What If The Global Supply Chain Collapses?

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Prices are going up, some shelves are still empty, and some things seem to have simply disappeared from stores. Orders for many things are late, many stores are closing, and even critical items like pharmaceuticals and other medicines are delayed. What's going on?

Supply & Demand

Supply and Demand is the endless tug-of-war affecting all products and services related to pricing, availability, quality, and quantity. It's a delicate balance and whenever demand exceeds supply, there are impacts on the prices and availability of many goods and services.

Lessons from a Pandemic

A lot of the disruptions in the current availability and price of products can be traced to the COVID 19 pandemic. But in many ways, the price hikes and shortages point to a critical weakness in global manufacturing processes and delivery that go beyond the temporary impacts of a pandemic.

It's all related to the supply chain and some important factors that affect it, and particularly one decision that has emerged as a threat: **JIT** which stands for "Just In Time," but we'll get into more of that later.

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Supply Chain 101

The supply chain defines how a product moves from its source as a raw material to a finished product available to the consumer. It's sometimes referred to as "farm to fork." There are 7 critical steps in most supply chains. Each has various factors affecting the success of the step and all are now dependent on computer technology as a critical success

factor.

1. Raw Material Collection

Farms grow crops and raise livestock, coal and oil is mined from the ground, and trees are cut from forests. Every product begins as a raw material and both labor and climate are the most critical success factors in this first step to harvest, mine and collect these raw materials.

2. Transport

Transportation is a recurring step in the supply chain. It is done in a variety of ways including ships, trains, trucks, and sometimes by air. Equipment, fuel costs, climate and labor combine as critical success factors for any transportation and final distribution of goods in a supply chain.

3. Preliminary Processing

Processing often involves taking a raw material and turning it into a commodity or basic form that can be used by a manufacturer. These processes are usually done on-site where the raw material is initially harvested or collected, or transported to specialized plants that perform the preliminary processing. Critical success factors for this step include labor, equipment, and fuel.

- Ores and other minerals are crushed so they can be loaded into trucks.
- Fruit and vegetables are sorted and given a preliminary wash before being packed in bulk.
- Livestock are slaughtered and often delivered as full carcasses for further processing at a specialized processing location.
- Crude oil is piped or shipped to refineries.

4. Manufacturing

This is where and when the raw and processed materials are further processed, manufactured, and packaged. Some products skip this step. Produce usually goes directly to the next step, and some livestock processing is complete the first time around.

Packaged foods in bottles, cans, and boxes require this manufacturing step in addition to anything requiring any amount of assembly or refinement. Skilled labor is the primary success factor in addition to equipment and fuel.

5. Distribution

This gets back to transport and the finished product is shipped by trucks, train, ships or by air to distribution centers. Few large scale manufacturers deliver directly to retailers. Labor, equipment, climate and fuel are critical.

6. Warehousing

You may have seen large, boxy buildings occupying acres and acres of land out in the middle of nowhere. They often have parked semi-trailer trucks backed up to loading docks. Those are regional distribution centers and all manner of goods are stored there for delivery to various destinations, usually retailers. Labor is a primary factor for success.

7. Delivery

This is the final step in the supply chain. It usually involves trucks. Sometimes it’s a dedicated fleet of trucks and sometimes independent operators. This is when the final manufactured product is delivered to a retailer from a regional distribution center for sale to the consumer or customer.

Products that don't require any additional processing or manufacturing steps like eggs are delivered earlier in the supply chain, but most products that require any degree of refinement or assembly go through every step of the process. Labor, climate, equipment and fuel are critical success factors to delivery and any threats to those factors would compromise supply.

The Greatest Threat to the Supply Chain: Just-In-Time Manufacturing

Just-in-Time Manufacturing or "JIT" was a concept that originated in Japan. It was driven by the emergence of computer technologies and presented a cost-effective alternative to traditional manufacturing methods.

There was a time when manufacturers would over-produce products and simply store the excess inventory in warehouses. This would allow for any unexpected increase in demand and the excess inventory could supply enough product until more were manufactured. And then… computers showed up.

Computer technology allowed quick and instant communication. Toyota was the first to figure out that they didn't need to incur the additional labor costs and leasing to over-produce and store excess inventory.

They could streamline the process and their entire supply chain with this new level of instant communication so that every car could be manufactured and delivered –*Just-In-Time*. The whole world noticed and it has now become standard operating procedure across all manufacturing worldwide.

The Fatal Flaw

Just-In-Time manufacturing assumes that every step in the supply chain is fully operational and functioning in a normal

manner. When everything is working, JIT succeeds and products can be made and distributed in the most efficient manner possible.

But it assumes that everything in every step is not only working but working at maximum efficiency. It's a "perfect world" assumption and all of the critical success factors are subject to any number of threats affecting our perfect world.

Another curious flaw is that JIT does not seem to cope well with sudden shifts in supply and demand. It would seem that it's designed for that eventuality but in actual fact it only works in a very stable and consistent environment.

Perhaps the greatest mistake was assuming that JIT could be applied to everything. Critical goods during any length of shortages should have been exempt from JIT. This includes food, water, medicines and other materials necessary for everyday life.

Emerging Threats to the Supply Chain

This isn't just about a pandemic. COVID-19 is just one of many threats that have emerged recently, but there are others that are not only more ominous but may endure well past the day when COVID becomes another footnote in the history books.

Cyber Threats

The current global supply chain is totally dependent on computer technology to function. *Just-In-Time* manufacturing has made it the most critical success factor across every industry. Crime syndicates have figured that out and threats to cyber security continue to affect goods and services from ransomware attacks to malicious hackers to the continuing threat of cyber terrorism.

Complicating matters is that almost every critical success factor in the supply chain can be affected by cyber crimes. There's little sign that cyber threats are reducing and as they grow, the failure of the supply chain and the whole concept of *Just-In-Time* manufacturing are at risk.

Fuel Costs

Almost everything in the supply chain requires fuel. As fuel prices continue to spike, so do prices. Fuel shortages could disrupt any step in the process and any disruption in a process can cause JIT to fail. This is especially critical to transportation, affecting all forms of shipping.

Climate Change

Weather can have adverse affects on crops, cattle, ships at sea, and trucks on the road. Climate change is the driving force behind growing weather extremes and represents a greater threat to our supply chain than any pandemic.

Recent examples include the frequency and intensity of hurricanes and typhoons around the world. In many lakes and rivers, water levels have dropped, affecting inland waterways either slowing the amount of shipping or preventing it all together. It's happening from the Mississippi to the Amazon.

Another impact of climate change is the affect of oppressive heat on people who need to work outdoors, particularly field workers who see working for a low wage not worth the endurance and risk of working in dangerous and relentless temperatures.

Manpower Shortages

The pandemic is often blamed for impacts on shortages, but there has also been a major shift in the employment mindset. Many people who had never worked from home not only found it preferable to commuting but just as profitable. Even after the

pandemic has passed the mindset will remain and “Now Hiring” signs may be an everyday sign of the times.

This is having a particular impact on the availability of drivers for trucking and other transport systems, in addition to factory and warehouse workers and even clerks at retail stores. A recent report stated that trucking companies were offering new drivers $100,000 a year with full benefits and a $10,000 sign on bonus. Here again, it’s not just about fear of a virus but a shift in how some people think and feel about how and where they work.

Pandemic

COVID19 has turned the supply/demand equation upside down. The demand for some things has bottomed out while the demand for others has climbed significantly.

The demand for many food products served through food-service establishments like restaurants, hotels, and schools has gone down, but that has also reduced the supply. The result is that prices have spiked at the grocery store. This points to the chink in the armor of a JIT perfect world.

- Livestock ranchers can’t raise livestock to maturity overnight to meet a spike in demand so there’s a raw material failure leading to reduced supply.
- People are afraid to go to work resulting in manpower shortages affecting the supply of goods across the supply chain.
- The increasing number of people working from home—in addition to kids engaged in remote learning—has led to a spike in the demand for computer technology, resulting in a computer chip shortage.
- School closings also affect the demand for milk given that 40% of the milk consumed in the U.S. is through school lunches.

- The demand for computer chips has made it difficult to manufacture automobiles due to a lack of supply raising auto prices.
- Finally and inevitably, many people in the work-force contracted COVID-19. Most recovered, some struggled with long-term effects, and some died while the pandemic continues.

What's apparent is how the COVID-19 pandemic has demonstrated how fragile the supply chain is in a world that continues to move farther away from anything perfect.

What's Affected?

To put it bluntly, everything. The failure of the global supply chain would affect everything and everyone. Food would be the first resource to suffer due to the delicate nature of most foods we eat. On average, cities have 3 days of food on the shelves in their grocery stores which are restocked nightly.

- **Fresh produce** needs moisture and refrigeration quickly after harvest. Any delays in transport or distribution and the produce rots.
- **Meat products** are labor intensive at the processing stage and also require constant refrigeration or freezing. If there's a shortage of transport systems that are refrigerated or freezer equipped, or a labor shortage for any reason, meat products are at risk. This is also true for seafood, milk, and any manufactured frozen meat products. The average price for crab legs stands at $59 a pound as of September, 2021.
- **Pharmaceuticals** are manufactured around the world and shipped as a major export and import. 83% of the pharmaceuticals used in the U.S. are manufactured in China and many have a specific shelf-life. Delays in

production, transport, and distribution have already occurred and could potentially lead to shortages. Some pharmaceuticals require constant refrigeration like insulin and certain antibiotics. As the space for refrigerated shipping becomes scarce, some products won't make the trip.

- **Gas shortages** could occur, and it's not about OPEC. Tanker trucks deliver gas to gas stations and shortages of drivers with the skills to handle and transport hazardous materials are at an all-time high. Between 20% to 25% of tank trucks in the fleet are parked due to a paucity of qualified drivers, according to the National Tank Truck Carriers.
- **Commodities** from lumber to steel and even rare Earth minerals have also spiked to prices unseen in the past. And corn, wheat, and soybean prices continue to rise.

Preparing for a Supply Chain Collapse

Self-reliance and self-sufficiency are the best preparation for a collapse of the supply chain. Stockpiling will work for a period of time, but stockpiling in and of itself creates unusual demands affecting overall supply. Toilet paper shortages may be the grim lesson many of us have learned as panic buying and hoarding left shelves bare. Stockpile what you can, but eventually you may be on your own.

Gardening

The most obvious solution for many is gardening to at least supplement a food supply. How much you can garden depends on your acreage, but even 5-gallon buckets and hydroponics can allow for some degree of gardening in smaller areas.

It's quite possible that the days of flower gardens are past

as every available plot of soil becomes home to a new crop of edible fruits and vegetables.

The ability to preserve, can, and effectively store food will also be an important skill as we look to build up a personal supply to meet our personal demands.

Animal Husbandry

Chickens are the go-to choice for many. The produce not only meat but eggs and the amount of space needed both in terms of acreage and coops is relatively small. Even people in urban environments have raised chickens to some degree.

Large livestock bring greater challenges, although the amount of protein delivered may outweigh the resources needed. The most critical need is land and a suitable building, pen, or sty to keep them. Feed is another consideration in addition to water and the knowledge of how to slaughter and process the animals in addition to raising them.

The Art of Food Substitution

Chefs know this well and we all may need to start thinking like a chef. When there's a shortage or lack of one item, the challenge is to find a substitute that's available or less expensive.

The produce sections in our grocery stores look like displays in an art museum. The day may come when we have to engage in stem to root harvesting like most of Asia and Africa currently do. The fresh foods won't look as pretty, and some may be very new to us, but the nutrients are often denser than in many of the fruit and vegetable artworks we currently consume.

We could also take a lesson from vegans. They have mastered the ability to find proteins in vegetables and other substitutions for dairy products across plants in nature.

Did you know that the leaves around a head of cauliflower have more calcium than a glass of milk? Think about that the next time you trim off those cauliflower leaves and toss them.

And remember that certain beans have more protein and amino acids than a steak. Shortages have been with us before, but if they choose to stay, we may need to think more creatively about how and what we eat.

Other Shortages to Come

Rather than generate a list of everything that could be in short supply (and it could be everything), consider some questions that make something vulnerable to a supply chain failure.

- Is this product locally produced or grown, or did it come from some distance away?
- If it came from some distance, how far? The next state? The next country or the other side of the planet?
- Is this a commodity meaning it's common and perhaps more likely to be available, or is this unique and potentially going to increase in demand or cease to be available?
- If something critical broke, could you fix it instead of replacing it And what would you need in terms of equipment and supplies?
- Is there anything I might need "someday" that I should buy today while I still can?
- Think about anything that you can't live without. For most of us, that includes food, water, medical supplies and for many, pharmaceuticals for chronic conditions. If you can't live without it, figure out how you're going to get it when it's gone.

From Just-In-Time to Just-In-Case

It’s hard to know exactly how many things may become too expensive to buy or simply unavailable. With so many challenges emerging in the world on so many fronts, the questions surrounding the supply chain may seem like just one more item to add to the list.

What’s ominous is that all of those other things that are currently happening from climate change to labor shortages will most directly affect the supply chain. Without a steady supply of the things we need, we are left with only demand.

If the past is any indicator, unmet demand often leads to famine, unrest, and war. It may be time to say goodbye to *Just-In-Time* and continue a mindset designed around preparation, sustainability, and self-reliance—just in case.

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