



ECOSOC: Economic and Social Council

Student Officer: Barış Gürel

Issue: The issue of managing global supply chains during COVID-19

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Committee: Economic and Social Council (ECOSOC)
Issue: The issue of managing global supply chains during COVID-19
Student Officer: Barış Gürel – Vice President

I. Introduction

In simple terms, a supply chain is the system of processes followed to meet the product or service with the customer. An example supply chain may include the following elements: manufacturer, distributor, wholesaler, retailer, and customer. A lack of communication between these rings of the chain or a malfunction directly affects the time it takes the product to reach the customer. Covid-19 crisis brought the issue of maintaining and managing these supply chains effectively and finding alternative solutions to what companies have been accustomed to do.

As the Covid-19 pandemic started to spread very quickly between people, nothing was certain about what would happen and what needed to be done to survive the situation with the least impact on the world. The effects of the crisis were so severe that the IMF reported that the impact of Covid-19 on the global economy was at least as severe as the 2008 crisis which was the worst economic crisis after the Great Depression back in 1929 (Fonseca and Azevedo)¹. Given the nature of the virus, face-to-face communication amongst people was extremely difficult and thus the need for alternative solutions for supply chains emerged. Shopping centers were closed and markets were open only at certain designated times. This had a significant and rapid impact on how people were buying items. Online shopping became much more popular and this benefitted local and international cargo companies.

The Covid-19 crisis showed the lack of resilience and flexibility that global supply chains have. The main problem that arises when trying to maintain these supply chains is the dependence of nations on each other, mainly China and other large producer countries. In February 2020, for example, the Finance Minister of France publicly told French businesses to find solutions to decrease their dependence on China.² Such recommendations were made in other countries as well.

¹Fonseca, Luis Miguel, and Americo Lopes Azevedo. "COVID- 19: Outcomes for Global Supply Chains." *University of Porto*, 2020, pp. 424–438.

² "UPDATE 1-France Urges Business to Rethink Supply Chains As Coronavirus HITS Asia." *Reuters*, Thomson Reuters, 21 Feb. 2020, www.reuters.com/article/china-health-france-idUKL8N2AL3KZ.



II. Involved Countries and Organizations

United Nations (UN) Covid-19 Supply Chain Task Force

The issue that UN Covid-19 Supply Chain Task Force (UNCSCTF) focuses on is the inaccessibility and shortage of essential supplies as a result of the negative impacts of the pandemic on global supply chains. The task force is managed by WHO (World Health Organization) and WFP (World Food Programme) and these organizations are responsible for pinpointing the lack of supplies in certain regions and responding to the needs promptly. Apart from this, the task force is also responsible for ensuring the participation of private and public parties to help meet the needs. As the main source of the problem is the lack of transportation of these essential supplies, the task force is also designated to ensure the transfer of these important supplies and cargo. The task force has played a key role in the areas such as advocacy, promotion, treatment, research and surveillance. The task force and its members were responsible for socio-economic effect assessments of Covid-19, starting and developing social media campaigns, ensuring that the salaries of health workers are paid promptly, conducting regular surveys on the effect of Covid-19 on small and medium businesses, and supporting people in poverty with social support payments.

In the last 18 months, UNCSCTF worked to improve the issue in numerous areas. WFP delivered 35,000 cm³ of cargo to over 150 countries around the world. LTAs³ have been established to ensure the maintenance and continuation of supply chains, which was crucial in this period. The LTAs mainly covered the production and delivery of PPE including surgical masks, respiratory devices, goggles and gloves. Approximately 15 million test kits were delivered, which consisted of automatic and manual tests. These were some of the activities that UNCSCTF was involved in during the last 18 months and improvements in numerous other areas have also been made.⁴

World Health Organization (WHO)

WHO is a specialized agency of the United Nations concerning global public health and healthcare. As its main role, WHO informed the public about the pandemic. The organization made the necessary warnings to countries regarding Covid-19. WHO also played a role in managing the supply chains as a

³ LTA can be defined as Long Term Agreements

⁴ World Health Organization, and World Food Programme. "Supply Chain Task Force Notes for the Record." United Nations, 1 Sept. 2020.



co-chair of the UN Covid-19 Supply Chain Task Force.⁵ It was responsible for ensuring the sufficient supply of medical products to all countries and also the maintenance of the pre-existing medical products.

World Food Programme (WFP)

WFP is the agency of the UN responsible for dealing with world hunger. As the disruptions in supply chains caused shortages of food supply, WFP undertook a very active role in maintaining the transportation of food to the ones in need. WFP collaborated with local NGOs and WHO to provide food where it was needed. WFP is also responsible for policy support to governments, mainly to LEDCs such as Bangladesh, Cote d'Ivoire and the Philippines.⁶ WFP also collaborated with UNICEF to help 1.3 billion children who were out of school during Covid-19. The collaboration helped students in poor countries who were dependent on school meals through providing rations and cash.⁷

China

China is the largest manufacturer in the world. A great portion of high and low tech products are manufactured in China due to the low cost of labor. As a result, China has a significant 28.7% share in global manufacturing output according to a 2019 report prepared by the United Nations Statistics Division.⁸ It can reasonably be said that there is a heavy dependence on China in the manufacturing of goods.⁹ Connecting this with the fact that Covid-19 started in Wuhan, China; there was a huge threat to the supply chains from the country. Not only did the production of goods slow down during this period, but the transportation of these goods from China was negatively affected as well.

United States of America (USA)

The United States (US) -China trade war that started in 2018 exacerbated over time. Both countries put tariffs on each other, hurting the global economy. While discussing solutions to overcome the issue of supply chains, such political relations between countries should thus be carefully considered to come up with realistic and efficient solutions. The high dependence of the US private sector on Chinese manufacturing makes the already difficult pandemic situation worse for the US side. The US imports a significant amount of medication and PPE from China. Once the Chinese manufacturing of PPE and

⁵"How Who Is Re-Imagining and Fixing the Links in the Supply Chains during Covid-19." *World Health Organization*, World Health Organization, www.who.int/news-room/feature-stories/detail/how-who-is-re-imagining-and-fixing-the-links-in-the-supply-chains-during-covid-19.

⁶ "COVID-19 Pandemic: World Food Programme." *UN World Food Programme*, www.wfp.org/emergencies/covid-19-pandemic.

⁷ <https://www.wfp.org/school-health-and-nutrition>

⁸"UNdata | Record View | Gross Value Added by Kind of Economic Activity at Current Prices - National Currency." *United Nations*, United Nations.

⁹Woetzel, Jonathan, et al. McKinsey, 2019, pp. 1–153, *China and the World*.



medication was blocked as a result of the pandemic, the US experienced a shortage in these supplies as the country imported most of these products from China.¹⁰ As this was the case for most other products, US companies had to find alternative supply chains, which slowed the workflow of American companies. Whilst online and Internet-based companies weren't negatively affected by the pandemic, some industries requiring physical contact including transportation and retail were severely affected by the situation.

European Union (EU)

The EU has played a key role in maintaining supply chains during Covid-19 and collaborated with WHO and WFP to supply regions in need with medical supplies and food.¹¹ However, the EU has significantly restricted and controlled the export of PPE to outside countries. The EU requires a license which is obtained after extensive control and checks for PPE to be produced and exported. As being the largest PPE exporters in the world along with China and the USA, this significantly limited the access to PPE in other countries, especially third world countries which are the importers of PPE.¹²

International Labour Organization (ILO)

Founded in 1919 and being the first and oldest special agency of the United Nations, the ILO aims to ensure the well-being of workers around the globe and improve the working conditions of workplaces. During Covid-19, The ILO was responsible for assisting governments to improve their trade agreements and laws to ensure the implementation of necessary adaptation of rules and regulations to satisfy ratified international labour standards. The ILO also played a key role in managing global trade during the pandemic. It called for the protection of food and medical product trade during the pandemic as these products were vital for survival. To minimize the effects of supply chain disruptions in maritime trade, the ILO collaborated with governments in adopting necessary exemptions from travel restrictions to ensure the continuation of global trade without disruptions.¹³

¹⁰ Friedberg, Aaron. "The United States Needs to Reshape Global Supply Chains." *Foreign Policy*, 8 May 2020, foreignpolicy.com/2020/05/08/united-states-reshape-global-supply-chains-china-reglobalization/.

¹¹ "European Union Supports WFP Operations to Transport CRITICAL COVID-19 Relief: World Food Programme." *UN World Food Programme*, www.wfp.org/news/european-union-supports-wfp-operations-transport-critical-covid-19-relief.

¹² "Export Controls and Export Bans over the Course of the Covid-19 Pandemic." *Federation of German Industries (BDI)*, 29AD.

¹³ International Labour Organization. "The Effects of COVID-19 on Trade and Global Supply Chains." International Labour Organization, June 2020.



III. Focused Overview of the Issue

The concept of supply chains is essentially the need for the collective production of parts to produce a final product. In a globalized world, it is almost impossible for a manufacturer to produce every single component of a product by itself. As these manufacturers are involved in a collective production process, there is a crucial need for logistics as these parts need to be transported and assembled. Disruptions in these supply chains slow down production significantly. As a result, companies cannot profit and consumers cannot access the goods. An example of this is the shortage of toilet paper in the early Covid-19 period as the accessibility of this product decreased as a result of the disruptions in the supply chains. This changed consumer behavior and resulted in the over-purchase of the product.¹⁴ Similar examples can be given as disruptions in supply chains caused similar impacts on many industries.

Global supply chains can be thought of as webs of products and materials between countries. These products and materials come together to form a single, final product. Thus, a problem or a disruption in one of the points of this web is likely going to cause problems such as the delay of the final product and the lack of the quantity of the final product. These disruptions were very frequent during Covid-19 period, as the transportation and production of products was negatively impacted. The first and main part of the problem arose when employees were not able to be physically present in the factories. This had a severe effect on the manufacturing processes. Many industries had to work online and the number of employees within the production sites were strictly limited. According to a report published by ILO, 93% of the manufacturing sites experienced some form of closure, indicating that physical production was negatively impacted during this period.¹⁵ This situation decreased the production rate, eventually causing a lack of supply. Another perspective of the issue was regarding the transportation of products. Many countries, including the world's largest economies USA, China and the EU, implemented trade restrictions and closed their borders. As a result, the transportation of goods slowed and production of the end products were delayed. One example of such products can be Apple's Iphone. The product requires parts from 63 countries to be assembled. The design is made in Cupertino, California and the assembly is mainly made in China. To further exemplify, Apple buys their OLED (Organic Light Emitting Diode) displays from Samsung, located in South Korea. They also outsource their processor manufacturing to TSMC (Taiwan Semiconductor Company).¹⁶ A disruption in one of these suppliers, which was the case for a majority of the companies during Covid-19, prevented the final product from being manufactured and caused delays.

¹⁴ *How the CORONAVIRUS Created a Toilet Paper Shortage ...* cnr.ncsu.edu/news/2020/05/coronavirus-toilet-paper-shortage/.

¹⁵ International Labour Organization. "ILO Monitor: COVID-19 and the World of Work. Seventh Edition Updated Estimates and Analysis." 25 Jan. 2021.

¹⁶ mpetrova92. "We Traced What It Takes to Make an Iphone, from Its Initial Design to the Components and Raw Materials Needed to Make It a Reality." *CNBC*, *CNBC*, 14 Dec. 2018, www.cnbc.com/2018/12/13/inside-apple-iphone-where-parts-and-materials-come-from.html.



1. Shortage of PPE (Personal Protective Equipment) & Diagnostics Equipment

Personal Protective Equipment needed during Covid-19 can be listed as face masks, full face shields, gloves, etc. As the need for PPE significantly increased during the Covid-19 period, the production of these products had to be raised to meet the expanded need. In figure 1.2, a production and demand graph of N95 masks in the USA can be seen. Factories extended their working hours and hired more workers, and governments licensed more companies, allowing them to produce masks and other PPE.

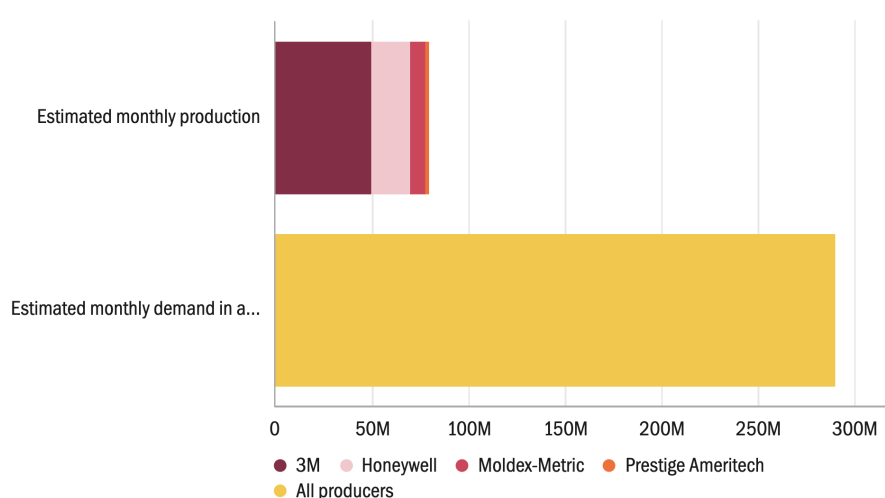


Figure 1.2: Estimated monthly production of N95 masks and the monthly demand for N95 masks in the US.
Source: US Department of Health and Human Services.¹⁷

Given the fact that China is the largest exporter of PPE, the disruption in the Chinese supply created a severe shortage of PPE in the world.

Diagnostics equipment are testing devices used for detecting Covid-19 cases. The increased need for these equipment dominates the already disrupted supply chains and other testing devices experienced a shortage in many laboratories.¹⁸

2. Some Developments and Solution Attempts

The UN Covid-19 Supply Chain Task Force was mainly responsible for locating the regions where medical supplies and food are needed. It was essential for this task force to allocate enough supplies to regions in need. To do this, efficient and fast communication between the task force and local governments

¹⁷Gereffi, Gary, and Gary Gereffi is Emeritus Professor at Duke University. "Increasing Resilience of Medical Supply CHAINS during the COVID-19 Pandemic." *Industrial Analytics Platform*, iap.unido.org/articles/increasing-resilience-medical-supply-chains-during-covid-19-pandemic.

¹⁸"Supply Shortages Impacting COVID-19 AND Non-Covid Testing." *ASM.org*, asm.org/Articles/2020/September/Clinical-Microbiology-Supply-Shortage-Collecti-1.



was crucial. As of 31 December 2020, UN Covid-19 Supply Chain Task Force has procured over 1 billion\$ of PPE diagnostics equipment and biomedical equipment as can be seen in Figure 1.3.

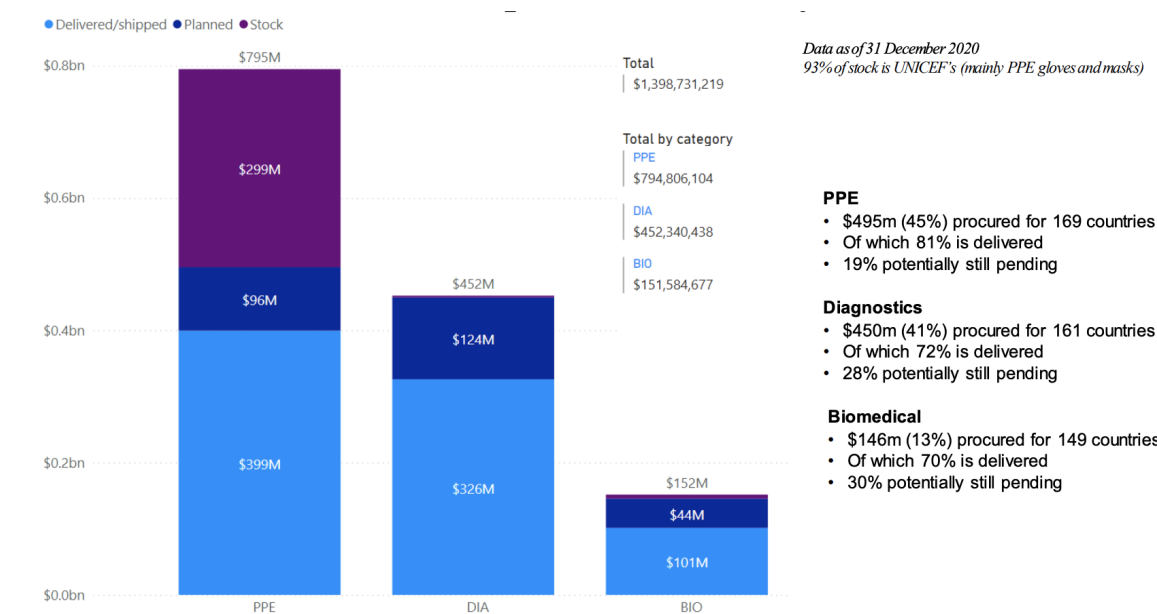


Figure 1.3: The UN Covid-19 Supply Chain Task Force procurement statistics as of 31 December 2020.

Source: "Covid-19 Supply Chain System Assessment Executive Summary." The Yellow House, 26 Feb. 2021.¹⁹

Another aspect of the issue is the import and export of food. As food production and trade involves human labour, the risks of spreading the virus through these products is not negligible. To exemplify, Russia is the main exporter of China's seafood supply. It was reported that a batch of salmon, imported from Russia, tested positive.²⁰ Similar cases were seen across the world. To tackle the issue, food companies tried to work in ways to have the products delivered in fully sealed, cold chain containers, instead of bulk carriers, which was the case for the China-Russia example.

The fact that governments had to regionalize instead of globalize as they were doing prior to Covid-19 period, inevitably required extra effort to shift their industrial portfolios. For example, European countries saw that they were importing roughly 80% active components for drug supply from China, India and other East Asian countries.²¹ As a result, these countries are now shifting to regional production of drug components and other products. The effects of the results of these policies will be seen in the future.

3. Shortage of Microchips

¹⁹"Covid-19 Supply Chain System Assessment Comprehensive Analysis." *The Yellow House*, The Yellow House, 26AD, pp. 1–268.

²⁰ Times, Global. "Fears over Supply Chain from Covid-19 Cases in Imported Russian Seafood." *Global Times*, www.globaltimes.cn/content/1208564.shtml.

²¹ Cordon, Carlos. "The Future of the Supply Chain in a Post-COVID World: IMD Article." *IMD Business School*, IMD Business School, 5 May 2020, www.imd.org/research-knowledge/articles/A-post-COVID-19-outlook-The-future-of-the-supply-chain/.



Microchips are the small computers responsible for the management of electronic devices. The applications of microchips range from smartphones to home appliances and therefore necessary for the production of almost all electronic devices. As a result of the high demand and lack of production and supply during Covid-19, many industries suffered from the shortage of microchips.

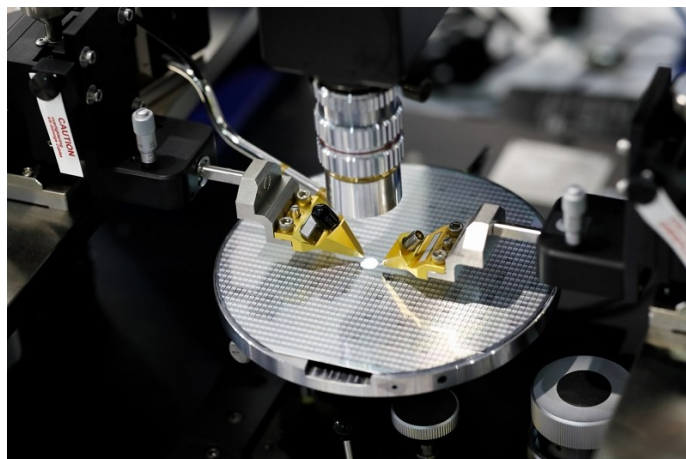


Figure 1.4: A process in the production of a microchip at one of the largest microchip producers, Taiwan Semiconductor Manufacturing Company (TSMC)

Source: Tzu-ti, Huang. "Challenges Facing Taiwan's Semiconductor Industry: Taiwan News: 2020-07-08 16:58:00." *Taiwan News*, Taiwan News, 8 July 2020, www.taiwannews.com.tw/en/news/3962573.²²

As the largest producer of microchips, East Asian countries lost \$2.1 trillion in revenue.²³ To resolve the issue, US President Biden sought \$37 billion in funding to increase microchip production in the US.²⁴ Nevertheless, microchip shortage still damaged American companies such as Ford, which failed to produce over a million cars due to the lack of microchip supply. Other automakers including but not limited to Nissan, Volkswagen, Honda experienced similar issues. Another aspect of the issue was the tech war between US and China, which increased the negative impact of the disruptions in supply chains on the shortage of microchips.

²² Tzu-ti, Huang. "Challenges Facing Taiwan's Semiconductor Industry: Taiwan News: 2020-07-08 16:58:00." *Taiwan News*, Taiwan News, 8 July 2020, www.taiwannews.com.tw/en/news/3962573.

²³ Campbell, Charlie. "Impact of Coronavirus on China's Economy Only Just Beginning." *Time*, Time, 21 Apr. 2020, time.com/5824599/china-coronavirus-covid19-economy/.

²⁴ Hunnicutt, Trevor, and Nandita Bose. "Biden to Press for \$37 Billion to Boost Chip Manufacturing amid Shortfall." *Reuters*, Thomson Reuters, 24 Feb. 2021, www.reuters.com/article/us-usa-biden-supply-chains-idUSKBN2AO13D.



V. Key Vocabulary

Supply Chain: A supply chain is the system of processes followed to meet the product or service with the customer. An example supply chain may include the following elements: manufacturer, distributor, wholesaler, retailer, and customer.

Global Economy: This term refers to the close relationship between singular, international economies. As these relations get more dependent on each other, a more unified, global economy is created.

Manufacturing: Manufacturing is the process and/or the series of processes followed to produce a product from its raw materials.

Dependence: In economic terms, dependence refers to the reliance of countries on each other. For instance, the Western reliance on Chinese manufacturing is an example of economic dependence.

Shortage of supplies: As the global supply chains were disrupted due to Covid-19, essential medical, food supplies were not able to be transported across countries. Such products include surgical gloves, test kits, drugs, and medicine.

V. Important Events & Chronology

Date (Day/Month/Year)	Event
31 December 2019	First Covid-19 cases were identified in Wuhan, Hubei Province.
13 January 2020	The first case outside China was reported in Thailand.
30 January 2020	WHO held a Member State briefing to provide more information about the outbreak.
2 March 2020	The Russian Federation put temporary export bans on PPE and medical equipment which was effective until 1 June 2020. ²⁵
3-7 April 2020	The USA implemented export restrictions of PPE and medical equipment for the purpose of allocating scarce resources for domestic use only. ²⁶

²⁵"COVID-19: Measures Affecting Trade in Goods." WTO, www.wto.org/english/tratop_e/covid19_e/trade_related_goods_measure_e.htm.

²⁶National Archives and Records Administration, National Archives and Records Administration, trumpwhitehouse.archives.gov/presidential-actions/memorandum-allocating-certain-scarce-threatened-health-medical-resources-domestic-use/.



8 April 2020

The UN COVID-19 Supply Chain Task Force was formed.

VI. Past Resolutions and Treaties

A/C.2/75/L.10/Rev.1: Towards a New International Economic Order (11 November 2020)

<https://undocs.org/A/C.2/75/L.10/Rev.1>

This resolution mainly aims to ensure that financial institutions and member states are implementing policies that improve the liquidity in the financial system. The increased efforts on development cooperation and collaboration were the focus of this resolution

A/RES/75/17: International cooperation to address challenges faced by seafarers as a result of the COVID-19 pandemic to support global supply chains (1 December 2020)

<https://undocs.org/en/A/RES/75/17>

This resolution focuses on minimizing the effects of Covid-19 on global trade, especially maritime trade, through urging governments to take necessary measures to ensure the resilience of the supply chains and the well-being of trade personnel.

VII. Failed Solution Attempts

As Covid-19 started to disrupt supply chains and cause shortages, companies started to order more supplies than they actually needed. This caused supplier companies to not be able to meet the demands. When companies started to order excess amounts of supply to guarantee the functioning of their own company, other companies or regions in need were not able to access these supplies. As a result, there was a significant shortage of supplies. Overbuying was a solution for companies in the short term, yet this failed.

VIII. Possible Solutions

One of the problems that emerge during economic crises like Covid-19 is panic buying due to a shortage of supplies. This mainly occurs because of the disruptions in supply chains. The customers of the suppliers are aware of the shortage and thus buy an excessive amount of supplies from the suppliers to keep their organization/production going. These buyers often order supplies from multiple suppliers and when this is done by multiple mass buyers, the already existing supply shortage worsens, in the end



creating the lack of that very supply in the market. An example of this is the panic buying of toilet paper. To avoid such panic buying, the suppliers should first be aware that the orders they receive are panic orders. Not to run out of supplies, the suppliers may choose to ration supply according to the customer's past orders. For instance, if the customer orders triple the amount of what they used to order, then, the supplier should understand that these are panic orders and take measures accordingly.

Since reacting to supply needs is crucial during Covid-19, the supply chains had to be very flexible. If one supplier couldn't supply the sufficient quantity and quality of products on demand, those needs could not be met. To improve the flexibility of supply chains, it is of great importance to have strong communication with each element of a supply chain. Additionally, having more possible suppliers of a product significantly increases the resilience of a supply chain. Following these measures will likely lead to a more flexible and efficient supply chain. Another measure to take into account is not having all the supplies from a single region. For example, 95% of surgical masks and 70% of masks with ventilators that are produced in the USA are outsourced.²⁷ Meaning that the components required to produce these products come from locations outside the USA. This is very normal as in globalized economies, such complex and international supply chains do exist. However, the main concern here is that a significant portion of these components come from China. The heavy dependence on China is in fact not very favorable. This is because if a disruption in the Chinese supply occurs, then the products can't be produced anymore. In Covid-19, when China closed its borders, many manufacturers around the world were negatively affected as they did not have suppliers from diverse regions. It is therefore essential to diversify the geographical locations of the suppliers and not be dependent on a single region.²⁸

The stockpiling of PPE and other medical equipment is also a solution to building more resilient supply chains. The lack of stockpiling before Covid-19 is one of the reasons for the shortages in PPE and medical equipment.

Governments may foster regional producers to restore their manufacturing. This is because off-shoring causes longer and more complex supply chains, which are much weaker in disruptions. Engaging in regional production (if possible) makes the risks posed by the disruptions of supply chains much less severe.²⁹

²⁷ Simonite, Tom. "How Decades of Offshoring Led to a Mask Shortage in a Pandemic." *Wired*, Conde Nast, 29 Mar. 2020, www.wired.com/story/decades-offshoring-led-mask-shortage-pandemic/.

²⁸ Kilpatrick, Jim, and Lee Barter. "COVID-19: Managing Supply Chain Risk and Disruption." *Deloitte*, 2020.

²⁹ https://unctad.org/system/files/official-document/osg2020d1_en.pdf pg72



IX. Useful Links

- [UN COVID-19 Supply Chain Task Force](#) (detailed information about Supply Chain Task Force)
- https://unctad.org/system/files/official-document/osg2020d1_en.pdf (Covid-19's impact on global trade)
- <https://www.oecd.org/coronavirus/policy-responses/covid-19-and-global-value-chains-policy-options-to-build-more-resilient-production-networks-04934ef4/> (solution options for a more resilient supply chain)
- <https://link.springer.com/article/10.1057/s42214-020-00074-6> (policy recommendations for the disruptions in supply chains)
- https://www.researchgate.net/profile/Luis-Fonseca-12/publication/346035107_Fonseca_Azevedo_2020_COVID-19_GSCMMKCS15424-438/links/5fb79fe8a6fdcc6cc64f7ba9/Fonseca-Azevedo-2020-COVID-19-GSCMMKCS15-424-438.pdf (an analysis of the impacts of Covid-19 on supply chains)
- <https://www2.deloitte.com/global/en/pages/risk/cyber-strategic-risk/articles/covid-19-managing-supply-chain-risk-and-disruption.html> (supply chain risk and disruption)
- <https://hbr.org/2020/05/as-covid-19-disrupts-global-supply-chains-will-companies-turn-to-india> (India as an alternative supplier region)
- <https://hbr.org/2020/09/global-supply-chains-in-a-post-pandemic-world> (article about making supply chains more resilient)
- https://interagencystandingcommittee.org/system/files/2020-05/COVID-19%20SupplyChainTaskForce_28.04.2020.pdf (information about UN Covid-19 Supply Chain Task Force)
- [China and the world Full report June 2019](#) (McKinsey report on Chinese economy and trade)
- <https://www.cnbc.com/2020/09/29/5-charts-show-how-the-us-and-chinese-economies-depend-on-each-other.html> (American dependence on China)
- <https://www.who.int/news-room/feature-stories/detail/how-who-is-re-imagining-and-fixing-the-links-in-the-supply-chains-during-covid-19> (WHO's role in managing supply chains during Covid-19)
- [https://www.europarl.europa.eu/RegData/etudes/STUD/2021/662903/IPOL_STU\(2021\)662903_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2021/662903/IPOL_STU(2021)662903_EN.pdf) (Impacts of Covid-19 on EU industries and economies)
- https://www.jhsph.edu/research/affiliated-programs/johns-hopkins-drug-access-and-affordability-initiative/publications/Pandemic_Supply_Chain.pdf (a report on Covid-19 and its impact on supply chains)
- <https://cnr.ncsu.edu/news/2020/05/coronavirus-toilet-paper-shortage/> (Covid-19 and shortages in supplies such as toilet paper)



- <https://iap.unido.org/articles/increasing-resilience-medical-supply-chains-during-covid-19-pandemic>
(improving the resilience of medical supply chains during Covid-19)

X. Works Cited

Campbell, Charlie. "Impact of Coronavirus on China's Economy Only Just Beginning." *Time*, Time, 21 Apr. 2020, time.com/5824599/china-coronavirus-covid19-economy/.

"COVID-19 Pandemic: World Food Programme." *UN World Food Programme*, www.wfp.org/emergencies/covid-19-pandemic.

"Covid-19 Supply Chain System Assessment Comprehensive Analysis." *The Yellow House*, The Yellow House, 26AD, pp. 1–268.

"European Union Supports WFP Operations to Transport CRITICAL COVID-19 Relief: World Food Programme." *UN World Food Programme*,

"Export Controls and Export Bans over the Course of the Covid-19 Pandemic." *Federation of German Industries (BDI)*, 29AD.

Fonseca, Luis Miguel, and Americo Lopes Azevedo. "COVID- 19: Outcomes for Global Supply Chains." *University of Porto*, 2020, pp. 424–438.

Gereffi, Gary, and Gary Gereffi is Emeritus Professor at Duke University. "Increasing Resilience of Medical Supply CHAINS during the COVID-19 Pandemic." *Industrial Analytics Platform*, iap.unido.org/articles/increasing-resilience-medical-supply-chains-during-covid-19-pandemic.

How the CORONAVIRUS Created a Toilet Paper Shortage ...
cnr.ncsu.edu/news/2020/05/coronavirus-toilet-paper-shortage/.

"How Who Is Re-Imagining and Fixing the Links in the Supply Chains during Covid-19." *World Health Organization*, World Health Organization, www.who.int/news-room/feature-stories/detail/how-who-is-re-imagining-and-fixing-the-links-in-the-supply-chains-during-covid-19.

Hunnicut, Trevor, and Nandita Bose. "Biden to Press for \$37 Billion to Boost Chip Manufacturing amid Shortfall." *Reuters*, Thomson Reuters, 24 Feb. 2021, www.reuters.com/article/us-usa-biden-supply-chains-idUSKBN2AO13D.



- International Labour Organization. "ILO Monitor: COVID-19 and the World of Work. Seventh Edition Updated Estimates and Analysis." 25 Jan. 2021.
- International Labour Organization. "The Effects of COVID-19 on Trade and Global Supply Chains." International Labour Organization, June 2020.
- Kilpatrick, Jim, and Lee Barter. "COVID-19: Managing Supply Chain Risk and Disruption." *Deloitte*, 2020.
- mpetrova92. "We Traced What It Takes to Make an Iphone, from Its Initial Design to the Components and Raw Materials Needed to Make It a Reality." *CNBC*, CNBC, 14 Dec. 2018, www.cnbc.com/2018/12/13/inside-apple-iphone-where-parts-and-materials-come-from.html.
- Simonite, Tom. "How Decades of Offshoring Led to a Mask Shortage in a Pandemic." *Wired*, Conde Nast, 29 Mar. 2020, www.wired.com/story/decades-offshoring-led-mask-shortage-pandemic/.
- "Supply Shortages Impacting COVID-19 AND Non-Covid Testing." *ASM.org*, asm.org/Articles/2020/September/Clinical-Microbiology-Supply-Shortage-Collecti-1.
- Times, Global. "Fears over Supply Chain from Covid-19 Cases in Imported Russian Seafood." *Global Times*, www.globaltimes.cn/content/1208564.shtml.
- Tzu-ti, Huang. "Challenges Facing Taiwan's Semiconductor Industry: Taiwan News: 2020-07-08 16:58:00." *Taiwan News*, Taiwan News, 8 July 2020, www.taiwannews.com.tw/en/news/3962573.
- UNdata | Record View | Gross Value Added by Kind of Economic Activity at Current Prices - National Currency." *United Nations*, United Nations.
- "UPDATE 1-France Urges Business to Rethink Supply Chains As Coronavirus HITS Asia." *Reuters*, Thomson Reuters, 21 Feb. 2020, www.reuters.com/article/china-health-france-idUKL8N2AL3KZ.
- Woetzel, Jonathan, et al. McKinsey, 2019, pp. 1–153, *China and the World*.
- World Health Organization, and World Food Programme. "Supply Chain Task Force Notes for the Record." United Nations, 1 Sept. 2020.