

CHALLENGES OF GLOBAL LOGISTICS DURING PANDEMIC



UNIVERSITY OF WISCONSIN, PLATTEVILLE

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Abstract

Globalization changed business operations as many businesses sourced products and raw materials from different parts of the world to meet their needs and those of their customers. The Global logistics industry enabled the supply chain to move the products from the manufacturer to the suppliers and the end-users. The COVID 19 pandemic brought about disruptions in the supply chain which affected normal operations and highlighted the vulnerabilities in the supply chain. The lockdowns, restriction of movement, and closure of businesses put a strain on operations since they had to lay off workers to cut costs, and in turn, the remaining workers strained to meet the demands. There was congestion due to delays along the way affected inventory management and overall warehousing. There was a need to develop measures to curb the challenges and ensure resilience in the supply chain. Automation of operation, bringing products closure, and diversifying sources of products are some of the ways global logistics can continue operating during uncertain times like pandemics. This paper examines global logistics during the COVID 19 pandemic and the challenges posed by using a meta-analysis approach that reviewed articles on the challenges and impact of the COVID 19 pandemic on Global logistics and mitigation measures.

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Chapter 1: Introduction

Logistics are integral in local and international supply chains as they facilitate trade and enable businesses to get products to their customers. Global logistics involves preparing, packing, storing, and moving goods in the supply chain, from the point of production to the final consumer locally on an international level. Companies in global logistics connect businesses to the market through transportation, warehousing, inventory management, and freight forwarding (Twinn et al., 2020). Many manufacturing companies use raw materials from different countries worldwide, and acquiring this material is made possible through global logistics. These goods are moved by air, water, or on-road using cargo and passengers' airplanes, ships, trains, and trucks. Once a customer makes an order, the goods are moved from the storage facilities (warehouses). They are prepared and packaged through the proper inventory channel and then transported to the required destination. The whole process involves different people handling the products across the supply chain through several countries until they reach the final destination. The supply chain involved in global logistics is broad, and sometimes it becomes challenging to manage given the big data involved in the process (Richey et al., 2016).

The outbreak of the COVID 19 pandemic affected human lives and business operations in manufacturing and the general supply chain, including the logistics industry (Akintokunbo and Adim, 2020).). Adjusting to changes brought about by natural disasters, crises, and pandemics like the COVID 19 pandemic makes it challenging to carry out routine operations. This paper describes a pandemic as a global epidemic due to an infectious disease affecting more than one continent and many people's everyday social and business life (Qui et al., 2017). Companies in global logistics need to put in place measures to mitigate the risks and possible losses that may arise from such and ensure continuity after the situation has passed. This paper will focus on the

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coronavirus pandemic and its challenges to global logistics since it is the most recent and fatal pandemic that has affected almost all sectors.

1.1. Background

The coronavirus pandemic was first reported in Wuhan, China, towards the end of 2019, and it spread across different parts of the world at a very alarming rate (Wu et al., 2020). China is one of the largest manufacturers and distribution locations internationally, and the outbreak of the virus disrupted the supply of products to other countries that depended on China for business. Annually, China exported goods worth \$2.3t US dollars, about 165 of the world's exports hence a GDP of about 9.5% in 2018 (Constantinescu et al., 2019). Many countries were affected by the lockdowns, and the supply chain that heavily depended on the transportation of products from one point to another faced significant operation effects. Businesses were closed, and the transport was almost at a standstill with curfews, lockdowns, and travel restrictions aimed at mitigating the spread. The death toll was so high that it was declared a global pandemic. The pandemic threatened humanity and took a significant toll on the worldwide economy, rising from the previous financial crisis experienced in 2008. Since March 2020, most countries imposed lockdowns that disrupted the global supply chain, especially the transport sector, which forms the fundamental part of international logistics (Erhie, 2020). It is essential to note that, unlike previous pandemics that affect one region, the coronavirus pandemic affected the whole world at almost the same level, not sparing anyone. Travel restrictions affect many businesses that depend on moving goods from place to place, especially the global logistics industry, whose sole purpose is to ensure the supply chain is moving. Closure of businesses also brought about stagnation as most of the goods already available for the consumers stayed in the stores since there were little to no purchases.

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1.2.Statement of the Problem

Globalization brought new opportunities for businesses to venture into the international market, expanding the supply chain through increased sourcing (Gereffi and Lee, 2012). It also provides business opportunities to reach recent locations at a lower cost which is made possible through global logistics. Today, businesses operate virtually, sourcing products from far away places and through global logistics; the operations are carried out seamlessly, from the source to the supplier and end-users. Companies in global logistics have set up warehouses in different locations to ensure products reach consumers on time at no extra cost. The Coronavirus pandemic brought new challenges because of the changes in the business environment. The travel restrictions and closure of businesses brought about economic stagnation that directly impacted the international supply chain, especially the logistics industry. Many companies were closed, and tight border security measures were taken to prevent the spread of the virus, which caused many delays along the way. The challenges brought by the pandemic caused the global logistics industry to take action to realign the supply chain and regain the business. Successful global logistics depend on product quality and services, time taken to deliver, and the overall cost, all of which were affected by the pandemic. The delays caused during the cross-border restrictions and pileups at the ports and the airports caused a significant challenge for global logistics companies. They needed to diversify ways of enabling operations even during uncertain times like the one presented by the pandemic.

1.3.Purpose of the Study

The paper's purpose is to discuss the challenges Global logistics faced during the pandemic and measures taken to solve them as the world came to terms with the pandemic.

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1.4. Significance of the study

Pandemics like the Coronavirus outbreak are uncertainties that the business world encounters. Understanding the challenges and the measures taken to overcome them prepares businesses, especially those in the global market, to prepare for future uncertainties and avoid losses.

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Chapter 2: Literature Review and Analysis

This section will review the most recent studies concerning global logistics in the supply chain and how the coronavirus pandemic affected normal operations. The research available is limited to the onset up to the end of the pandemic.

2.1. The Impact of COVID-19 on Global Logistics

The supply chain involves different organizations involved in activities that involve suppliers and consumers to ensure efficiency and customer satisfaction. Logistics and transportation play a significant role in enabling businesses to carry out regular operations based on the goods they supply (Docherty et al., 2021). The coronavirus pandemic-imposed regulations and restrictions affected how these businesses operated. The disruptions caused by the pandemic impacted businesses and the end-users since consumer products flow in the key international markets like Europe, America, and Asia were restricted given the lockdown of important ports and airports (Dash and Charman, 2022). According to a study by Zhang et al.(2005), connectivity through transport is a critical element in the movement of goods. Flexible logistics ensure competitiveness in the markets from customer satisfaction. Any limitations to this end put businesses in a very crucial position. The Covid 19 pandemic was an unknown risk whose possibility of occurrence was unpredictable. The world spent a lot of time trying to contain the spread of the virus, which caused changes in the normalcy of society and business. The travel restrictions and closure of businesses to curb the spread posed a significant challenge to the global logistics industry.

According to Goel and associates (2021), the covid 19 disruptions affected the smooth running of the supply chain, given that nations depend on each other during global business transactions. If one country involved in the supply chain is affected, it may cause chaos in the

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entire supply chain. Taking an example of China, many countries depend on raw materials and products from the country. Still, once the COVID 19 pandemic struck and the country's borders closed, the nations that depended on these products and the logistic companies that operated from the region suffered. Although challenges existed before the Covid 19 pandemic, the pandemic added uncertainty and urgency. The scenarios experienced can be helpful in future planning for similar situations (Alicke et al., 2020). China, one of the most significant contributors to the global economy, was hit hard by the pandemic. Reports of dropped demands, shortage of transportation capacity, change of service mode, and disruption of the entire logistics network led to increased operating costs. A study by (Attinasi et al., 2022) shows that COVID 19 brought difficulties in the logistics sector with global shipping disrupted and overcrowded ports, leading to misplacement of containers which led to increased shipping costs from Asia to Europe and the United States in 2020. The COVID 19 pandemic caused a complete disruption in the global logistics as the main international ports in China, Asia, and the United States were closed down. Landlocked countries that do not have ports face the issue of cross-border and port restrictions imposed by their neighboring countries, which affect cargo traffic (Rivera,2020). The conditions delayed the logistics process since the products were only allowed through the authorized ports.

2.2. New Opportunities

Joseph Schumpeter, an economist, coined 'creative destruction' to claim that breakthroughs are made when the standard order is destroyed or collapses as it gives room for new and more effective ideas (Mathews, 2018). Although the covid 19 pandemic presented many challenges to supply and chain industries, it also provided new opportunities and possibilities. A study by Ho et al. (2020) shows that the pandemic was beneficial to some extent as the changes presented

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during the pandemic led to increased use of electronic commerce, payment, and purchasing patterns. These services led to increased demand for smart logistics services through technology. Businesses need to learn to be innovative and create resilient strategies that will help them through challenging and unpredicted times like the one presented by the pandemic. The new opportunities presented by the pandemic give the business a chance to recover the losses encountered.

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Chapter 3: Methodology

3.1. Introduction

The paper is a meta-analysis of various literature that provides evidence regarding current global logistics and the industry's challenges during the coronavirus pandemic. A meta-analysis is a statistical analysis of data from multiple independent studies which focus on the same topic. Analyzing the studies provides evidence to support the research topic and give more insights. Through metanalysis, the readers can have a clear and conscience understanding of a particular area f interest. Metanalysis also promotes evidence-based business management as the findings from the articles reviewed provide enough supporting evidence for a specific aspect of a business.

3.2. Inclusion and Exclusion Criteria

The research seeks to identify and evaluate challenges faced by contemporary global logistics during pandemics. There is limited research concerning previous pandemics like the influenza virus, salmonella, HIV, and Ebola; hence the current study will focus on COVID 19. The articles used for the meta-analysis must include information about pandemics, global logistics, COVID 19, the challenges posed by the COVID 19 pandemic to the global logistics industry, the measures taken to curb the challenges, and the future of global logistics in managing uncertainties. The articles will also include the most current information between the end of 2019. This period is between the breakout and today when the world is recovering from the pandemic. According to the paper's definition of a pandemic, the current study did not use articles discussing pandemics that influenced a small region.

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3.3. Search Strategy

Words like pandemics, COVID 19, Coronavirus, and Global Logistics were considered keywords to help ease the search. Since Global logistics operate under supply chain management (SRM), the term supply chain was used along with global logistics. Google was the primary source of information, but to get more relevant articles, google scholar, Research gate, Prologis, and Global Freight. The online data search using the word pandemics yielded many results, including information about widespread outbreaks of foodborne illnesses that did not fit the definition of a pandemic (Qui et al., 2017). The influenza virus was also an outbreak, but since it influenced a single/small region, it did not qualify as a global pandemic. Other articles about pandemics talked about obesity and other diseases, but the information they gave did not fit the current study. The search was narrowed down to pandemics that affected global logistics, and coronavirus was the most notable with the most recent and relevant

3.4. Articles selected

All available and relevant articles were chosen for the research following the inclusion and exclusion criteria. These articles were based on the coronavirus pandemic since they gave more relevant information about the current study. The articles included information regarding global logistics challenges during and after the COVID 19 pandemic and provided measures companies used to mitigate these challenges. The articles selected also gave information about global logistics and how it contributes to the supply chain. With these data, people interested in global logistics can learn a lot about setting up their business to make profits even during hardships. There was no data cleaning since the articles available were limited, and all the available articles were selected for the study.

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Chapter 4: Results and Discussion

The articles selected were critically reviewed to provide solid supporting evidence regarding current global logistics challenges during the COVID 19 pandemic. Recent research indicates that the covid 19 pandemic significantly affected the supply chain as it changed how businesses operate and customers purchase goods. These changes were sudden, given the fast spread of the virus, as nations had to implement measures to contain the virus spread. The most notable challenges were caused by the travel restrictions, closure of businesses, and lockdowns which caused a lot of losses. According to Hohenstein (2022), the pandemic exposed many vulnerabilities in global logistics which were previously overlooked, and companies needed to assess their operations and create ways to remain operational.

4.1. Challenges in Global Logistics During the COVID 19 Pandemic

The COVID 19 pandemic is the greatest and maybe most expensive pandemic ever witnessed (Singh et al., 2021). This is because it affected everybody in all aspects of life, personally, socially, economically, and culturally. Companies in global logistics were affected so much by the economic disruptions caused by the death toll and travel restrictions during the pandemic, which led to reduced consumption and losses in business (Singh et al., 2021). The pandemic also affected the labor market due to layoffs that contributed to the already high unemployment rate many countries were experiencing. These problems adversely affected the economy. This section of the paper analyzed the challenges the pandemic posed to global logistics and offered solutions to avoid these challenges in case of similar uncertainties in the future.

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4.1.1. AIR AND SEA FREIGHT LIMITATIONS

During the pandemic, passenger carriers were grounded as a security measure to regulate the spread of the virus. Many governments limited air and sea transport to control the spread and protect their citizens from the deadly virus (Twinn et al., 2020). This reduced the revenue earned through these modes of transportation, which mainly depended on ferrying cargo and people. The movement of goods by sea from China was halted, meaning air transport was the only reliable means of cargo transportation. The demand for the products grew, making it hard for the airplanes to meet them since air travel was also restricted. Many people were stranded, and the few operational passenger planes carried luggage too. During the period, there were limited carriers through few routes. Landlocked countries that do not have ports face the issue of cross-border and port restrictions imposed by their neighboring countries, which affect cargo traffic (Rivera, 2020). The restrictions delayed the logistics process since the products were only allowed through the authorized ports. In the study carried out in Bolivia and Paraguay, which are landlocked and depend heavily on neighboring Brazil, Uruguay, Chile, and Peru for sea transport, it is evident that the travel restrictions posed a significant challenge to their logistics operations.

4.1.2. CHANGES IN SOURCING PATTERNS

Procurement logistics focus on sourcing materials the manufacturers need, like buying raw materials required for manufacturing. Organizations in global logistics depend on the international sourcing of goods and products to meet the business demands and needs. China was one of the major producers of raw products, and when the pandemic struck, the movement of the products from that region was severed (Dabre, 2020). On the same note, moving products from faraway places saves costs and ensures the products sourced are of good quality. During the

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pandemic, companies in global logistics encountered delays due to travel and cross-border restrictions. Air, sea, rail, and road transportation became a hurdle as the drivers and crew had to go through the health checks, and sometimes, they had to wait for the borders to be opened for them to move forward. Some global logistics companies opted for a source close to home to ensure their customers get the required material on time and in good conditions (Dabre, 2020). Other companies are looking to diversify their sources so that when one source is unavailable, they can always get the products from another. Changing the sourcing pattern and location requires the company to be flexible in its operations. Additionally, changing the operation system and adopting a new one is challenging and requires time and resources.

4.1.3. WORKFORCE AND CAPACITY SHORTAGE

The fluctuations in supply and demand and low profits led to layoffs to cut costs since the profits were down. The retained workers were strained since the limited shifts caused burnout and stress. A study by Singh and associates (2021) posits that more than 2 billion workers were affected by the lockdown during the pandemic. Labor-intensive sectors like textile, agriculture, mining, and hospitality were most affected by the workforce shortage since some temporarily migrated while others were sent home to cut costs. Reduced labor force lowered production, and the logistics could not meet the product demands. An article by UNCTAD (2021) shows that port labor shortage caused operations strains, leading to many blank sails and delivery delays.

Workforce shortage also made it difficult to maintain the carriers, which led to more vessels being packed instead of transporting products, contributing to the capacity shortage (UNCTAD, 2021). The capacity shortage was also contributed by a limited number of truck drivers and the restricted road and rail transportation which led to congestion at the ports. Most of the available chassis were holding goods waiting to be loaded on the cargo ships. The association between

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travel restrictions, shortage of workforce, and storage capacity contributed to challenges in inventory management.

4.1.4. INVENTORY MANAGEMENT CHALLENGES

Inventory management determines the efficiency of product storage, which is central in manipulating logistics. Proper management of the inventories help managers, researchers, and planners understand the relationship between logistics and inventory and make the right decisions (Mangan and Lalwani, 2016). Companies in the logistics industry need innovations designed to manage the checklist to help quickly identify items, optimize stock space and analyze prioritized products for the customers. Many businesses were closed during the pandemic, and the lockdowns put operating companies at a standstill, leading to an inventory buildup; sometimes, products spoilt before reaching their destination. A study carried out in a Columbian Biosafety distribution facility shows that the pandemic affected inventory management. The solution was to create visibility to track what goods were needed most and the availability in the warehouses (Pérez Vergara et al., 2021). According to the survey, inventory management helps the organization prioritize the products to be sold first, depending on the urgency and current conditions. Technology and human decision-making go a long way in ensuring proper decisions are made regarding the inventory (Pérez Vergara ET AL., 2021). Many logistic companies have long cycles because of the long time spent on transportation, and they do not have visibility. The covid 19 pandemic added to these existing challenges mainly due to delays. Inventory management challenges are closely related to warehousing since warehouses are managed through a proper and accurate inventory.

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4.1.5. WAREHOUSING

Because of the lockdowns and movement restrictions imposed on the population, most consumers preferred to do business with companies that dropped the products at their doorstep. The measures put in place to control the spread of the virus, like social distancing, quarantine, and restricted movement, posed a challenge to logistic companies. The warehouse struggled to manage its inventory to ensure no pileup or limited storage space. Other companies were forced to bring their warehouses closer to the market to avoid reevaluating their operations and keep providing customer service. Given the challenges faced by the movement restriction, logistics companies had to change how they operated. For goods that were likely to go bad, the warehouses needed special storage conditions, and since the sudden pandemic, it was expensive to set up these facilities. The consumers' purchasing behavior forced logistic companies to utilize 3rd logistics party (3PL) who use alternative means of transport, use technology and prioritize delivery of goods where the most important products like foodstuff are given priority (Twinn et al., 2020). Warehousing issues posed significant challenges during the COVID 19 pandemic, and logistic companies needed to find solutions fast to avoid more losses and gain stability in their business.

4.2. Managing the Challenges and Moving Forward

The COVID 19 pandemic challenged the preparedness of the global logistics companies in case of uncertainties. Throughout history, economists and researchers have advocated for a resilient supply chain that can weather any situation. International logistics companies have realized the vulnerabilities in the supply chain. Diversifying the sources of products, opting for regionalization, moving closer home instead of globalization, and depending on far away nations like China. Warehousing companies opted for technology like using robots for packaging since

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the human labor force was scarce. Similarly, they used artificial intelligence to analyze big data and forecast inventory management. A study by Srinivas and Marathe (2021) suggests using mobile warehouses strategically placed in different locations with an inventory that meets the necessary needs of the people and businesses in that particular location.

The distribution bottlenecks during the pandemic made the companies opt for cheaper direct selling. Through improved visibility, global logistics brands can track their products' movement and create a relationship with their customers through feedback, ensuring business stability now and in the future. The pandemic also changed consumers purchasing behavior, and they opted for electronic commerce. Logistics companies had to adjust to these new normals and create an online presence to help reach the customers and provide the services that fulfill their needs. Another way of managing the challenges is through the contactless delivery system, where businesses ensure the products reach their customers on time and in perfect condition. The contactless delivery system can be incorporated into the normal transportation modes (Perkumienė et al., 2021). For instance, the road and belt initiative to locate logistic distribution centers along the main highways in China contributed to continued transportation during the pandemic (Lee et al., 2022). Other countries can use the same method to ensure the business continues despite their challenges. All in all, smart logistics is the way to go, since through digitalization of the logistics process, shortening the supply chain and bringing products closer offer the best solution and help create a more resilient supply chain.

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Chapter 5: Conclusions and Recommendations For Future Research

The disruptions caused by the COVID 19 pandemic are significant and exposed the supply chain's vulnerabilities. Globalization is good for business as it allows connections between different nations, which are essential for business. Global logistics rely on these connections to ensure timely delivery of products from one point to another. The challenges posed by the pandemic show that the international logistics companies need to reevaluate their system of operation. Issues with warehousing, capacity, and workforce shortages can be solved through automation. Solely depending on a single source for products is dangerous. Global logistics companies need to diversify and reduce the supply chain to enable faster delivery of goods within the expected time, at no extra cost, and in a suitable condition. The companies should also invest in warehouses that utilize technology and has special storage facilities for perishable products or those that need special storage before they are transported to the desired destinations.

The current study provides valuable solutions that companies can use even after the pandemic to make their operations seamless, less costly, and more resilient in case of future uncertainties that may cause disruptions like those created by the COVID 19 pandemic. Notably, the pandemic provided businesses with new opportunities, like e-commerce, which they can salvage and make profits to recover the losses encountered during the pandemic. Future studies can utilize the information gathered in the meta-analysis to analyze the impact of a pandemic on global business and how companies can work around these challenges. The study was limited to the covid 19 pandemic due to the unavailability of other supporting evidence regarding other pandemics, which limits the findings. Future research can dwell on other pandemics that affected the world and the challenges these particular pandemics brought to the global logistics.

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References

- Akintokunbo, O. O., & Adim, C. V. (2020). Covid-19 and supply chain disruption: A conceptual review. *Asian Journal of Economics, Business, and Accounting*, 19(2), 40-47.
- Alicke, K., Barriball, E., Lund, S., & Swan, D. (2020). Is your supply chain risk blind—Or risk resilient. *McKinsey & Company*.
- Attinasi, M. G., Balatti, M., Mancini, M., & Metelli, L. (2022). Supply chain disruptions and the effects on the global economy. *Economic Bulletin Boxes*, 8.
- Constantinescu, C., Mattoo, A., Ruta, M., Maliszewska, M., & Osorio-Rodarte, I. (2019). *Global Trade Watch 2018*.
- Dabre, R. (2020). Four Key Challenges Faced by Logistics Industry during COVID-19. *Gocomet Blog*. Retrieved from <https://www.gocomet.com/blog/4-key-challenges-faced-by-logistics-covid/>
- Dash, T. R., & Charman, K. P. (Eds.). (2022). *Covid-19: The Economy and Society*. Allied Publishers.
- Docherty, I., Marsden, G., Anable, J., & Forth, T. (2021). Transport, the economy and environmental sustainability post-Covid-19. In *Productivity and the Pandemic*. Edward Elgar Publishing.
- Erhie, E. (2020). Impact of COVID-19 on the Supply Chain Industry. <https://www.pwc.com/ng/en/assets/pdf/impact-of-covid19-the-supply-chain-industry.pdf>
- Flick, U. (Ed.). (2013). *The SAGE handbook of qualitative data analysis*. Sage.
- Gereffi, G., & Lee, J. (2012). Why the world suddenly cares about global supply chains. *Journal of supply chain management*, 48(3), 24-32.

CHALLENGES OF GLOBAL LOGISTICS DURING PANDEMIC

- Ghosh, P., & Sharma, R. R. K. (2020). Challenges of logistics and supply chain management during covid-19. In *2nd African International Conference on Industrial Engineering and Operations Management, IEOM 2020* (pp. 713-714). <https://search.bvsalud.org/global-literature-on-novel-coronavirus-2019-ncov/resource/en/covidwho-1232817>
- Goel, R. K., Saunoris, J. W., & Goel, S. S. (2021). Supply chain performance and economic growth: The impact of COVID-19 disruptions. *Journal of Policy Modeling*, 43(2), 298-316.
- Hohenstein, N. O. (2022). Supply chain risk management in the COVID-19 pandemic: strategies and empirical lessons for improving global logistics service providers' performance. *The International Journal of Logistics Management*.
- Mangan, J., & Lalwani, C. (2016). *Global logistics and supply chain management*. John Wiley & Sons.
- Mathews, J. (2018). Schumpeter in the twenty-first century: Creative destruction and the global green shift. In *Schumpeter's Capitalism, Socialism and Democracy* (pp. 233-254). Routledge.
- Pérez Vergara, I. G., López Gómez, M. C., Lopes Martínez, I., & Vargas Hernández, J. (2021). Strategies for the preservation of service levels in the inventory management during COVID-19: A case study in a company of biosafety products. *Global Journal of Flexible Systems Management*, 22(1), 65-80.
- Perkumienė, D., Osamede, A., Andriukaitienė, R., & Beriozovas, O. (2021). The impact of COVID-19 on the transportation and logistics industry. *Problems and perspectives in management*, 19(4), 458-469.

CHALLENGES OF GLOBAL LOGISTICS DURING PANDEMIC

Richey, R. G., Morgan, T. R., Lindsey-Hall, K., & Adams, F. G. (2016). A global exploration of big data in the supply chain. *International Journal of Physical Distribution & Logistics Management*.

Rivera, A. (2020). The impact of COVID-19 on transport and logistics connectivity in the landlocked countries of South America.

Singh, S., Kumar, R., Panchal, R., & Tiwari, M. K. (2021). Impact of COVID-19 on logistics systems and disruptions in food supply chain. *International Journal of Production Research*, 59(7), 1993-2008.

Srinivas, S. S., & Marathe, R. R. (2021). Moving towards "mobile warehouse": Last-mile logistics during COVID-19 and beyond. *Transportation Research Interdisciplinary Perspectives*, 10, 100339.

Twinn, C. I., Qureshi, N. A., Conde, M. L., Guinea, C. G., Perea Rojas, D. S., Gupta, H., & Luo, J. (2020). The impact of COVID-19 on logistics. <https://documents1.worldbank.org/curated/en/944061596087531129/pdf/The-Impact-of-COVID-19-on-Logistics.pdf>

Twinn, C. I., Qureshi, N. A., Conde, M. L., Guinea, C. G., Perea Rojas, D. S., Gupta, H., & Luo, J. (2020). The impact of COVID-19 on logistics. https://www.ifc.org/wps/wcm/connect/2d6ec419-41df-46c9-8b7b-96384cd36ab3/IFC-Covid19-Logistics-final_web.pdf?MOD=AJPERES&CVID=naqOED5

UNCTAD. (2021). Container Shipping in Times of COVID-19: Why Freight Rates have Surged, and Implications for PolicyMakers. https://unctad.org/system/files/official-document/presspb2021d2_en.pdf

CHALLENGES OF GLOBAL LOGISTICS DURING PANDEMIC

Wu, Y. C., Chen, C. S., & Chan, Y. J. (2020). The outbreak of COVID-19: An overview. *Journal of the Chinese medical association*, 83(3), 217.

Zhang, Q., Vonderembse, M. A., & Lim, J. S. (2005). Logistics flexibility and its impact on customer satisfaction. *The International journal of logistics management*, 16(1), 71-95.