

## THE MEDIUM AND LONG-TERM IMPACT OF COVID-19 ON GLOBAL SUPPLY CHAIN DESIGN

### СЕРЕДНЬО- ТА ДОВГОСТРОКОВИЙ ВПЛИВ COVID-19 НА ПОБУДОВУ ГЛОБАЛЬНИХ ЛАНЦЮГІВ ПОСТАВОК

*One of the most immediate consequences of the global COVID-19 pandemic over two years has been and remains the impact on supply chains. As you know, crises almost always give impetus to create new great opportunities. Since the beginning of the pandemic, the problem of food shortages has become acute in the world, primarily because food supply chains have been interrupted across closed borders. Problems arose not only with consumers but also with producers who did not sell goods and did not receive the expected income. The turmoil in production and supply chains required ingenuity and resilience from managers. The world market began to create conditions for the redistribution of cash flows and spheres of influence. Because it was necessary to ensure the proper functioning of global supply chains to support economic activity. This has led to very rapid changes in the way suppliers are managed, combined with the reorientation of existing management tools and methods. The instability of the pandemic period has identified vulnerabilities in the global supply chain and identified the most vulnerable industries in the world. The global economic crisis caused by the coronavirus has affected four main pillars of food security: availability, affordability, usability and stability. This article describes the main trends over the past two years in the formation and modernization of global supply chains on the example of various industries.*

**Key words:** supply chain design, globalization, logistics, nearshoring, reshoring, Covid-19 pandemic.

Одним із найбільш безпосередніх наслідків глобальної пандемії COVID-19 протягом двох років був і залишається вплив на ланцюги поставок. Багато факторів мало вплив на формування нових ланцюгів та на зміну наявних, починаючи від обмежень на пересування людей і способів транспортування товарів, до безпосереднього впливу вірусу на людей, зменшення їхньої працездатності, що в свою чергу означає значно ускладнене виробництво та транспортування товарів і надання послуг не лише в межах однієї країни, а й глобальному вимірі. Як відомо, кризові явища майже завжди надають поштовх для створення нових великих можливостей. З початку пандемії у світі гостро постала проблема нестачі продовольчих товарів, передусім тому, що через закриті кордони перервалися логістичні ланцюги поставок продуктів харчування. Проблеми виникли не тільки у споживачів, а й у виробників, які не продавали товари та не отримували передбаченого доходу. На додачу, зростали видатки підприємств на забезпечення зберігання запасів та підтримки працівників. Ці фінансові потрясіння у виробництві та ланцюжках поставок вимагали від менеджерів винахідливості та стійкості. На світовому ринку почали створюватися умови для перерозподілу грошових потоків і сфер впливу. Тому що необхідно було забезпечити належне функціонування глобальних ланцюгів поставок для підтримки економічної діяльності. Це призвело до дуже швидких змін у способі управління постачальниками в поєднанні з переорієнтацією існуючих інструментів і методів управління. Нестабільність періоду пандемії виявила вразливі місця в глобальному ланцюжку поставок та визначила найбільш вразливі галузі світової промисловості. Викликана коронавірусом глобальна економічна криза вплинула на чотири основні стовпи продовольчої безпеки: наявність, доступність, вживаність і стабільність. У цій статті подано опис основних тенденцій протягом останніх двох років формування та модернізації глобальних ланцюгів поставок на прикладі різних галузей світової промисловості. Також визначені переваги та недоліки нових ланцюгів та нові способи пристосування підприємств до нових реалій.

**Ключові слова:** дизайн ланцюгів поставок, глобалізація, логістика, ресоринг, неаршорінг, пандемія Covid-19.

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**Formulation of the problem.** One of the most immediate consequences of the global COVID-19 pandemic has been and remains the impact on supply chains. Everything has affected supply chains, from restrictions on the movement of people and the way goods are transported, to the effects of the virus on humans, which means that the production of goods and the provision of services is becoming more difficult.

These short-lived supply chain shocks required ingenuity and resilience from managers. Because it was necessary to ensure that global supply chains functioned well to support economic activity.

This has led to very rapid changes in the way suppliers are managed, combined with a reorientation of existing management tools and practices. Global

supply chains have been destabilized by a series of shocks over the past two years.

The volatility of the past year exposed vulnerabilities in the global supply chain:

– After several years of increasing sharp restrictions on free trade and vain attempts, there is a desire to satisfy the consumer with domestic production.

– COVID-19 led to twin shocks, first on supply and then on-demand [9].

#### **Analysis of recent research and publications.**

The analysis of the impact of the coronavirus pandemic on the construction of global supply chains was reflected in important documents and reports of leading international organizations recently: McKinsey&Company review of industries

[3; 10], Harvard Business Review [9], and analytical conclusions of PWC [7]. Among the latest analytical publications, a new trend related to reshoring and near-shoring, which is due to savings in transportation costs and production control, should be noted.

Despite the growing number of published scientific works and analytical reports as a Statista overview [2], there is still a lack of research in which the concepts of developing new supply chains are considered comprehensively, as interconnected theoretical constructs in unity with practical models, and sufficient theoretical justification for the need to change the design of global supply chains is not given. supply chains and production shifts. Therefore, this determines the need for further theoretical and methodological research in this direction.

**Formulation of the goals.** The study aims to examine the medium and long-term effects of the coronavirus pandemic on the formation of global supply chains and identify new management decisions.

**Main part.** In February 2020, the supply shock rippled through the network of suppliers, starting in China. Following that by a demand shock as Western economies shut down. With a tremendous decline in global trade, shipping networks found insufficient demand to equal sail cargo ships.

After concluding that trade would fall for the year, a rapid economic uptick in the second half of 2020 led to a surge in trans-Pacific trade, marked by the highest spot rates ever recorded for eastbound trans-Pacific container freight and dramatic increases in logistics costs. These disruptions cut across sectors.

Many companies around the globe have long relied on production and supplies from China and other countries with cheap labour (Vietnam, Malaysia and Korea). Consequently, when the pandemic first

hit that corner of the globe, the waves were felt all over the world. A few months later, when Europe and other countries moved to the blockade, panic broke out and basic goods, which should have been plentiful, suddenly became scarce.

Interconnected global supply chains with less added value and more components are more resilient to critical situations. And sectors such as electronics and the automotive industry, which rely on very complex supply chains, have suffered more than ever in the past year. For instance, Ford and other automakers were forced to cut output due to parts shortages. At an EndeavorB2B webinar, Greg Woods of IHS Market discussed how global locks significantly affect consumer habits and increase demand for game consoles, TVs, smartphones and other consumer electronics [1].

During Q4 2020 and Q1 2021, the demand for electronic devices is actively increasing, as shown in Figure 1. However, there is a significant shortage of supply. As a result, the number of essential components such as chipsets has quickly become the main problem. Furthermore, it will still hamper the supply of smartphones in the coming quarters. Consequently, that will force global brands to rethink regional strategies. For instance, some brands have been deprived of priority of device deliveries in India among the new wave of COVID-19. Therefore, these companies focus on rebuilding regions such as Europe and Turkey. And while the deficit persists, it will give large companies a unique advantage, as global brands have more power to negotiate the politics of distribution manufacturing.

In 2022, the electronics industry in the Americas is expected to grow by around 5% YoY. The market is projected to continue the recovery from its slump in 2020 when the market contracted by 3%, compared

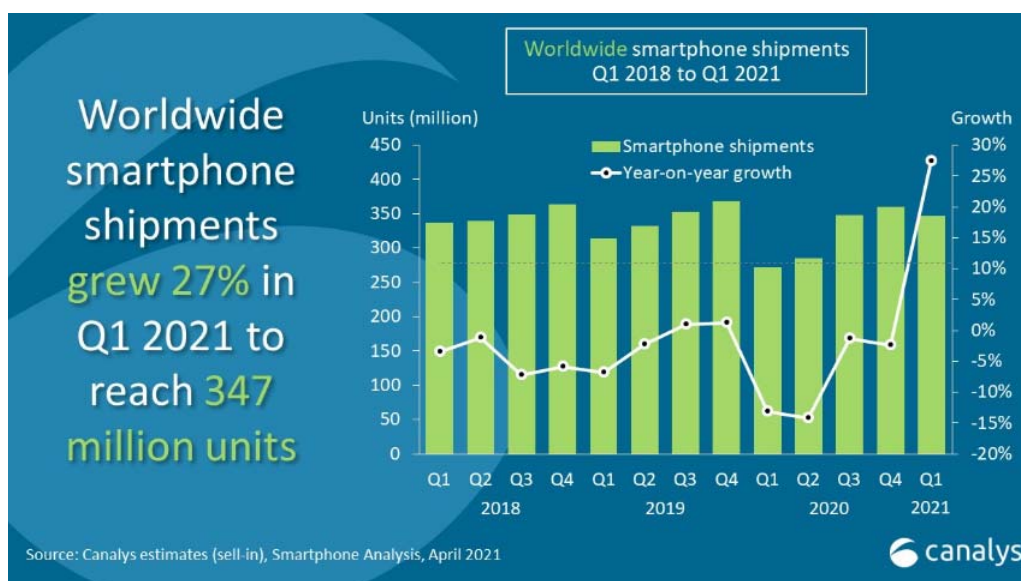


Figure 1. Worldwide smartphone shipments Q1 2018 – Q1 2021

with 2019. The market was valued at around 880 billion euros in 2019, accounting for roughly 20% of the global market, which was sized at 4.6 trillion euros in 2019. The COVID-19 pandemic forced people around the world to work, learn, and spend their free time at home, driving the demand for consumer electronics. However, due to the global shortage of chips and disruptions to supply chains, many electronics products continue to be in short supply. The global electrical and electronics industry thus did not grow in 2020 compared with the previous year. As problems related to COVID-19 are increasingly being addressed, the industry is expected to experience a period of growth in 2021 and 2022. Between 2021 and 2022, the industry is expected to grow by 6%, globally.

The following example is the fashion supply chain has been fundamentally redesigned. The Covid-19 pandemic has accelerated pre-crisis fashion trends, such as digital shopping and consumer demand for social justice and product accountability. To survive in 2021, brands must strive to provide quality and reliable production capacity and make the long-overdue transition to a demand-driven model to operate in increasingly volatile conditions.

Over the past few years, world interest in custom-made clothing has grown. This model requires less investment and leads to reduced inventory and greater flexibility and agility. Shorter turnovers can reduce demand uncertainty and contribute to a more sustainable small-batch production cycle. Pre-ordered models and production models invested, at the time when consumers buy goods before they are made and receive them in a few weeks or even months, are becoming more attractive and even fashionable. Brands seek to minimize long and complex supply chains that are overly dependent. Their solution can be "reshoring" and "nearshoring". These terms refer to the movement of suppliers

and manufacturers closer to home or the country of residence. As offshore factory workers are working at the end of the crisis, consumers have become more aware of the plight of vulnerable employees in the fashion supply chain. Moving to 2021, we must strive for the highest standards of human rights and social justice in commercial transactions. Over 70 per cent of companies plan to increase the share of nearshoring close to company headquarters, and roughly 25 per cent intend to restore sourcing to their headquarters' country, according to McKinsey's Apparel CPO Survey 2021.

Deglobalization of supply chains and their relocation to countries with stricter labour laws and environmental regulations directly assist to boost sustainable development. A closer supply chain also reduces the carbon footprint of clothing, as the finished products are sent shorter distances from the manufacturer to the threshold.

The State of Fashion reported in 2021 and 2022 that The Business of Fashion and McKinsey and Company discuss the future of the industry after the global failure in 2020. To continue to drive unsurpassed levels of uncertainty next year, they say companies need to redesign their operating models to provide flexibility and faster decision-making and balance speed against discipline in the search for innovation. In 2021, we expect the winning brands to be those that can set clear, long-term ambitions while demonstrating enough flexibility, speed and agility to navigate the uncertain short-term future" [3].

Looking forward to the future, as consumer demand remains declining in 2021, they advise that fashion companies should strive to reflect changes in consumer behaviour in their product offerings and focus on growth hotspots. Brands should focus on accelerating market entry and aligning product releases and reductions with the needs of their customers rather than with the traditional fashion

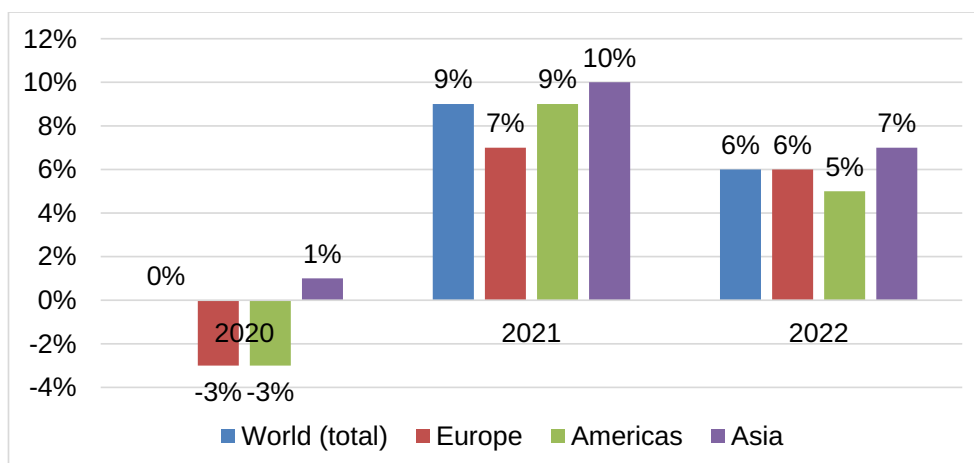


Figure 2. Estimated growth rate for the global electronics industry 2020–2022, by region

Source: [2]

calendar. Consumers are now watching fashion trends on social media rather than what's brands are trying to promote and sustainability issues that hinder fast fashion.

During the pandemic, consumers embraced digital technology as many brands finally went online, and enthusiasts introduced digital innovations such as live streaming, video chat, customer service and social shopping. Brands need to find new ways to attract consumers to the Internet and optimize their work on the Internet [4].

In 2022, brands will aim to regain control of supply chains while communicating potential delays with customers at each step. It will pay to consider control towers, in-house distribution, nearshoring of manufacturing, and cutting-edge inventory management, all while securing early access to raw material supplies.

Leading brands will collaborate closely with logistics providers, communicating frequently and expecting that providers will hold more cards in negotiations. To keep a watchful eye on finances at a time of rising supply chain costs, they may also consider using a zero-based budgeting system, requiring all costs to be re-justified at each budget review. In short, as the pressure intensifies, careful planning and deeper integration of supply chain considerations into decision-making will become table stakes in the year ahead [10].

The Covid-19 pandemic has not only become a threat to health but has also broken the socio-economic thread of the world. Industries such as pharmaceuticals and biotechnology have become vulnerable. The challenges of the supply chain of the pharmaceutical industry, especially for top managers include shortages of raw materials, unprecedented changes in the structure of demand, inability to schedule deadlines and labour shortages. The supply chain efficiency of the pharmaceutical industry still needs to be improved, and some transformational changes may be needed to thrive in the new environment.

Problems with the pharmaceutical supply chain have been the main cause of concern for the industry during 2020. Problems are still common, even as the world moves forward into an era of a new normal

situation. This pandemic has caused a noble global socio-economic impact and has led to disruptions in almost all aspects of the industry. Modern companies, equipped with the appropriate tools and technologies, have quickly adapted to change. Organizations that still operated in archaic systems tried to adapt to changes in the business processes caused by the pandemic. Slow-adapting companies have had to work harder to understand the changes needed [5].

An example of N95 mask deficiency in the United States during the COVID-19 pandemic demonstrates the difficulty of forming supply chains.

The US International Trade Commission published a report in December 2020 about issues with supply chains related to COVID, including N 95 masks. 1 Although it seems simple, the masks are carefully designed to provide a medical and environmental level of protection. Creating a mask requires special equipment. During the pandemic, each stage faced supply constraints [6].

Before the pandemic, the US market was mainly (about 80%) supplied by domestic production. He was not particularly sensitive to global supply chains. The main vulnerability was that most of the imported masks were from one country, China.

At the beginning of the pandemic, the demand for masks in the United States rose sharply. Imports of masks from China have fallen as the Chinese government has prioritized the domestic market. American companies have re-equipped production lines as much as they could to N95 masks and the production of molten fabrics. Domestic production of masks has increased sixfold but still could not meet demand. Starting in June, Chinese suppliers resumed exports. In the summer months of 2020, imports of N95 masks increased 60 times. By December 2020, the domestic / import split had been partially reversed, with 62% of deliveries coming from abroad. The offer is far from sufficient, as evidenced by higher prices for masks – from about \$ 1 for a mask for a pandemic up to \$ 6 during parts of 2020 [6].

Although this episode is an extraordinary example of supply and demand fluctuations, it can teach some lessons about supply and self-sufficiency chains. International supply chains remain a crucial source of production flexibility, reducing each country's need

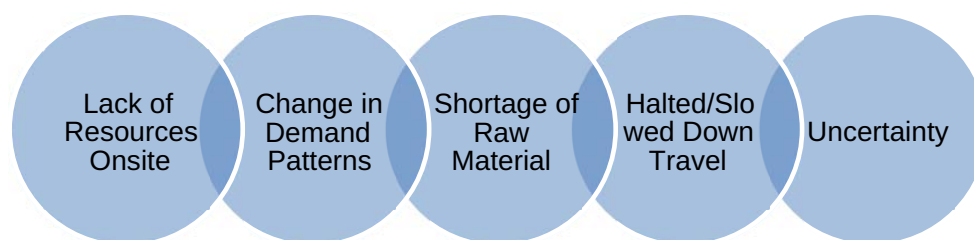


Figure 3. The fundamental pathogens of pharmaceutical supply chains

Source: [5]

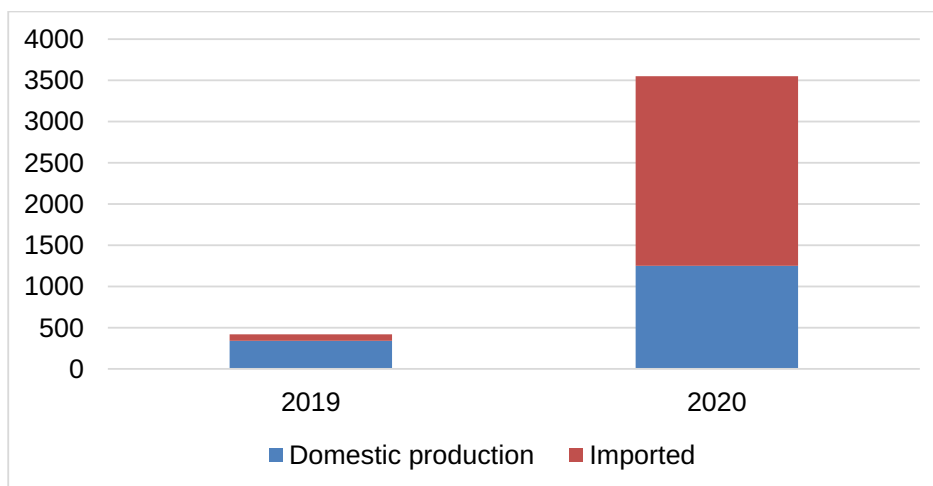


Figure 4. Monthly N95 mask production in the USA 2019–2020, M

Source: [6]

to increase investment to change demand. China remains unequivocally able to drastically increase production; to meet consumer demand.

Market forces may not provide sufficient investment in the required commodity, especially when demand is expected to be short-lived or volatile. Critical goods may require government intervention – or the adoption of a deficit period.

The main problems that arose during the pandemic are:

- Demand for therapeutics and vaccines has put undue pressure on the industry.
- Lack of resources and slow global travel have increased disruptions in pharmaceutical supply chains.
- Changes in quality standards added new tasks to the workforce that were not part of their daily lives, and they had to adapt quickly.
- Changes in quality testing have created adjustments to the test specification and additional testing steps.
- Disintegrated systems complicated the production process.
- Inability to manage supply and demand cycles.

While modern manufacturing companies have addressed the challenges and used solutions such as cloud applications, automation, artificial intelligence (AI), machine learning and big data to reap the benefits. Alas, many pharmaceutical companies, which are unable to implement new technologies quickly, are still prone to supply chain problems due to a lack of proper tools.

With the pandemic calling global attention to the pharmaceutical industry and demonstrating the importance of the supply chain, it is no surprise the US government is more focused on ways to improve supply chain resilience to reduce the impact on consumers. Executive order released on US supply chains that comments on the need to

rebuild domestic manufacturing capacity. In August 2019, 72 per cent of US active pharmaceutical ingredients (APIs) were manufactured overseas, with 18 per cent coming from India and 13 per cent from China. The US government has taken action and increased involvement in the pharmaceutical industry and only time will tell if interest wanes as supply chains return to normal or if it will remain to prevent future disruptions. In the meantime, some manufacturers are looking at what it would take to have more manufacturing facilities within the US or ‘nearshoring’ closer to it.

The need for speed due to the ‘Amazon effect’ combined with the need for a fast Covid-19 vaccination rollout changed the pharmaceutical landscape and the traditional delivery points in the final mile. In the past, most cold chain medicines were being delivered directly to hospitals or pharmacies with small instances of home delivery for drugs like insulin. With the Covid-19 vaccine, there was a greater need to meet patients wherever they were, such as at work, a community center, or in some cases their home. The last quarter mile of delivery became more hyper-focused than ever before. During the pandemic, e-commerce was also increasing and the need for faster deliveries of pharmaceutical and consumer goods resulted in a need for more urban warehousing, but the last mile infrastructure was not built to withstand the limits as they were. Many large players in the final mile are making investments to offset their distance from major cities [11].

Therefore, the eight main problems in the supply chain of the pharmaceutical industry at present are clearly expressed:

- Not ready for extra failures: Different countries around the globe are struggling with the second or third wave of the pandemic. These persistent failures have led to severe disruptions in the pharmaceutical distribution system.

– Technological bottlenecks prevail: The pharmaceutical industry is cautious and introduces new technologies.

– Lack of raw materials: The inability to plan effectively during a pandemic can cause many obstacles to purchasing raw materials.

– Standard operating procedures and processes: Lack of the right tools to study and work during a pandemic can increase the workload.

– Management of refrigerators requires extensive resources.

– Guidelines and standards for pharmaceutical safety vary across borders: The pharmaceutical industry must be resilient and vigilant, following the guidelines and safety rules. However, the issues with pharmaceutical supply chains are exacerbated as raw materials and drugs cross borders, and these standards are constantly changing.

– Rapid testing and promotion of drugs on the market.

– Lack of integration between processes [5].

Problems with pharmaceutical supply chains have been part of this sector for a long time, and companies that do not have the proper equipment will tend to struggle more than others. Therefore, this period of the pandemic helps to identify weaknesses in the activities of enterprises as a whole.

**Conclusion.** Currently, most companies are focused on the short term, and their strategies approach the COVID-19 situation as a temporary problem. But if you look strategically at the current situation, it can potentially contribute to further growth and competitive advantage for many years to come. Five ways in which current challenges will create new opportunities for companies:

– Working capital management: using data analysis for financial modelling.

– Planning capabilities: digitization to increase the speed of decision-making and execution.

– Through visibility of the supply chain: building digital models.

– Source and supplier management: application of lean production methods (value, value stream, flow, pull, and perfection).

– Enable e-commerce [7].

Furthermore, the tendency to return the localization of production closer to the consumer manifested itself before COVID-19. However, the pandemic has helped uncover the fragility of extended supply chains.

The initial stages of the pandemic led to a shortage of the supply chain, not only valuable medical and protective equipment but also plants that depended on intercontinental supplies to be shut down. Multicomponent industries such as pharmaceuticals, automotive and electronics have become particularly sensitive [8]. There was a sharp increase in demand for e-commerce, home textiles and household appliances. The pre-pandemic tendencies of national

protectionism and the movement towards localization received more impetus during the pandemic, as governments see it as a way of domestic economic growth. Current tariff restrictions on trade and negotiations will still be an influential factor in developing new supply chains.

Supply chain reengineering after COVID-19 makes it possible to create a more sustainable supply chain and production strategies. That provides an opportunity to protect the logistics structure from future risks.

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