

Challenges to the supply chains in the context of COVID-19 pandemic

Gabriela Ioana ENACHE

Bucharest University of Economic Studies, Bucharest, Romania
enachegabriela15@stud.ase.ro

Abstract. *Global supply chains have been an important factor in changing the organization of the global goods production and global economy.*

The pandemic has also brought negative effects on global supply chains, as we have seen a shortage of workforce and transport systems (maritime, air, land), while demand for mandatory products, such as sanitary ones, was rising. The blocking of supply chains has also affected the process of economic recovery, unbalancing the production sector, and fueling inflation.

During this time, the European Union's reliance on the foreign imports it had both before the pandemic and after periods of trade imbalance, were brought to light, considerably amplified. Increasing autonomy has been a necessity of these conditions, and in order to optimize the resilience of its supply chains, the European Union is applying politics aimed at a wide diversification of suppliers, development of internal capabilities, support for a multilateral business environment based on a set of well-defined rules, and a good cooperation with the United States of America.

The study carried out an in-depth analysis of relevant literature in order to identify the challenges for both the member-states of the European Union, and for other states such as Japan, the United States of America, South Korea, and Australia in terms of imbalances in the supply chains and dependencies on imports from China. We also identified the best practices and measures adopted during the pandemic that led to major trade imbalances.

The research questions to which this study provides detailed answers to are: "How has the COVID-19 pandemic affected global supply chains?" and "What measures were taken globally in order to overcome the imbalances caused by the pandemic?"

This study offers a clarification on the situation of global supply chains and brings, in the same analysis, a series of good practices and strategies to solve supply chain blockages and reducing the dependency on foreign exports that most states had before the pandemic.

Keywords: supply chains, global economy, global production, pandemic, European Union

Introduction

Global supply chains have been an important pillar in the development of modern economy, where goods are produced using technologically advanced methods. In the current production process, pieces from many parts of the world are being utilized to create high-quality, low-cost goods, which are then distributed through international supply networks. Apple company is such an example, as in the year 2020 it had 204 suppliers, in 43 countries (Apple, 2020).

The development of a global economy has supported the internationalization of supply chains through the adoption of technologically advanced solutions, the removal of trade barriers, the liberalization of investment, and the transformation of Asia into the main center of global production. Global supply chains are made up in large part of multinational enterprises (MNEs), but also from a multitude of small and medium-sized enterprises (SMEs).

According to data published by the World Bank, the main products distributed through supply chains are cars and appliances. The regions specializing in the production of these goods

are Europe, North America, and East Asia. To support the production process, regions such as Africa, Latin America and Central Asia supply goods that are later included in an advanced production process.

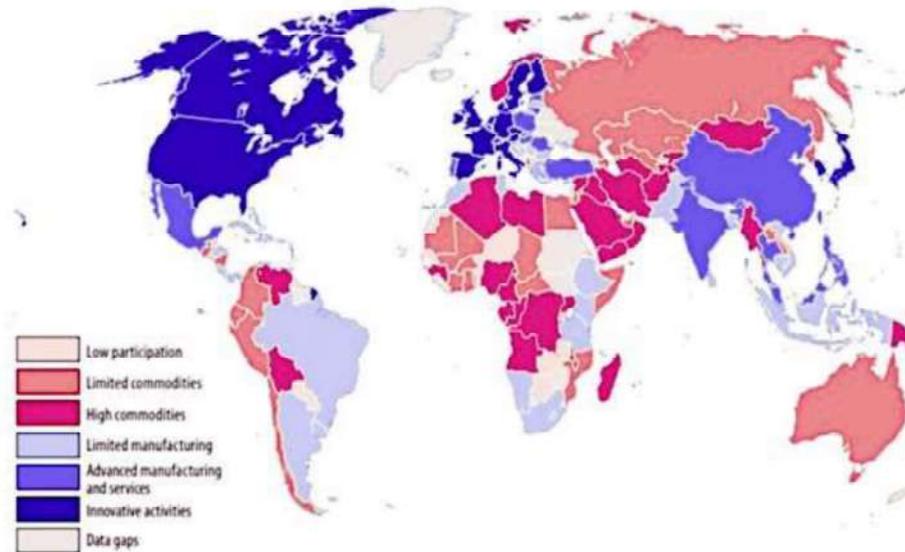


Figure 1. The main products distributed through supply chains

Source: <https://www.worldbank.org>.

In February 2020, the Organization for Economic Cooperation and Development (OECD) confirmed that the level of integration of international production chains is still at a satisfactory level, but compared to the pre-COVID-19 health crisis, it has decreased due to the negative effects it had on investments. Cross-border investments and restrictive measures have slowed down international trade.

The health crisis may have created long-term negative effects, as experts believe that global supply chains could remain on a downward trend due to the fact that countries such as China have undergone a profound paradigm shift. China, like the rest of the world, was under heavy traffic restrictions and has had to produce more for its internal markets, and create more domestic or regional supply chains. This model remained standing even after the traffic restrictions were relaxed. Developing countries have become more economical and environmentally friendly following wage increases brought by the integration of the latest technologies to automate production processes and Artificial Intelligence systems.

The future transformations of global production come from the growing emphasis on research, innovation and development, in terms of supply chains and global value chains. Countries that are reorienting towards an innovation-based model and investing in a highly skilled workforce will be one step ahead of everyone.

Literature review

Following the specialized literature analysis, I will make a synthesis of the main common approaches and best practices adopted both in the European Union and in other countries such as: Japan, the United States of America, South Korea and Australia in terms of on increasing the resilience of supply chains and limiting dependence on foreign exports: creating public policies to

increase the resilience of supply chains and reduce potential risks, relocation, diversification and reorganization of supply chains to address pandemic-generated crises, financial incentives, subsidies, and government investments in strategic sectors, public-private partnerships and an increase in judicial security, creating risk-monitoring programs and increasing transparency.

Methodology

The research questions asked are of an exploratory nature that require a qualitative study, following which I can provide the appropriate answers: "How has the COVID-19 pandemic affected global supply chains?", and "What measures have been taken globally to overcome the imbalances caused by the pandemic?". Therefore, following a systemic review of the literature where I used official reports, scientific papers, and studies published by representatives of governments and other public institutions, I provided answers that cannot be formulated on the basis of quantitative research.

During this study, my goal was identifying the main challenges that supply chains had to overcome since the beginning of the pandemic, as well as the measure that the countries mentioned above had to take in order to eliminate the blockages.

Results and discussions

How has the COVID-19 pandemic affected global supply chains?

The COVID-19 pandemic has profoundly unbalanced global supply chains due to traffic restrictions, leading to the temporary disruption of trade and logistic activity. In February 2020, after the virus had long since crossed China's borders, the activity of European factories was interrupted due to restrictions, which then led to a significant economic contraction.

Although the worst economic crisis was recorded at the beginning of the pandemic, a short while after, in the third quarter of 2020, we recorded the greatest recovery, as the GDP of the European Union and the total trade of goods at an international level have risen sharply. The health crises that followed this period did not affect the supply chains with the same intensity, thus managing to stabilize much faster. The rapid pace of economic recovery has taken many companies by surprise, as they have underestimated the scale and pace of the recovery from the crisis.

During periods of economic recovery, companies struggled to meet customer demand for various goods to which access had been restricted during quarantine periods. However, the services sector did not fully recover, as zonal restrictions still persisted based on vaccination rate or the incidence of COVID-19 cases per capita, which led to factory closures and blockages of air, sea, or land traffic. According to a survey conducted in 2020, the COVID-19 pandemic had a major impact on supply chains, which led to a limitation of cross-border transport. The results of the survey look like this:

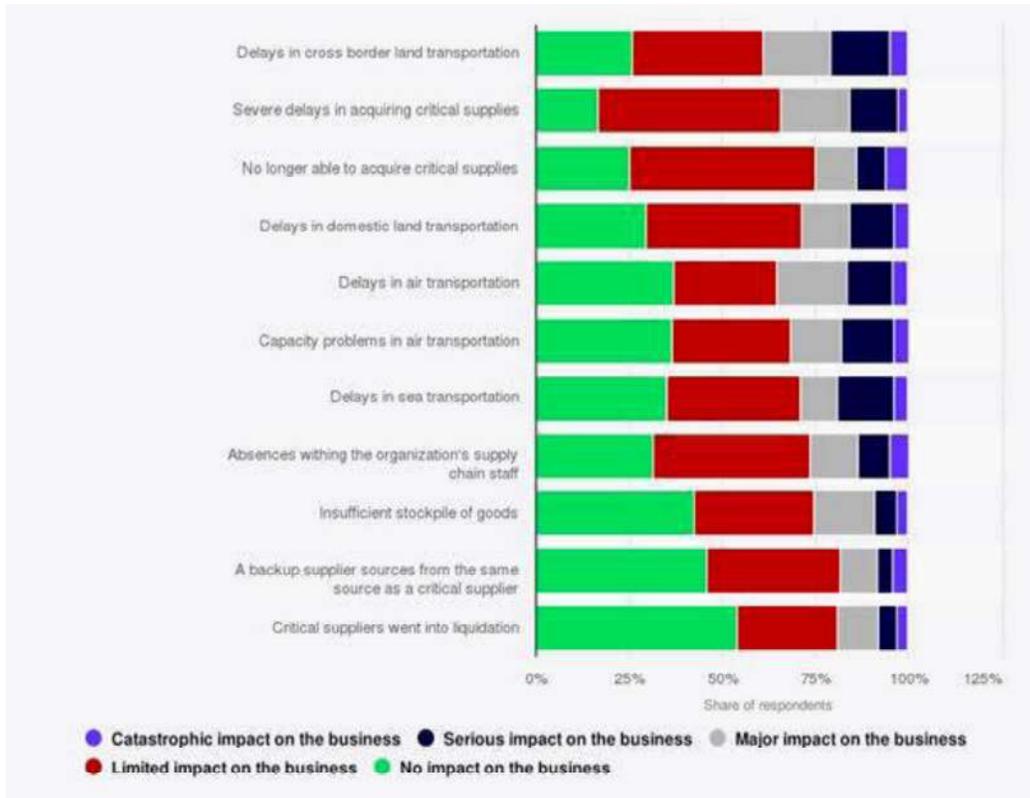


Figure 2. The impact of the COVID-19 on supply chains

Source: <https://www.statista.com>.

By blocking supply chains along the Asia-European Union and the United States corridor, most companies, regardless of their production domain, have faced a substantial shortage of parts. According to statistics, 2 out of 5 European producers had to reduce their production due to a shortage of materials and equipment (European Commission, 2021). When demand grew exponentially, there was a major imbalance that affected the entire transport system, from the price of containers to roadblocks along the way, and the shortage of workers and drivers.

The price of containers has risen significantly, both globally and on the most important corridor between China and North Europe, as shown in the following chart:

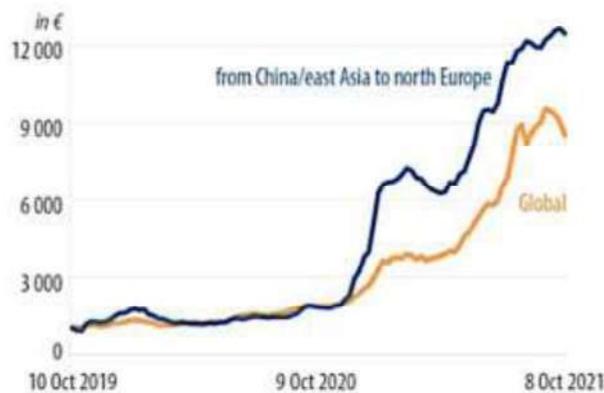


Figure 3. Container shipping prices

Source: Freightos data.

When it comes to maritime transport, the space inside container vessels is limited and the number of fleets is also small. Companies do not have the capacity to supplement their fleets in a significant and fast way, and port overcrowding, where ships can wait even for a week, is a problem that's even more difficult to manage.

The European Union's dependence on foreign imports of goods came to light when supply chains were disrupted. When the whole production process was blocked due to material shortages, exports decreased and the negative effects also affected the trade balance. Currently, experts are discussing two options in terms of the raising prices. Some believe that the current rise in prices is temporary, while others believe that the global economy is heading for an inflation that will persist for a long time to come. As long as supply chains operate without interruption, they generate disinflationary effects on the economy, but in periods of imbalance they become the core of inflation. The darkest forecasts also call into question the scenario of a stagflation where prices will explode due to a demand that cannot be satisfied as a result of supply rigidity. Economic erosion occurs when central banks raise interest rates.

The findings of a large study conducted by the Federal Reserve Bank of New York show that the pandemic has produced a structural imbalance, where supply chains produce inflationary effects that are felt throughout the economy. Also, we cannot predict whether the blockages will be fixed in the near future or will continue for an indefinite amount of time (Amiti et al., 2021).

Political answers and expert opinions

Public policies could be a first step towards adopting resilience measures through which some of the risks currently facing supply chains can be eliminated. A remodeling of the supply chain structure through relocations, diversification and reorganization could address some of the problems caused by the pandemic. To support these steps, measures must be taken such as: financial incentives, subsidies, government investment in strategic sectors, and public-private partnerships.

In order to create a stable environment and increase the resilience of global supply chains, a judicial security program is needed that includes both trade and investment sectors, creating rules that can be applied to the entire international trading system. With the help of public funding, the supply chains of companies from strategic sectors can be supported in several ways:

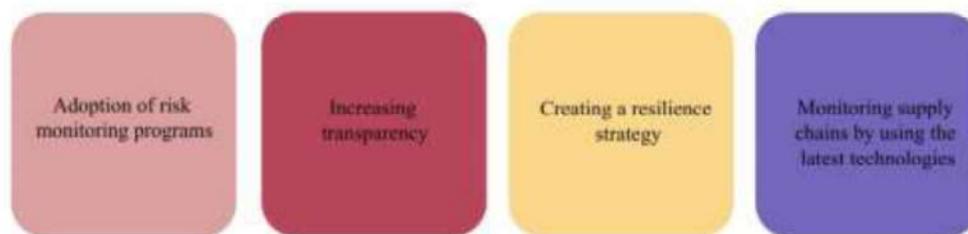


Figure 4. Ways to support supply chains

Source: Created by author.

With regard to the public sector, authorities can support supply chains through vulnerability management programs to identify weak point and risk management programs in order to receive early warning signals. Representatives of public authorities can support the system through a constant review of regulations, taking into account the multitude of risks. When a roadblock occurs, a more flexible and agile system allows for a faster comeback. For example, the simplification of border processes and the reduction of customs duties on critical goods can support the streamlining

of traffic. Also, public authorities can opt to financially support certain, more costly measures, such as building alternative factories and diversifying stored products to develop much more resilient supply chains.

According to the Organization for Economic Cooperation and Development (OECD), financial support from public authorities to increase the resilience of supply chains can be achieved in two ways. First, by creating a simplified procurement strategy and eliminating disruptions in the supply chain. In order for these measures to be carried out, there is a need for increased cross-border transparency regarding the availability of essential goods, prices, contracts and risk management arrangements. Second, disruptions to the flow of goods must be eliminated by simplifying cross-border transactions, improving purchasing power, (especially in small states) and facilitating the exchange of goods through joint procurement and loan agreements and regional or bilateral standardization of procurement processes.

Good collaboration between the public and private sectors must be based on a clear division of responsibilities in order to easily overcome a possible supply chain blockage. By creating a communication platform, public-private partnerships can be built, companies can send suggestions on improving the system, strategies can be devised to improve responsiveness, and as long as responsibilities are clearly divided, blockages in the supply chain can be more easily overcome.

*What measures have been taken globally to overcome the imbalances caused by the pandemic?
Actions of the European Union*

The resilience of supply chains was an important issue even before the pandemic, and the transfer to a green and digital society and economy was part of the European Union's strategy. In 2020, the European Commission stated in its Trade Policy Review that the European Union is working to strengthen an open strategic autonomy by strengthening the resilience and sustainability of its supply chains and economy (European Commission, 2021).

The study called "The Digital Decade and European Autonomy", conducted by the European Parliament in 2021, highlights the idea that by increasing the resilience of the supply chains, the European Union can maintain its autonomy. The European Union has always supported multilateralism and open trade, but has also emphasized its ability to operate independently (Codagnone et al., 2021).

In the study "The Digital Decade and European Autonomy" published in October 2021, the European Parliament emphasized the idea that supply chain resilience is one of the pillars on which the European Union's autonomy is based. According to the European Commission's General Trade Department, the European Union has always supported and will continue to support open trade and multilateralism, but will also maintain its independence.

From the European Commission's report on "Dependencies and Strategic Capabilities" of the European Union, I have identified two strategies through which the resilience of the supply chains can be supported. First and foremost, the European Union, by diversifying its import sources and meeting the demand for certain goods, can strengthen its presence in global value chains, thus eliminating the possibility of blockages or disruptions. Secondly, the European Union needs to develop deep multilateral cooperation and coordination mechanisms. Cooperation between the G20 and the World Trade Organization (WTO) could support supply chains through constant monitoring, which would reduce roadblocks along the way.

In May 2021, the European Commission came up with an update on its Strategy on the European Union's strategic dependencies and capabilities. What is new is an analysis of the European Union's strategic dependencies, where 5200 imported products were analyzed. Of these,

137 products come from foreign imports vital to the European Union. At least 34 of the above products fall into the category of vulnerable products due to the lack of alternative importers. Half of the products imported by the European Union come from China (52%), Vietnam (11%) and Brazil (5%).

Both the “Dependencies and Strategic Capabilities” report and the “Trade Policy Analysis” contain a number of common guidelines to increase the resilience of supply chains and access to global markets. This can be achieved by developing a partnership with countries outside the EU. At the same time, trade policy aims to support European Union companies to start from the same level in global competition. Thus, there is a need for measures such as: elimination of unfair practices and better enforcement of current trade agreements. (European Commission, 2021).

The European Union can also increase the resilience of supply chains by strategically storing crucial goods and expanding domestic production. At the moment, industrial alliances at EU level, together with key projects of common interest, support a strong industrial development. A positive example of an industrial alliance is the European Raw Materials Alliance, which was launched in 2020 to support raw material-value chains to overcome the challenges they were facing.

The "Industrial Strategy" launched in March 2020 contains calls for the creation of an industrial alliance to make the transition to a green and digital economy. It is also extremely useful to create a strategy to more easily manage crises in strategic sectors and supply chain blockages. This can be done by supporting international partnerships and developing alternative solutions, such as reserve stocks (Renda, 2021).

Public procurements by the European Commission lead to increased resilience in supply chains, strengthened resilience of industrial ecosystems and reduced dependencies. This also supports the European Union's transition to a green and digital economy.

With a high degree of vulnerability, SMEs need the support of public authorities to meet the challenges of blockages, which are often extremely costly. Measures to increase resilience and diversify supply chains must be taken in order to overcome these crises. A real help is the Enterprise Europe Network platform, which aims to support SMEs in reducing their vulnerabilities and disruptions, diversifying their offer through new partnerships. The European Commission is considering financial support for the creation of a new workforce that will develop the skills needed to increase internal capacity.

Measures taken on the world stage

In the following, I have drawn a parallel between the national and international actions of the countries in the European Union regarding the resilience of supply chains and the other states occupying a high position in the ranking of the "Index of economic complexity", where 146 countries were analyzed. The position in the ranking is related to the number and complexity of the exported products.

The United States

At the beginning of the pandemic, the United States financially supported supply chains with incentives worth \$ 2.2 trillion. At the same time, the US government has implemented the "Defense Production Act" through which the president receives extended authority over the private sector to deal with crises during the pandemic, such as deficiencies in the healthcare sector.

Both the president at that time, President Donald Trump, and his successor, Joe Biden, financially supported the medical supply chains and sought to reduce dependence on foreign

sources as much as possible. Among the first projects undertaken by President Joe Biden at the beginning of his term is a detailed analysis of vulnerabilities and risk of the supply chain aimed at creating a strategy to increase resilience. Finally, in June 2021, a report resulted in the ranking of key areas: semiconductors, high capacity batteries, critical materials, pharmaceuticals and active pharmaceutical ingredients. The report also includes recommendations on developing close working relationships with partners who share the same values. Also in June 2021, President Joe Biden left the task force for supply chain disruptions aimed at resolving delays and roadblocks.

Both the US and the EU have the largest trade deficit in their relations with China. Since the beginning of the pandemic, the United States has started partnerships with Japan, South Korea and the European Union in terms of supply chains. Also in June 2021, President Joe Biden launched the task force for supply chain disruptions, aimed at solving the problematic on delays and roadblocks along the way. Both the US and the EU have the largest trade deficit in their relations with China. Since the beginning of the pandemic, the United States has started supply chain partnerships with Japan, South Korea and the European Union (Helper & Soltas, 2021).

Japan

Japan is a global leader in economic complexity, ranking first in the Economic Complexity Index. As in the case of the United States and the European Union, before the pandemic, Japan was heavily dependent on imports from China, which led to further efforts to reduce dependencies. In April 2020, the first financial incentives worth \$ 108.2 trillion were granted to encourage businesses to redirect their supply chains back to the country and to the Association of Southeast Asian Nations. The maximum threshold granted to a company was \$ 140 million and was intended to cover the cost of building new facilities and feasibility studies. About 300 companies have benefited from this investment promotion program for the strengthening of supply chains in 2020 and 2021.

In October 2021, Japan decided to appoint the world's first economic security minister, who will be tasked with developing a strategy and legal framework through which Japan can increase its economic security in terms of resources, supply chains, advanced technologies, and relevant infrastructure (Ito, 2021).

South Korea

As in the case of the United States and Japan, South Korea has made significant efforts ever since the beginning of the pandemic to reduce its reliance on foreign suppliers. South Korea had been developing a long-term reshoring strategy since 2014. However, only 10 companies returned each year between 2014 and 2018.

The Strategy for Materials, Parts and Equipment 2.0 was launched in July 2020 by the Korean Ministry of Trade, Industry and Energy to manage export restrictions. The strategy will allocate \$ 1.3 billion over a 5-year period to implement new technologies that can be used for equipment, materials and parts.

Part of the investment will also be used to attract relocation grants, foreign industries specializing in state-of-the-art technologies, and infrastructure investments. The budget allocated by the Government to cover the relocation costs of companies returning to regions outside the capital is \$ 16.8 million, and for companies using advanced technologies and returning to Seoul, the budget is 4.2 million of dollars. For companies that want to build smart factories or integrate intelligent robots into existing factories, the budget can be as high as \$ 430,000 (Agarwal et al., 2020).

Australia

The Cyber Security and Infrastructure Center launched just before the pandemic underlines Australia's strong interest in these issues. The Centre's tasks are to assess and manage national security risks and to increase the resilience of supply chains. With the onset of the pandemic, as in most countries, supply chain vulnerabilities have been amplified and brought to light. In its attempt to reduce dependence on imports from China, it has developed a strategy based on actions supporting supply chains.

The budget allocated by the government to support the realization of ideas into business opportunities, expand Australian business and increase supply chain resilience, was \$ 1 billion. The priority sectors are: the medical system, critical resources, food and beverages, security, recycling and clean energy.

Another initiative aimed at supporting supply chains in reducing their vulnerabilities, especially when it comes to basic necessities such as medicine, has received funding of \$ 1.4 million (Shi et al., 2021).

Conclusion

Globalization has led to a relativization of distances, bringing together producers and consumers from the farthest meridians. Equally, interdependencies and deep dependencies have been created, which the pandemic crisis has revealed in their true complexity. The European Union has understood that interdependencies can become vulnerabilities, while syncope's on production and supply chains have revealed this. The relocation of some production capacities, at least of some sectors of strategic importance is a first form of reducing these systemic gaps.

Global supply chains have been severely affected by route restrictions, which vary from area to area. Because, by definition, global supply chains involve different parts of the world, only through good international cooperation can these challenges be overcome.

Right now, most countries are working hard to bring things back to a balanced state, but there are still many issues that need to be addressed and solutions will not be long in the making. By identifying the main challenges and defining the best practices and measures taken so far, I have provided a clearer perspective on the real situation of supply chains.

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