

---

## Impact of the Covid-19 Pandemic on the US Supply Chain and the Role of the Ukraine-Russian War

BY

Olayinka Abideen ARISEKOLA  
Department of Management and Marketing  
College of Business  
Southern University and A&M College Baton Rouge LA  
United States of America

---

### *ABSTRACT*

*The COVID-19 epidemic has had an unprecedented pace and manner of effect on global supply chains. This study examines the supply chain issues that firms have encountered as a result of the COVID-19 outbreak and the Russia-Ukraine war as affected by the US. To analyze issues and the appropriate mitigation solutions, the study provides a conceptual framework based on the dynamic capability theory. A literature review, an analysis of many news stories, and interviews with specialists led to the identification of key issues. To further examine the connections between various supply chain difficulties, the COVID-19 outbreak, and the Russia-Ukraine war, the study has adopted the use of descriptive statistics with graphical illustrations. Scarcity of material (SSM). Inconsistency of Supply (PIS), etc., have been established as some of the ways the supply chain is being affected by the COVID-19 outbreak and the Russia-Ukraine war. The study offers recommendations that countries and firms should prepare well for the possibility of a future pandemic in order to minimize the impacts of the pandemic. It was also recommended by the study that economies should begin to rely less in terms of international trading on countries that are highly prone to war. The proliferation of AI should also be embraced in logistics businesses.*

**KEYWORDS:** COVID-19/SARS-CoV-2 pandemic, Ukraine-Russian war, Supply Chain and United States

---

### **Introduction**

The COVID-19/SARS-CoV-2 pandemic recently caused a horrible disaster that affected the entire world, including the United States (Verma & Gustafsson, 2020). The novel coronavirus was found in December 2019 in Wuhan, China's Hubei province (Ivanov & Dolgui, 2020). Nonetheless, the pandemic spread to other parts of the world in the months that followed, causing millions of people to suffer directly and indirectly. It has piqued the curiosity of academics (Govindan et al., 2020) as well as professionals (Deloitte 2020; Fortune 2020). Demand surged unexpectedly in some businesses while declining in others. Many countries' economies came to a standstill as a result of the strict lockdowns, most notably the United States. Ivanov and Dolgui (2020) assert that the virus has allegedly affected all commercial sectors, particularly international supply chains. Its numerous long-lasting impacts have resulted in significant supply interruptions (Govindan et al., 2020; Ivanov, 2020a). For instance, COVID-19 has already had an effect on the supply chains of 94% of Fortune 1000 companies (Fortune, 2020).

The coronavirus outbreak has an impact on global supply chains in terms of supply, demand, and logistics (Mishra et al., 2021; Sharma & Kumar, 2021). For example, as the virus spread throughout the United States, face mask shipments were suspended, frightening multinational firms' supply networks. The demand shock had an effect on other businesses. While demand for necessities increased, there were concerns about supply shortages, unexpected travel delays, delivery delays, and a labour shortfall (induced by a reverse exodus of employees from cities). As a result, the gap between supply and demand grew. Prior to the COVID-19 period, supply chain managers usually prioritised just-in-time inventory management since it encourages cost savings and increased productivity. This strategy, as demonstrated by the COVID-19 pandemic, does not sufficiently prepare the global supply networks to resist severe shocks. (Govindan et al., 2020). The impact of the coronavirus pandemic on international supply chains has also highlighted the necessity for risk management and mitigation techniques. Organisations must assess their supply chain architecture, dependencies, and strategies to avoid needing to act rapidly in the case of impending natural disasters and to be well-prepared to handle unplanned interruptions.

Throughout the conflict, Russia was only able to provide the United States with a finite amount of essential metal. For example, 13% of the titanium, 30% of the platinum group metals, and 11% of the nickel imported into the United States but no longer available were produced in Russia. Due to a shortage of nickel, a critical component used in batteries that power devices and automobiles, the manufacture of essential goods has been hampered. A University of Florida study claims that titanium shortages are a significant problem because it is one of the hardest metals and is used to make many industrial products.

Due to a lack of resources, COVID-19 supply chain research is currently in its infancy. Because COVID-19 is so uncommon, when microscale research does exist, it often focuses on theoretical initiatives to exactly describe the condition. After examining the information, several studies propose further research. However, the current debate over how the COVID-19 pandemic and the war in Ukraine and Russia have impacted international supply networks largely ignores the COVID-19-related supply chain problems that businesses are currently facing and their mitigation actions. These issues have forced supply chain managers to reevaluate their strategies in an effort to avoid similar disruptions in the future. The COVID-19 pandemic affected a variety of things, including supply chain operations, tier relationships, firm policies, and networks of interrelated linkages. For instance, (a) businesses are switching from global to local sourcing strategies (Choi et al., 2021); (b) the pandemic may alter the power dynamics inside supply chains; (c) supply chains need to be more robust; and (d) businesses are switching from a global to a local inventory strategy. It is critical to consider how interruptions caused by COVID-19 affect the interconnected business environment of supply chains in order to close this gap.

- A). What is the extent of the COVID-19 cases in the US?
- b) What impact does COVID-19 (which emanated from China) have on US supply chains?
- c) To what extent does the Russian-Ukrainian war affect the supply chains of the US?

---

## Literature Review

### Previous studies on supply chains and COVID-19

Arisekola and Rufus (2022) define supply chain management as all the efforts an organisation considers in an attempt to achieve a smooth supply chain process. The most recent supply network interruption, COVID-19, was one of the greatest in human history, claim Ivanov and Dolgui (2020). The whole supply chain system is severely impacted by disruptions (de Sousa Jabbour et al., 2020). The supply chain has been impacted by a number of developments (Govindan et al., 2020). Another study found that even minor supply chain interruptions might have a significant impact (Scheibe & Blackhurst, 2018). Due to the disruption of the supply, demand, and logistics sides, the COVID-19 pandemic has been far worse than any previous outbreak in history (Mishra et al., 2021; Sharma & Kumar, 2021).

Numerous studies have examined numerous COVID-19 outbreak-related topics. This includes the "ripple effect" (Ivanov & Das, 2020; Ivanov, 2020a, 2020b), "mobile service operations" (MSO) during the COVID-19 pandemic (Choi, 2020a), "production recovery strategies" (Paul & Chowdhury, 2020), "demand management decision support systems" (Govindan et al., 2020), and "the effects of technological advancement." None of these publications, however, have looked at the supply chain issues businesses are now facing or how these issues are connected. For instance, Arisekola and Rufus (2022) carried out a study on supply chain management and operational performances in Walmart. The study made use of 60 samples and found out there is a significant relationship between strategic supply chain partners and operational performance.

In contrast to other research, this study looked at the issues that businesses were having as a result of the COVID-19 outbreak in the context of the supply chain and its linkages alongside the war between Russia and Ukraine. Depending on their geographic locations and varied degrees of supply chain resilience and readiness, companies are suffering a range of problems (de Sousa Jabbour et al., 2020). The USA was selected as the study's geographic focus since it is one of the world's major industrial centres and has the largest COVID-19 impact (The Guardian, 2020). It is crucial to examine the supply chain issues US firms are facing due to COVID-19 and the Russian-Ukrainian war and provide appropriate mitigation measures.

If supply networks are to be less affected by the COVID-19 outbreak, supply chain resilience must increase (Belhadia et al., 2020; Ketchen & Craighead, 2020; Queiroz et al., 2020). Craighead et al. (2020) provide suggestions on how these theories may help in solving these issues as they address a number of themes. According to Remko (2020) and Golan et al. (2020), supply networks purportedly lacked readiness for this pandemic, had flaws in their response strategies, and required improved supply chain resilience. According to Belhadia et al. (2020), research on supply networks for the automotive, agricultural, and aviation industries has been done in relation to supply chain resilience. Through their thorough examination of the literature on pandemics and epidemic outbreaks, Queiroz et al. (2020) provided evidence that supply chain architecture should take flexibility, ripple impact, recovery, digitization, planning, and sustainability into account. Belhadia et al. (2020) provide strategies for enhancing supply chain resilience in 2020 for both short- and long-term time frames.

The present discussion on global supply chains and the coronavirus pandemic still does not address the issue of what mitigation methods should be put into place as a result of the lessons learned from the difficulties encountered.

### Challenges Caused by the Covid-19 Pandemic on Supply Chain

**Uncertainty of demand:** Hippold (2020) predicts that the COVID-19 pandemic would alter consumer spending patterns and disrupt demand in the US and in certain other nations. The COVID-19 pandemic outbreak has resulted in an all-time low in commodities demand, which has had a significant impact on downstream suppliers and companies in the industrial sector.

**Inconsistency of supply:** According to Razdan & Kumar (2020), the COVID-19 pandemic has caused supply-side capacity restrictions as well as price and quantity instability, which are major disruptors. The United States widely dispersed Micro, Small, and Medium-Sized Enterprises (MSMEs) have been affected by supply shortages and other anomalies (The Economic Times, 2020). Various inconsistencies in the distribution of essentials also affected the country. Staples like grains and pulses are becoming more difficult to get on the market, according to a recent Business Standard story (2020). Since the epidemic began, Mumbai alone has seen a rise in grain imports that now total approximately 100,000 30 kg bags every day. The supply chain is really a network of several companies. Focus businesses have often depended on nearby vendors. Mapping is crucial for maintaining the visibility of a supply chain network (Sodhi et al., 2021). The bulk of the supply chain network does not yet have supply chain network mapping, nevertheless. Lack of visibility across supply chains was the root cause of supply chain inconsistency.

**Scarcity of material:** Concerns regarding the status of the global market have been raised in response to the outbreak of the pandemic and the accompanying lockdowns in various nations, particularly the USA. According to Razdan and Kumar (2020), supply-side operations during and after the lockdown were unclear, panic purchasing increased demand for particular requirements, and both of these factors constituted a serious threat to the accessibility of vital goods and services. Furthermore, Bloomberg (2020) notes that imports have only partially returned over the last three weeks despite many closure restrictions being eased.

**Delays in delivery:** Finding a balance between how long it takes to locate, create, and transport products to customers and how patient customers are willing to wait is the biggest challenge for nearly every organisation. Furthermore, customers often don't want to wait for a long time, even when there are alternatives. Since it relies on outside suppliers and is thus beyond of their control, it is also uncertain how long it now takes for all enterprises to get raw materials. Moving goods and supplies has been challenging because of the COVID-19 epidemic, especially in areas that have been classified as containment or restricted zones. Due to lengthening lead times, it is now increasingly difficult to provide necessary raw materials and semi-finished goods on schedule (Hippold, 2020). According to Entrepreneur.com, the lead times for Anvyl's Chinese suppliers have increased by an average of 20 days since the end of 2019. These delays in the delivery of raw materials and semi-finished goods will make it more difficult for the supply chain to function normally, which will have an impact on how the goods are processed and provided to the ultimate consumer.

**Adoption of suboptimal substitutes:** COVID-Vendors and suppliers have had trouble ensuring business continuity because to 19 deployment and lockout restrictions. During these times, alternative suppliers and product options are often taken into account to reduce sourcing risks. Razdan & Kumar and Deloitte, both 2020. The USA is not immune to the effects of China's catastrophic supply chain breakdowns, according to a recent story in The Hindu Business Line (2020). Many companies had switched to "just in time" delivery techniques in the US.

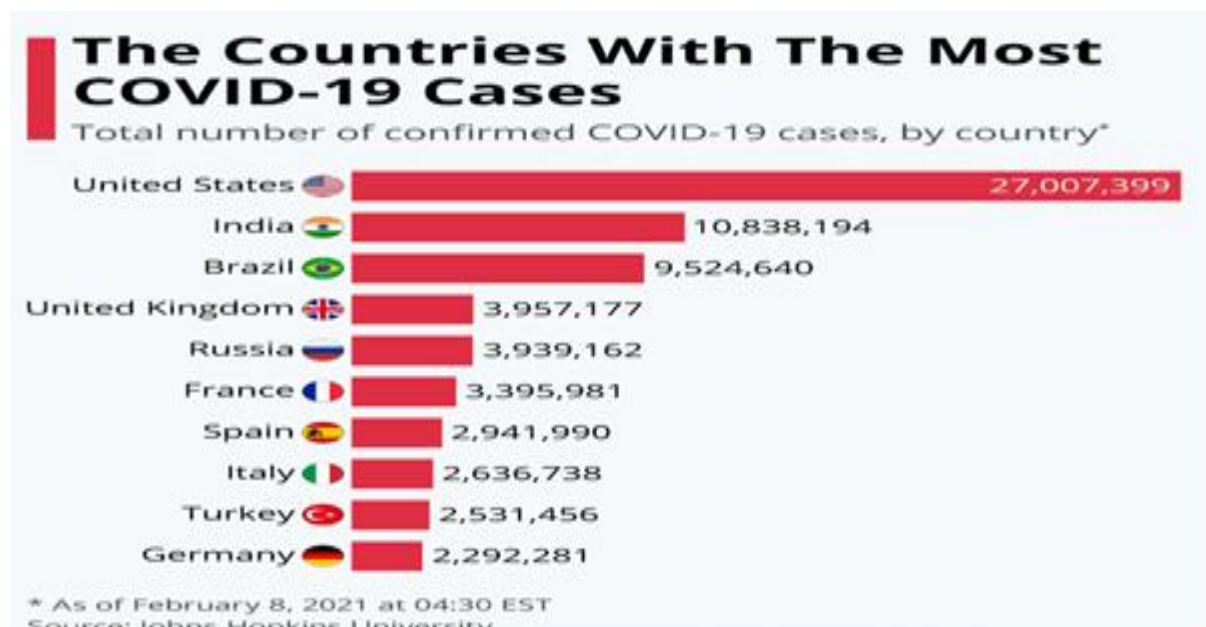
**Last mile delivery challenges:** In response to consumer demands to reduce physical contact points following the epidemic, the majority of businesses have changed their supply networks. How to build a robust supply chain is a topic that experts and businesses are talking about more and more. In an effort to draw consumers, brands are either merging with last-mile delivery partners or transitioning to totally captive in-house delivery services (Razdan & Kumar, 2020). However, the majority of metropolitan areas are categorised as restricted or red zones during a lockdown (McKinsey, 2020), which makes it difficult for last-mile delivery partners to deliver goods to customers' doorsteps.

### Research Methodology

The study has adopted a descriptive statistic and a quantitative data analysis where a graphical illustration of the effect of Covid-19 and the Russian-Ukrainian war on the supply chains in the US has been provided. The data used basically ranges from 2019 to 2021 with a mixture of annual, daily, and quarterly data.

### Results and Analysis

Figure 1: Counties with the most Covid-19 cases



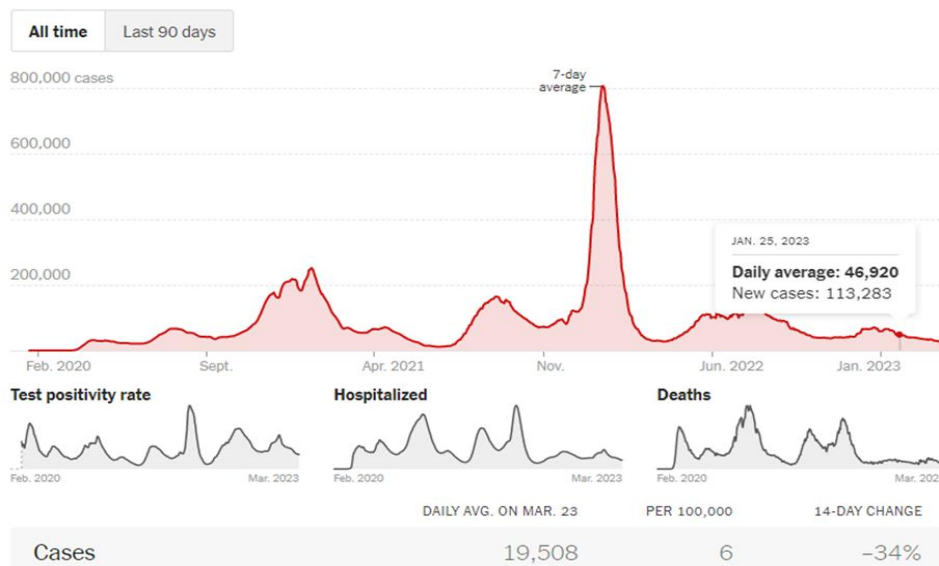
Source: Statista, 2023

The CDC reports that over 80% of new cases of the extremely contagious Delta variant over the past four weeks have increased the seven-day average of new infections by more than six times.

Dr. Rochelle P. Walensky, director of the CDC, described the Delta variant as "one of the most infectious respiratory viruses" she has ever faced in her 20-year career during a White House briefing some time in 2021. The Delta variation, she said, is more aggressive and contagious than previously prevalent strains. In light of this, leading medical authorities and government officials continue to encourage unvaccinated Americans to be immunised since the vaccines now available continue to provide the best protection against the aggressive virus, despite (fully predicted) breakthrough infections.

As seen in the accompanying graph, the number of new infections has already exceeded that of the virus's first and second waves. While it seems that the EU has temporarily stopped the surge in new cases, the number of instances in the US is still increasing.

**Figure 2: New reported Cases of Covid-19 pandemic in the US**



Source: Statista, 2023

According to information provided by hospitals to the U.S. Department of Health and Human Services, the number of patients per 100,000 who were newly admitted to a hospital with Covid-19 each day is shown for each age category in this chart.

**Figure 3: US economy shows a downturn due to covid-19**



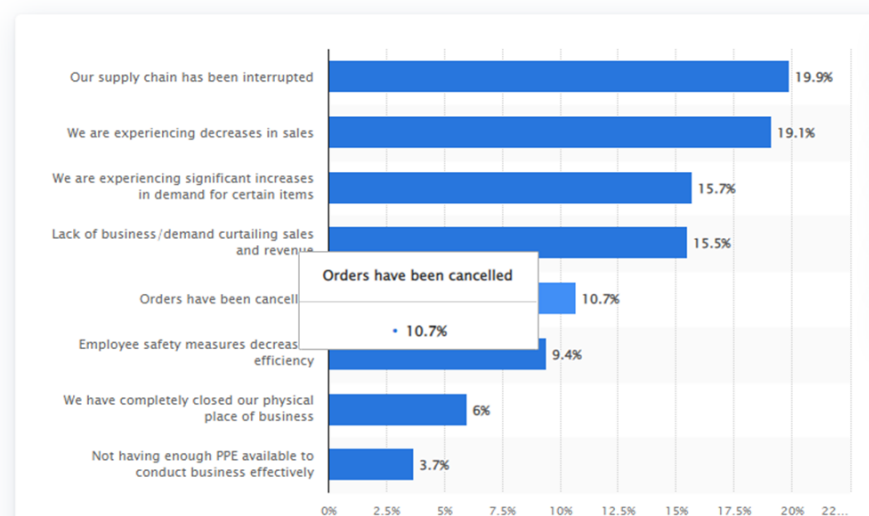
Source: US Bureau of Economic Analysis, 2023

During a briefing at the White House sometime in 2021, Dr. Rochelle P. Walensky, director of the CDC, referred to the Delta strain as "one of the most infectious respiratory viruses" she had ever seen in her 20-year career. She said that compared to earlier common strains, the Delta variety is more Dr. Rochelle P. Walensky, director of the CDC, described the Delta strain as "one of the most infectious respiratory viruses" she had ever seen in her 20-year career at a briefing at the White House sometime in 2021. The Delta variant, it was said, is more resistant to infection than previous prevalent strains. During a briefing at the White House at some unspecified time in 2021, Dr. Rochelle P. Walensky, director of the CDC, called the Delta strain "one of the most infectious respiratory viruses" she had ever encountered. The Delta strain, according to her, is more virulent and communicable than earlier, more common forms. Leading medical authorities and government officials still encourage unvaccinated Americans to be immunized since vaccinations presently on the market continue to provide the highest protection against the aggressive virus.

The accompanying graph demonstrates that more people are now infected than during the first and second waves of the virus. Although it seems that the rise in new instances has temporarily slowed in the EU, the number of incidents is continuously rising in the US.

**Figure 4: Impact of Covid-19 on the supply chains in the US**

How have your operations been affected by COVID-19?



Source: Martin Placet, 2022.

The COVID-19 epidemic disrupted supply networks for over 20% of logistics sector experts in 2020, according to their reports. In addition, roughly 11% of respondents said that the epidemic caused their orders to be cancelled.

### Russia-Ukraine war effect on the global economy with US inclusive

#### *Russia-Ukraine War and Market Outlooks 2022*

During a briefing at the White House sometime in 2021, Dr. Rochelle P. Walensky, director of the CDC, referred to the Delta strain as "one of the most infectious respiratory viruses" she had ever seen in her 20-year career. She said that compared to

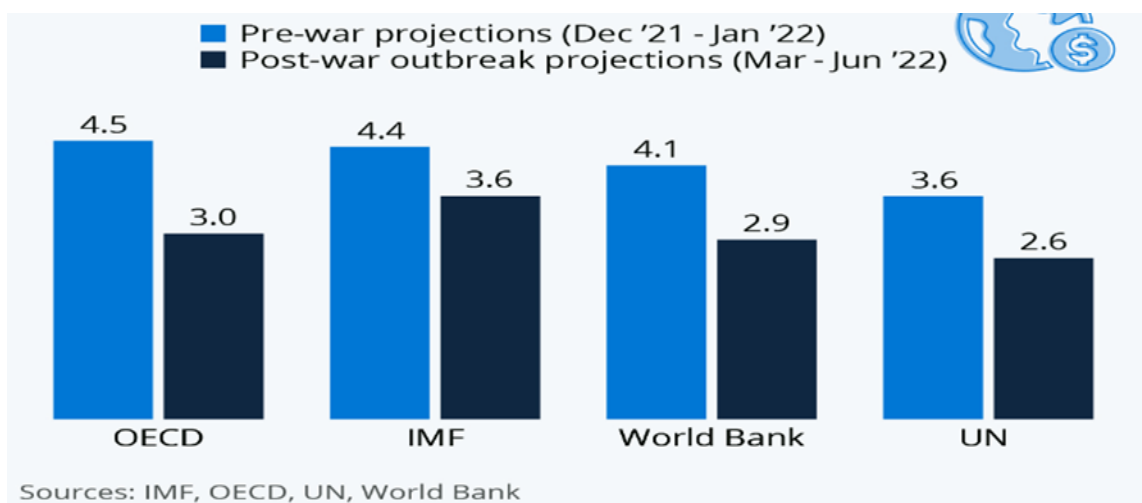


earlier common strains, the Delta variety is more The director of the CDC, Dr. Rochelle P. Walensky, described the Delta strain as "one of the most infectious respiratory viruses" she had ever seen at a briefing at the White House sometime in 2021. She said that the Delta strain is more resistant than previous prevalent strains. The entire economy was predicted to recover quickly from the epidemic in 2022. However, the Ukraine crisis has had a big impact on all aspects of the world economy's future. Food security is at risk in many regions of the world due to the violence, which is also putting more pressure on global supply systems and raising levels of general instability. This is because it increased the cost of goods.

In comparison to their pre-war predictions, all major international organisations, including the UN, OECD, World Bank, and IMF, have reduced their estimates for world economic growth in 2022 by around 1%. In addition to slower growth, several nations are also facing strong inflationary pressures, with some sizable economies seeing their greatest levels in recent years, according to the OECD Economic Outlook June 2022.

Recent national studies predict that the war would affect most countries' economies, inflation, or both, depending on how economically connected they are to Russia and Ukraine. There will probably be severe repercussions, and they will vary greatly amongst countries.

Figure 5: GDP global growth projections for 2022 (pre and post-war outbreak of Russia and Ukraine in %)



Source: Statista, 2023

An effective post-pandemic recovery was anticipated for the global economy going into 2022. However, the war in Ukraine has a tremendous impact on all aspects of the world economy. The violence, which has caused a spike in commodity prices, is endangering food security in many parts of the world, heightening financial stress, putting pressure on global supply systems, and generally escalating already high levels of uncertainty globally.

In comparison to their pre-war calculations, all major international organisations, including the IMF, the World Bank, the OECD, and the UN, have reduced their predictions for the growth of the world economy in 2022 by about one percentage point. According to the OECD Economic Outlook June 2022, several nations are



experiencing substantial inflationary pressures in addition to slower growth, with some large economies seeing inflationary pressures at their greatest levels in many years.

According to our most recent national reports, depending on their economic relationships with Russia and Ukraine, most countries will see reduced growth, higher inflation, or both, as a result of the war. The effects are expected to be long-lasting and vary greatly among countries.

## Conclusions

The novel coronavirus (COVID-19/SARS-CoV-2) pandemic, which first appeared over three years ago, has now evolved into a global emergency and is continuing to have an irreparable effect on all of humanity (Ivanov and Dolgui, 2020). Despite the fact that the virus's vengeance has affected entire continents and countries, manufacturing businesses operating globally have faced numerous challenges.

According to the findings, the most significant problems are supply instability and subpar production, followed by labour shortages, vehicle delays, and a lack of parts. To find appropriate long- and short-term mitigation solutions, the study thoroughly explored these issues with specialists. The study has developed appropriate mitigating measures to meet each of the highlighted difficulties, taking into account the dynamic capability theory as a tool to create supply chain resilience. These strategies are intended to solve each challenge both immediately and over the long term. Not only do these tactics serve to alleviate the current difficulties, but they also aid in alleviating similar-sized and similar-natured obstacles in the future. A few of the short-term tactics include choosing a number of vendors close to the principal company's manufacturing location, redefining safety and reserve stock levels, and putting in place employee welfare programmes to encourage talented migrant workers. In a similar vein, some long-term strategies include embracing end-to-end digital technologies in preparation for possible future pandemics, deeper use of AI and ML techniques, setting up big data-powered real-time visibility control towers, creating business continuity plans, and taking into consideration the use of autonomous vehicles and drones for line-haul trips and last-mile deliveries, respectively.

## Recommendations

Based on the findings made the following recommendations are deemed necessary:

1. Managers may find the structured analysis helpful for identifying major issue areas and the factors that need to be prioritised for resolving these issues.
2. On the supply side, managers would have to examine their BCPs, identify important components, focus on local suppliers, and give employee welfare a higher emphasis.
3. The target company would have to swiftly provide customers with end-to-end order lifecycle knowledge, provide omnichannel buying options, and train their workers in terms of safety, sanitation, and other best practices to adhere to during such disruptions. These would encourage

customer cooperation and trust, which would stabilize demand. From a logistical standpoint, managers should seriously consider using GPS-equipped vehicles and installing control towers that enable the use of big data from all partner IoT devices and monitor real-time tracking and movement of material across the supply chain. This is due to the fact that during the COVID-19 epidemic, the lack of availability and delay of cars became a significant problem.

3. Businesses could consider employing drone technology for customer last-mile delivery since autonomous cars may eventually be required for point-to-point transportation along established routes (Ketchen & Craighead, 2020).

---

REFERENCES

- Agrawal, S., Jamwal, A., & Gupta, S. (2020). Effect of COVID-19 on the Supply Chain and Economy. 2020, 2020050148 (Preprints), doi:10.20944/preprints202005.0148.
- Arisekola, O. & Rufus, D. (2020). Supply Chain management and operational performances in Walmart. *International Journal of Advancement in Education, Management, Science and Technology*, 5(2), 69 – 85.
- Bai, C., & Sarkis, J. (2013). A grey-based DEMATEL model for evaluating business process management critical success factors. *International Journal of Production Economics*, 146(1), 281–292.
- Belhadia, A., Kamble, S. S., Jabbourc, C. J. C., Ndubisi, N. O., & Venkatesh, M. (2020). Lessons from the automobile and airline industries on supply chain resilience for manufacturing and services during the COVID-19 pandemic. *Social Change and Technological Forecasting*, 120447.
- Bloomberg (2020). <https://www.bloomberg.com/news/features/2020-04-23/wuhan-s-r-eturn-to-life-temperature-checks-and-constant-anxiety>.
- Business Insider. (2020). Here are some ways that businesses can adapt and get ready as the coronavirus outbreak disrupts supply chains all around the world. On March 30, 2020, retrieved from: <https://www.businessinsider.com/covid-19-disrupting-global-supply-chains-how-companies-can-react-2020-3>.
- Business Standard (2020). Covid-19: Supply of essentials hit due to worker shortage, transport issues. Available <[https://www.business-standard.com/article/economy-policy/covid-19-supply-of-essentials-hit-due-to-worker-shortage-transport-issue-s-120032301405\\_1.html](https://www.business-standard.com/article/economy-policy/covid-19-supply-of-essentials-hit-due-to-worker-shortage-transport-issue-s-120032301405_1.html)> (accessed 06 May, 2023).
- Carnevale, J. B., & Hatak, I. (2020). Employee adjustment and well-being in the era of COVID-19: Implications for human resource management. *Journal of Business Research*, 116, 183–187.
- Choi, T. M. (2020a). Innovative “Bring-Service-Near-Your-Home” Operations under Corona-Virus (COVID-19/SARS-CoV-2) Outbreak: Can Logistics Become the Messiah? *Transportation Research Part E: Logistics and Transportation Review*, 101961. <https://doi.org/10.1016/j.tre.2020.101961>
- Choi, T. M. (2020b). Risk analysis in logistics systems: A research agenda during and after the COVID-19 pandemic. *Transportation Research Part E: Logistics and*
- Choi, T. Y., Narayanan, S., Novak, D., Olhager, J., Sheu, J. B., & Wiengarten, F. (2021). Managing extended supply chains. *Journal of Business Logistics*, 42, 200–206.
- Christopher, M., & Peck, H. (2004). Building the resilient supply chain. *International Journal of Logistics Management*, 15(2), 1–13.
- Craighead, C. W., Ketchen, D. J., Jr, & Darby, J. L. (2020). Pandemics and supply chain management research: Toward a theoretical toolbox. *Decision Sciences*. <https://doi.org/10.1111/dec.12468>

- De Sousa Jabbour, A. B. L., Jabbour, C. J. C., Hingley, M., Vilalta-Perdomo, E. L., Ramsden, G., & Twigg, D. (2020). Sustainability of supply chains in the wake of the coronavirus (COVID-19/SARS-CoV-2) pandemic: lessons and trends. *Modern Supply Chain Research and Applications*.
- Deloitte (2020). COVID-19: Managing supply chain risk and disruption. Retrieved March 30, 2020, from <https://www2.deloitte.com/global/en/pages/risk/articles/covid-19-managing-supply-chain-risk-and-disruption.html>.
- Golan, M. S., Jernegan, L. H., & Linkov, I. (2020). Trends and applications of resilience analytics in supply chain modeling: Systematic literature review in the context of the COVID-19 pandemic. *Environment Systems & Decisions*, 1.
- Govindan, K., Mina, H., & Alavi, B. (2020). A decision support system for demand management in healthcare supply chains considering the epidemic outbreaks: A case study of coronavirus disease 2019 (COVID-19). *Transportation Research Part E*.
- Hippold, S. (2020). Coronavirus: How to secure your supply chain. The Gartner. Available: <<https://www.gartner.com/smarterwithgartner/coronavirus-how-to-secure-your-supply-chain/>>
- International Labour Organization (2020). [ONLINE]. Available <[https://www.ilo.org/wcmsp5/groups/public/dgreports/dcomm/documents/briefingnote/wcms\\_740877.pdf](https://www.ilo.org/wcmsp5/groups/public/dgreports/dcomm/documents/briefingnote/wcms_740877.pdf)> (accessed 06 May, 2023).
- Ivanov, D. (2020a). Predicting the impacts of epidemic outbreaks on global supply chains: A simulation-based analysis on the coronavirus outbreak (COVID-19/SARS-CoV-2) case. *Transportation Research Part E: Logistics and Transportation Review*, 136, Article 101922.
- Ivanov, D. (2020b). Viable supply chain model: Integrating agility, resilience and
- Ivanov, D., & Das, A. (2020). Coronavirus (COVID-19/SARS-CoV-2) and supply chain resilience: A research note. *International Journal of Integrated Supply Management*, 13 (1), 90–102.
- Ketchen, D. J., Jr, & Craighead, C. W. (2020). Research at the intersection of entrepreneurship, supply chain management, and strategic management: Opportunities highlighted by COVID-19. *Journal of Management*, 46(8), 1330–1341.
- Khompatraporn, C., & Somboonwiwat, T. (2017). Causal factor relations of supply chain competitiveness via fuzzy DEMATEL method for Thai automotive industry.
- Kleindorfer, P., & Saad, G. (2005). Managing disruption risks in supply chains. *Production and Operations Management*, 14, 53–68.
- Luthra, S., Mangla, S. K., Shankar, R., Prakash Garg, C., & Jakhar, S. (2018). Modelling critical success factors for sustainability initiatives in supply chains in context using Grey-DEMATEL. *Production Planning & Control*, 29(9), 705–728.

- Mangla, S. K., Luthra, S., Rich, N., Kumar, D., Rana, N. P., & Dwivedi, Y. K. (2018). Enablers to implement sustainable initiatives in agri-food supply chains. *International Journal of Production Economics*, 203, 379–393.
- McKinsey (2020). <https://www.mckinsey.com/media/mckinsey/mal/what-now-decisive-actions-to-emerge-stronger-in-the-next-normal.pdf>.
- Mishra, R., Singh, R., & Subramanian, N. (2021). Impact of disruptions in agri-food supply chain due to COVID-19 pandemic: Contextualized resilience framework to achieve operational excellence. *The international Journal of Logistics Management*.
- Paul, S. K., & Chowdhury, P. (2020). A production recovery plan in manufacturing supply chains for a high-demand item during COVID-19. *International Journal of Physical Distribution & Logistics Management*, 51(2), 104–125.
- Queiroz, M. M., Ivanov, D., Dolgui, A., & Wamba, S. F. (2020). Impacts of epidemic outbreaks on supply chains: Mapping a research agenda amid the COVID-19 pandemic through a structured literature review. *Annals of Operations Research*, 319(1):1159-1196.
- Razdan, H., & Kumar, A. (2020). Ramping up the supply chain post COVID-19. KPMG. Available: <<https://home.kpmg/in/en/home/insights/2020/05/ramping-up-the-supply-chain-post-covid-19.html>> (accessed 06 May, 2023).
- Remko, V. H. (2020). Research opportunities for a more resilient post-COVID-19 supply chain—closing the gap between research findings and industry practice. *International Journal of Operations & Production Management*, 0165.
- Scheibe, K. P., & Blackhurst, J. (2018). Supply chain disruption propagation: A systemic risk and normal accident theory perspective. *International Journal of Production Research, Taylor & Francis Journals*, 56(1-2), 43-59,
- Sharma, A., & Kumar, B. (2021). Managing the supply chain during disruptions: Developing a framework for decision-making. *Industrial Marketing Management*, 97, 159–172.
- Singh, S., Kumar, R., Panchal, R., & Tiwari, M. K. (2020). Impact of COVID-19 on logistics systems and disruptions in food supply chain. *International Journal of Production Research*, 1–16.
- Sodhi, M. S., Tang, C. S., & Willenson, E. T. (2021). Research opportunities in preparing supply chains of essential goods for future pandemics. *International Journal of Production Research*, 1–16.
- The Economic Times (2020). Available <<https://economictimes.indiatimes.com/news/politics-and-nation/msmes-stare-at-labour-and-raw-material-supply-issues/article-show/75239175.cms?from=mdr>> (accessed 06 May, 2023).
- The Economist (2020). Available <<https://www.economist.com/asia/2020/05/23/indias-economy-has-suffered-even-more-than-most>> (accessed 06 May, 2023).

The Guardian (2020). Available <<https://www.theguardian.com/world/2020/sep/07/india-becomes-country-with-second-highest-number-of-covid-cases>> (accessed 06 May, 2023).

The Hindu Business Line (2020). Available <<https://www.thehindubusinessline.com/opinion/covid-19-exposes--industrys-supply-chain-vulnerabilities/article31224928.ece>> (accessed 06 May, 2023). Transportation Review.

Verma, S., & Gustafsson, A. (2020). Investigating the emerging COVID-19 research trends in the field of business and management: A bibliometric analysis approach. *Journal of Business Research*, 118, 253–261.

World Economic Forum – WEF. (2013). Building Resilience in Supply Chains. Retrieved November 06, 2021, from <https://www.weforum.org/reports/building-resilience-supply-chains>.

World Economic Forum (2020b). [ONLINE]. Available <<https://www.weforum.org/agenda/2017/10/india-has-139-million-internal-migrants-we-must-not-forget-them/>> (accessed 06 May, 2023).

World Economic Forum—WEF. (2020b). How China can rebuild global supply chain resilience after COVID-19. Retrieved April 5, 2020, from <https://www.weforum.org/agenda/2020/03/coronavirus-and-global-supply-chains/>.