

The Ukraine War Effect on Global Supply Chains

And what may be next

Ed Lindoo, Ph.D.
3333 Regis Blvd.
Denver, CO 80221-1099
303-964-6358
elindoo@regis.edu

Abstract

Supply chains have long been known for their resiliencies, however, today they are being tested in uncommon ways. Be it the COVID pandemic which nearly shutdown strategic supply chains globally, to the Ukraine War in 2022. The war has put Europe on its heels in terms of energy consumption, or lack thereof, as Russia is not supplying fuel, to the grain exports from Ukraine, affecting just about all countries around the world. One of the more eye-opening issues that came from this research is the fact that there are 7.6 million Tier 2 supplier relationships with Russian entities globally. In fact, there are more than 374,000 businesses, 90% of which are in the United States relying on Russian suppliers. With all the current sanctions, one can see many challenges. Another issue we see is the fact that Ukraine, prior to the war, exported 26% of the world's wheat supplies, with their ports blocked by Russia, something they no longer are able to do. Finally, we look at what affect a war with Taiwan might have on global supply chains.

Keywords *COVID, Supply-chain management, Dynamic capabilities, Sustainability, Environmental uncertainty, Ukraine War, Taiwan, semiconductors, Supply chain capabilities.*

Introduction

Supply chains are once again being tested, this time by the Russian war with Ukraine. As a result, disruption to upstream suppliers in Russia and Ukraine will further weaken global supply chains. A recent Dun & Bradstreet report entitled "[Global Business Impacts: Russia-Ukraine Crisis](#)," cites that nearly more than 600,000 businesses worldwide rely on Russian and Ukraine suppliers, and over 90% of those are based in the US. (Dun and Bradstreet, 2022)

Russia's invasion of Ukraine has exposed several geo-political fault lines: a breakdown in supply chains, inaccessibility of critical raw materials, and an impending commodity crisis. Little known to the world prior to the invasion, Russia and Ukraine are among the largest

commodity-exporting nations in the world. These two countries control crucial natural gas, oil, metals, and agricultural commodities on a global scale. They also act as vital lifelines for the European economy. Because of this, and as the war goes on, it creates significant implications for Europe's energy supply, as well as present food security issues for many countries (Dun and Bradstreet,2022).

Background

Looking further into this, we find that Russia and Ukraine together, account for 59% of global sunflower oil exports, 36% of global iron or non-alloy steel, and 26% of global wheat exports. However, among the most pressing vulnerabilities, is an overreliance in

Europe on natural gas and crude oil from Russia, as well as dependence on both Russia and Ukraine for key agricultural commodities. A 2022 Deloitte report noted that The Food and Agriculture Organization of the United Nations, backed up the D&B report, that Russia and Ukraine account for more than 26% of the world's trade in wheat and more than 59% of global sunflower oil, and also mentioned, 30% of global barley exports come from Ukraine. It is not just oil and agricultural commodities that are under

elements (including palladium), 13% of titanium, and 11% of nickel. Another little-known fact is that Russia is a major source of neon which is used for etching circuits on silicon wafers. There is already a widely known shortage of computer chips around the world, and a shortage now of neon only exacerbates the problem. Further, Palladium is a critical component of catalytic converters for cars and has climbed as much as 80% in price since the war started just six months ago. And because of the Ukraine conflict, LMC Automotive has cut its forecast of light

Chart 1 - Distribution of businesses in Ukraine and Russia



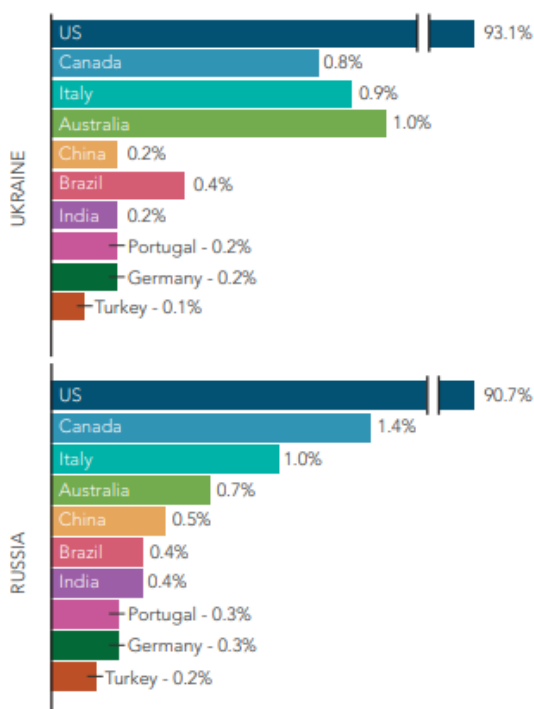
Source: Dun & Bradstreet

stress. As Deloitte noted in a recent report, "The principal reason that Russia plays above its weight is that it is a major exporter of some of the world's most important commodities." First and foremost, Russia is a significant source of many of the 35 critical minerals that the US Department of the Interior (DOI) considers vital to the nation's economic and national security interests. But with the new sanctions on Russia, most if not all of this is cut off, not only from the US but much of the world. This includes 30% of the globe's supply of platinum-group

vehicle sales in Europe by 2 million units a year over the next two years. Think about that! 2 million less cars over the next two year. That is a big impact to the automotive industry from manufacturing to sales. What many people do not realize is the interconnectedness of economies and businesses which has both been exacerbated by the growing supply chain crisis and to some extent, has masked it. According to Dun & Bradstreet, there are fewer than 15,000 Tier 1 suppliers in Russia. However, if one digs a little deeper you find that there are 7.6 million Tier 2

supplier relationships with Russian entities globally. In fact, there are more than 374,000 businesses, 90% of which are in the United States relying on Russian suppliers. It is interesting to note that in Deloitte's most recent annual survey of chief procurement officers, 70% believed they had good visibility into risks in their Tier 1 suppliers, however, only 15% had the same confidence about Tier 2 and beyond. (Kilpatrick, 2022). In a previous paper we saw a similar pattern of unknown tier two suppliers in China as a result of the COVID pandemic.

In the chart below we can see the distribution by country of businesses that have suppliers in Ukraine and Russia (Tier 1 & Tier 2)



Source: Dun & Bradstreet

With all the sanctions, among which is Russia cutting off gas supplies to Europe, the big question in everyone's mind is "can Europe survive without Russian energy in the short- and long-term?" The brief answer is NO, not in the short-to-medium term anyway because as the crisis worsens, Europe's energy security will

represent a key risk to markets. The threat or reality of supply disruption to hydrocarbon flows has already led to an increase in prices and will continue to do so. Because global energy markets are already tight, there is little chance of making near- to medium-term substitutions. Even though energy continued flowing from Russia to Europe at the height of the Cold War, Germany has taken action against the Nord Stream 2 gas pipeline, impacting 30 billion metric cubes of gas expected to enter the continent in 2022. Because of this, natural gas will need to be sourced from the U.S., Qatar, Saudi Arabia, or the UAE. However, most of these countries do not have capacity to increase production on an immediate basis, and most of their supply is already earmarked for trade or domestic consumption. With winter fast approaching, this has put all of Europe in a precarious situation (Sharafedin, 2022).

According to Gas Infrastructure Europe (GIE) Aggregate Gas Storage Inventory (AGSI) data, the European gas storage levels were critically low at around 33% of capacity as of February 25, 2022, exacerbating the situation. Shortly thereafter, European countries came together and passed a resolution to get their gas storage levels at or above 70% going into winter. As of August 1, 2022, these countries are on track to reach a gas storage filling target by the start of this winter, but the cost of replenishing stocks will be over 50 billion euros (\$51 billion) which is 10 times more than the historical average of filling up tanks for winter (Sharafedin, 2022).

While perhaps the fuel situation has been taken care of, at least short-term, the conflict in Ukraine has disrupted the country's agricultural production, and significantly decreased the flow of food from the Black Sea. This has caused the prices of food to increase as the global supply of grain remains low due to the lack of shipping from the Black Sea. In fact, Russia has on-again

off-again blocked the grain shipments and when they have agreed to let the grain move, they have bombed the port (Schwartz and Solomon, 2022).

Ukrainian Resources

Because Ukraine is considered the "breadbasket of Europe," everyone knew that an invasion would result in the food supply chain getting "hit hard," and it did.

China due to pandemic concerns, are the huge events that disrupted global supply chains in 2022 (Green, 2022)

To make matters worse, it appears that Putin is actively adopting policy similar to that of Joseph Stalin and Adolf Hitler, which is based on "hunger politics". Basically, Putin is preparing to starve much of the developing world as the next stage in his war in Europe." The plan

Rising agricultural prices

Jan 1, 2022=100



Source, Chicago Mercantile Exchange

As show above, Wheat, Soy and Corn all shot up immediately after the war started. We now see that Russia's invasion of Ukraine, the implementation of sanctions on Russia, as well as more shutdowns in

centers around controlling Ukraine's grain exports via a Russian naval blockade presently preventing Ukraine from exporting grain. If the Russian blockade continues, tens of millions of tons of food will rot in silos, and tens of millions of



Grain set on fire by Russian troops, July 2022

people in Africa and Asia will starve. And if that were not enough, Putin's troops are now burning wheat crops as fast as they can (Barba 2022).

The Future

The pandemic of 2020 and the invasion of Ukraine has certainly opened eyes and made companies very aware of their Tier-1, Tier-2 and even Tier-3 suppliers. Even as Russia was building up forces during November and December of 2019, not many were concerned. Even today (August 2022), with the China threat of invading Taiwan, there does not seem to be an outpouring of concern. Yet, Taiwan is a very strategic country not only to the U.S., but also around the world. Presumably, it is really not a matter of if China will invade Taiwan, it's a matter of when. If that happens, there will be a huge impact around the world. Part of the reason for this is that Taiwan dominates the global industry of semiconductors, which are critical components used in everything from smartphones and medical devices to cars and fighter jets. In fact, Taiwan accounts for 92% of world-wide semiconductor production. Lose this and the price of everything from smartphones to TVs, to cars and more will all skyrocket, if available!

We've already seen a sample of this because of a shortage of chips for automobiles. As Tucker (2022) explained, today's cars may contain as many as 150 tiny processors, controlling everything from engine timing to turn-by-turn directions. The COVID pandemic of 2020, caused the automotive industry to lose much of its supply of these chips early in 2020. This happened because the pandemic triggered travel restriction as well as demand for new cars. Automakers then trimmed their production plans and reduced their orders for new microchips. However, chip factories did not slow down because consumer demand became much

higher as workers stayed home and went on electronics buying sprees. When lockdowns began to lift, automakers tried to spool up their chip orders only to find that factories were too busy to accommodate them (Tucker, 2022).

Conclusion and recommendations

Recently, Chinese President Xi Jinping described the reliance on foreign technology as the "greatest hidden danger" facing the country and pledged to increase its self-sufficiency. However, starting up a new chip factory is not quick, nor easy. This may be why China seems hell-bent on taking over Taiwan. Not only would it give them instant access to this technology, but it would also cripple the rest of the world in terms of advanced technology.

Now especially is the time for not only companies, but countries as well, to start managing the risks they have in our global supply chains. As Kilpatrick (2022) pointed out, one needs to ensure risk management frameworks and systems are in place. That is focus on risks in the extended supplier network and in relation to the supply and inflationary pressures on key commodities. To do this, we can use technology to understand the risks in Tier 2 and beyond. As earlier discussed, on the surface Russia does not seem to be as critical to complex global supply chains as other nations, such as China. However, the picture is much different when you look beyond direct suppliers where we found 7.6 million Tier 2 supplier relationships with Russian entities.

Once we have determined our vulnerabilities, we need to find and activate alternative sources of supply. Onshoring and "friend-shoring" should be taken into consideration. As a result of the COVID-19 pandemic there is already momentum building to reshape global supply chains with a more regional, if not local, structure. Bringing supply chains

home can offer governments and companies more control and remove the volatility of foreign dependence. Onshoring isn't always possible so "Friend-shoring," or the reorchestration of critical supply chains by swapping risky foreign suppliers with close allies and partners, may be an alternate solution (Kilpatrick, 2022).

Updating inventory policy and planning parameters for critical materials is also a must. Establishing a policy for "strategic stock" of critical materials should be an essential component of a company's overall inventory policy. "Being short just one component, such as a wiring harness made in Ukraine, can stop production of an automobile." (Kilpatrick, 2022).

Often overlooked is logistics constraints and costs, which need to be constantly monitored. We now see record-high ocean freight rates, and the inability to move freight trains in and out of Russia, Ukraine and Belarus. In other words, a backup plan is essential. Cyber security can also be a big challenge especially if one is successfully attacked. Preparedness is essential to avoid disruption in operations, such as regional conflicts like we have seen with the Ukraine war. Bottom line, for most companies and countries, global scenario planning is a must.

References

- Aljazeera (2022). Why China is not sanctioning Taiwan's key chip industry. <https://www.aljazeera.com/economy/2022/8/4/why-china-is-not-sanctioning-taiwans-crucial-tech-industry#:~:text=For%20the%20most%20advanced%20semiconductors,security%20can%20hardly%20be%20overstated.>
- Barba, V., Trapnell, O., and Walters, J. (2022) Ukraine: Putin's 'horror' next phase of war to destroy lives of tens of millions. *Express*.
- Dun and Bradstreet (2022). Global Business Impacts: Russia-Ukraine Crisis. <https://www.dnb.com/perspectives/russia-ukraine-impacts-global-supply-chain.html>
- Green, R. (2022). How sanctions on Russia will alter global payments flows. *Carnegie Endowment for International Peace*. <https://carnegieendowment.org/2022/03/04/how-sanctions-on-russia-will-alter-global-payments-flows-pub-86575>
- Kilpatrick, J. (2022). Supply chain implications of the Russia-Ukraine conflict. *Deloitte Insights*. <https://www2.deloitte.com/us/en/insights/focus/supply-chain/supply-chain-war-russia-ukraine.html>
- Schwartz, M. and Solomon, E. (2022). Russia strikes Odesa port, stirring doubts on deal to export grain. *New York Times*, <https://www.nytimes.com/2022/07/23/world/europe/ukraine-russia-odesa-grain-attack.html#:~:text=ODESA%2C%20Ukraine%20%E2%80%94%20A%20string%20of,grain%20through%20Black%20Sea%20routes.>
- Sharafedin, B. (2022). European gas storage on track to meet target but at a cost. *Reuters*, <https://www.reuters.com/business/energy/european-gas-storage-track-meet-target-cost-2022-08-04/>
- The New Voice of Ukraine: Russian troops burn crops in Ukraine with incendiary rounds, trying to create global food crisis. <https://english.nv.ua/nation/russian-troops-burn-crops-in-ukraine-with-incendiary-rounds-50255187.html>
- Tucker, S. (2022). Is the end of the chip shortage in sight? *Kelley Blue Book*. <https://www.kbb.com/car-news/is-the-end-of-the-chip-shortage-in-sight/>