold for a higher price. Since the U.S. was in need, they would be willing to pay higher prices.

The U.S. purchased 15 million barrels of oil, which allowed them to reshape the market. Prices started increasing, and just one example of the increase would be with West Texas Intermediate. After the purchase of the 15 million barrels, their prices went from \$16.55 to \$52.00, creating a 214% increase [5]. Through 2021, the prices were seen continuing to be more of a consistent price, along with the demand steadily increasing. With the invasion of Ukraine, the United States decided to stop importing

oil from Russia. With this decision, the U.S. faced another supply chain disruption, and the oil prices soared to an all-time high. At this new all-time high, consumers started to take their anger out on the suppliers. ExxonMobil explained how consumers were pointing fingers at the wrong person. Due to the supply chain disruption and ExxonMobil's inability to influence oil prices, their prices were impacted by OPEC holding 35% of the world's oil production and the OPEC+ partnership with Russia [5].

4.2. Impact on suppliers and consumers

Something that is forecasted to impact both the oil industry and its pricing is the recession predicted to take place in 2023. Although this can disrupt the supply chain, for this industry it is predicted to increase the demand and also forecasted to struggle to keep up with the demand [6]. It is noted that gas reaching \$5 to even \$6 per gallon in some places can impact both suppliers and consumers [7]. Suppliers will be impacted by having limited goods. With the increase in oil prices, anything that needs fuel (i.e., truck, train, ship) to transport goods is at risk. This will heavily impact suppliers since they will face the challenge of transporting goods, which will impact consumers' purchases and where they spend their money. Another industry seeing this impact on oil price increases is airlines. Southwest Airlines noted that if the jet fuel prices hold the cost, they will be paying \$10 billion more than they did in 2019 [8]. Although this is just one side of the story, with these increased prices, consumers may be resistant to spending money on things they don't need since most of their spending will be put to other needs.

Consumers' reaction to increasing prices will also disrupt the market since people will likely not be purchasing wants, instead, they will only be paying for what they need. This will decrease companies' profits and will impact both consumers and suppliers in the marketplace.

5. Strategic games

Firms engage in strategic games when trying to arrange the best supply chain. The key players in industry supply chains find economic advantages as they see the least expensive and most productive supply sources [9]. However, this creates interdependencies amongst these players that have the potential to create unknown risks and vulnerabilities. They must engage in strategic games to secure the most profitable outcome. Suppliers vying for dominance in the market engage in simultaneous move games; it is disadvantageous to wait and see what competitors are doing to strengthen their supply chain. Firms must make decisions on what raw material suppliers and transportation firms to use without knowing how the rest of the market plans to perform.

6. Bargaining

The internationality of modern supply chains necessitates interdependency on suppliers and transportation globally. The recent supply chain issues created by the COVID-19 pandemic have been caused by challenges in resource acquisition and human capital shortages. They industry suppliers facing shortages, often causing interdependence amongst suppliers, seek security to promote greater international

systemic instability, leading these specific groups of suppliers to maintain a competitive advantage [9].

Suppliers are in a prisoner's dilemma; they must cooperate with rival firms to avoid widespread shortages while also making the most profitable decisions for themselves. The answer to the supply chain issues of the last few years seems to be a reform of the international supply chain. This, however, is costly and time-consuming, potentially costing a firm \$1 trillion over 5 years [10]. To gain market dominance, strategy is important. According to the strategic view of bargaining, firms are in a game of chicken with one another, and the first mover, the first to adopt a new form of supply and distribution, may have an advantage.

Nations try to maintain access to markets and resources by peaceful means such as stockpiling, direct investment in partner nations, and use of other financial incentives [9]. This can be a difficult balance to maintain, with international relations often fraught. Industry players have one of two choices: to strongly bargain or to accommodate [1]. Some resources are exclusive to certain parts of the world, so companies are forced to wait or intervene in the extraction of the raw goods or labor.

International suppliers need to navigate the hazards of internationally connected supply chains. Reaching market power allows you to consider actions that you will pursue against your competitors [1]. A country's dominance in a natural resource or factory production not only puts a burden on them but also puts them in danger of an invasion from a neighboring, less resource-rich, country (i.e., Russia's recent invasion of Ukraine).

7. Getting employees/divisions to work in the firm's best interest

Sources of supply chain issues can be natural resource deficiency, inability to move the resources, or human-caused. Skilled labor is an asset to firms, and it is in their best interest to keep skilled employees not only with the firm but also working in the firm's best interest. Supply chains are unavoidably interdependent and therefore risky for all parties. There can be an incentive conflict between firms and their suppliers. Firms want goods for the lowest possible price, and suppliers want to sell them for the highest possible price.

This can be mitigated by firms engaging in vertical integration, although this is not guaranteed to be profitable. Firms have an incentive conflict when selecting suppliers, vetting them to ensure they are providing quality goods and not overcharging. Additionally, once suppliers are contracted, they can engage in moral hazard, reducing quality or increasing wait times. This can cause a "bullwhip" effect wherein a small disruption (i.e., a human or departmental maleficence) causes an exponentially large disruption.

8. Adverse selection and moral hazard of supply chain disruption

When examining the different effects that supply chain disruptions can have on our customers or in the marketplace, we can look at both the adverse selection and moral hazard with which that industry is dealing. To be able to make the distinctions between adverse selection and moral hazards, we will first have to define adverse

selection. Adverse selection can arise when one party to a transaction is better informed than another.

Moral hazard arises when hidden actions by a person are withheld from a company making decisions involving that person's actions [1]. Another way of looking at adverse selection versus moral hazard could be whether the action or information that leads to a supply chain disruption is unintentional, which could be an adverse selection, or if something is intentional, it could be considered a moral hazard. Whether it is intentional or unintentional, this can cause disruptions in the supply chain and have definite consequences for consumers and suppliers. An example of an intentional or moral hazard that has happened is that in 2007, the Mattel toy company found that they had toys contaminated with lead-based paint.

This caused Mattel to recall these products and caused a severe disruption in their supply of these toys to their customers. Even though Mattel had appropriate controls in place to prevent hazardous materials being put into their toys, this happened anyway. The reason for this is because one of their suppliers intentionally went around their safeguards and used lead-based paint as an opportunistic cost-cutting measure. The actions of the supplier that intentionally used the lead-based paint are a moral hazard because it was the actions of them using the lead-based paint that caused the disruption in the supply chain. Even though the actions of Mattel were not intentional, the actions of the supplier that they were using were intentional, and that still caused a moral hazard [11].

A good portion of the time, suppliers that provide the products have better information about the manufacturers that they serve with products. These suppliers are going to know whether they are going to experience a production disruption, and they will have the necessary history and information that is causing that disruption, keeping in mind that many times the manufacturer will not have this information until after the disruption has happened. An exemplary disruption in the supply chain happened in March of 2007 to the Menu Foods Corp., a producer of pet food, and they had to recall over 60 million cans and pouches of cat and dog food; this included over 100 pet food brands. This happened because there were ports of pets that had died after eating the pet food. Menu Food Corp had purchased the tainted food from ChemNutra, a supplier based in the United States. What Menu Foods did not know is that ChemNutra had outsourced some of the products from a Chinese supplier, "Xuzhou Anying Biologic Technology". Due to the parent company, Menu Foods Corp., not knowing about the outsourcing and being unable to enforce quality standards, it caused them to have to recall over 60 million cans and pouches of pet food, and this was a great disruption in their supply chain [4].

9. Managing vertical relationships

Supply chain issues are especially dire for firms managing vertical relationships. For firms working with third-party services, supply chain issues can lead them to seek out new partners. For firms that have vertically integrated and control departments like production and distribution, a supply chain shortage can throw the whole operation into turmoil. To manage vertical relationships, suppliers are shifting manufacturing closer to home and chartering private container ships. Additionally, they are engaging

in “regionalization”, setting up multiple factories across regions that only serve that region. By taking this approach, a closed factory in one place only affects that region [10].

10. Goal misalignment theory and supply chain

When examining the effects of supply chain disruption and its effects on the consumer markets as well as the suppliers, an often-overlooked cause is goal misalignment within the company itself. Goal misalignment occurs when the various actors in a company or industry have goals that do not align themselves with each other. This can occur for a variety of different reasons and have lasting effects within the company. The various causes of goal misalignment can include such things as the lack of a common goal or decreased incentive to work towards a common goal. When this occurs, the supply chain can be interrupted as the company fails to be productive in their endeavors. A study conducted by Franke et al. [14] uncovers that “goal misalignment acts as an inverse catalyst when metaknowledge is centralized, triggering politics that subsequently reduce performance”. This reduced performance can lead to other issues outside of the company and cause disruptions in the market relevant to the size of the disruption at the company level and beyond.

Whether a company is an individual company producing their product completely in house or this company specializes in components that are needed for other companies, the ripple effect of goal misalignment can be seen throughout the industry. These effects are amplified exponentially when we consider that one company can have on another. If one company has reduced production capacity, this will lead to other companies who purchase their products having their production disrupted. This chain of events can cascade down the supply chain throughout all stages, from manufacturing of the product to the eventual purchasing of the product. This process can lead to the eventual consumers being left without not just one of their products, but many of their products. This causation can have the consumer market lacking not only the goods that they desire but the goods that they need to purchase to survive.

While goal misalignment is not an easy problem to spot or fix, the problem can cause a cascade of other problems that can impact numerous systems and businesses. While this may be a difficult problem to solve, in the wake of a goal misalignment crisis, Wong et al. [13] were able to identify a few key constructs. “Six main constructs for the enablers of alignment are identified and defined: organizational structure, internal relational behavior, customer relational behavior, top management support, information sharing, and business performance measurement system.” These methods boil down to the minimization of outside goals with the added pressure from management to align the goals of the workers to the goals of the company. With this added benefit, the company itself is now able to adjust their own goals to suit those of their employees to better reinforce their workforce. With a common goal and the alignment of both the company’s and employees’ overall goals, an increase in production rates can be seen. Just as with the negative effects, the positive effects of goal alignment within a company can have an exponential effect on other outside vendors and parties. As the rate of production increases due to the alignment of goals within the company, that individual company can meet and possibly exceed that quota.

This means other companies that rely on that company for components can also begin to increase their production. A study by Pervaiz et al. [15] found that goal participation, perceived insider status on mediating goal setting and employee behavior, and power distance positively encourage participation in goal achievement.

Goal alignment within a company can provide a company with strong incentives for their employees to fulfill their generalized quotas, which in return can provide stability within the supply chain. The supply chain can easily be disrupted, even by something as simple as a misalignment of goals. As a company aligns its goals, the stability of the supply chain improves, as does the overall production of the company itself.

Lastly, the strategies of “nearshoring”—moving a factory that was set up in a faraway location to near where the products are distributed and sold—or “reshoring”—moving production back to the home country [10].

11. Conclusion

The supply chain of any industry is a complex amalgamation of corporations and businesses that work together to have goods or services reach the market. These systems can be easily disrupted, which can have lasting effects on the consumer market. With each piece within the chain, there can be numerous problems that can cause the chain to stagnate and break down. These can range from moral hazards to issues managing a vertical relationship within a company to even something as simple as a misaligned goal within a company. Each of these scenarios and many more can and do affect the supply chain of any given industry at any given time. Each of these can cause a ripple effect between individual companies, reducing output or even halting production. If a product does not move from one company to another or a company to a consumer, then no profit is made. When no profit is made, one company can struggle, and another down the line can also struggle. This creates a supply disruption and can cause businesses to lose money or even shut down and leave a gap in the market. The effects of a supply chain disruption can be immediate and widespread, with each action traveling down the line. In the end, smarter business practices can help alleviate these occurrences and lead to a stronger system upon which we can all rely.

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