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Group 6

Annotated Bibliography

1. **Amir Hossein Ghadir, Hadi Rezaei Vandchali, Masoud Fallah, Erfan Babaee Tirkolaee (2022). Evaluating the impacts of COVID-19 outbreak on supply chain risks by modified failure mode and effects analysis: a case study in an automotive company**

   The purpose of the research is to examine how the COVID-19 outbreak has affected the risks associated with an automobile company's supply chain. To determine potential risks and their effects on the supply chain, the authors modified a Failure Mode and Effects Analysis (FMEA). There are two phases to the investigation. The authors initially recognized the potential dangers connected to the COVID-19 outbreak by gathering information from the company's suppliers. The risks and their effects on the supply chain were assessed using a modified FMEA in the second phase. The study's findings demonstrate that the COVID-19 outbreak significantly affects the supply chain risks for the automobile industry. The authors highlighted a number of potential concerns, such as transportation disruptions, shortages of raw materials, and delivery delays. The authors were also able to assess the seriousness, likelihood, and detection of these hazards with the aid of the modified FMEA. According to the study's findings, the modified FMEA can be a useful method for assessing how the COVID-19 epidemic has affected supply chain risks. The authors advise using this tool to help businesses identify potential hazards and create strategies to reduce them. The authors also advise businesses to create a crisis management plan to deal with unforeseen catastrophes like pandemics and diversify their supply chain.

   https://link.springer.com/article/10.1007/s10479-022-04651-1

2. **Brintrup A, Pak J, Ratiney D, et al. Supply chain data analytics for predicting supplier disruptions: a case study in complex asset manufacturing. *International Journal of Production Research*. 2020;58(11):3330-3341-3341. doi:10.1080/00207543.2019.1685705**
   This is a case study examining the use of data analytics in predicting first tier supply chain disruptions utilizing historical performance data. Their results found that adding engineered features in the data, especially agility, outperformed other experiments. They found that machine learning offered significant improvements in the prediction of disruptions even with limited internal historical data because it is able to find patterns in seemly random external factors. Authors suggest data augmentation as an area of future research.
   https://proxyiub.uits.iu.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=edselc&AN=edselc.2-52.0-85075130570&site=eds-live&scope=site

3. **Cabral I, Grilo A, Cruz-Machado V. A decision-making model for Lean, Agile, Resilient and Green supply chain management. *International Journal of Production Research*. 2012;50(17):4830-4845. doi:10.1080/00207543.2012.657970**
   The authors describe how Lean, Agile, Resilient, and Green (LARG) practices should be incorporated into supply chains (SC) while ensuring that SCs remain competitive. Lean relates to cost minimalization and waste elimination. Agile relates to flexibility, such as the ability to react to changes in demand, including the ability to deliver the right products to customers at the right time. Resilience refers to the capacity to overcome problems, such as responding to unexpected disturbances. Finally, green refers to environmental sustainability, including green product design, material sourcing and selection, marking, consumption, delivery, and end-of-life management. Many recommendations to improve a specific aspect of LARG comes with trade-offs on another; the authors introduce a framework to assist with decision making about which aspect to implement. Authors considered capacity surplus, replenishment frequency, information frequency, integration level, inventory level, production lead time, and transportation lead time. Authors utilizes the analytic network process (ANP) model to support decision making, and used Autoeuropa VW as a case study.
   https://proxyiub.uits.iu.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=79241973&site=ehost-live&scope=site

4. **Chitra Lekha Karmeker, Tazim Ahmed, Sayem Ahmed, Syed Mithun Ali, Md. Abdul Moktadir, Golam Kabir (2020). Improving supply chain sustainability in the context of COVID-19 pandemic in an emerging economy: Exploring drivers using an integrated model**

   The purpose of this research is to identify the factors that, in the context of the COVID-19 pandemic in a rising country, can enhance the sustainability of supply chains. It starts off by going through how COVID-19 has affected supply chains, including how there have been delays in transportation and logistics, a scarcity of raw materials, and decreased demand. They point out that these difficulties have brought attention to the importance of robust and sustainable supply networks. After that, the authors put forth a comprehensive strategy for enhancing supply chain sustainability in light of the pandemic. The four drivers in the model are technological, social, economic, and environmental. These elements are further divided into sub-factors including digitalization, labor practices, financial performance, and carbon footprint. The authors surveyed 162 businesses in an emerging market to test the approach. The findings indicate that the economic and technological drivers have a limited impact on supply chain sustainability, whereas the environmental and social drivers have a considerable impact. The sub-factors of carbon footprint and waste reduction were discovered to be the most crucial within the environmental driver. The sub-factor of labor practices had the biggest effect on the social driver. In light of the COVID-19 epidemic, they come to the conclusion that their integrated approach can assist businesses in identifying the factors that are most crucial for enhancing supply chain sustainability. To increase the sustainability of their supply

chains, they advise businesses to concentrate on lowering their carbon footprint, enhancing waste reduction initiatives, and implementing sustainable labor standards. They also stress the importance of cooperation between businesses, governments, and other stakeholders in order to create supply chains that are more sustainable and resilient.

https://doi.org/10.1016/j.spc.2020.09.019

5. **Dalia Perkumiene, Agbonmere Osamede, Regina Andriukaitiene, Olegas Beriozovas (2021). The impact of COVID-19 on the transportation and logistics industry**

The transportation and logistics sector has been significantly impacted by the COVID-19 pandemic. This sector includes many different types of organizations, such as shipping companies, transportation companies, airplanes, and warehouses. Global supply chains have been affected by the pandemic, consumer demand for some products has decreased, and several businesses in the sector have suffered large financial losses. Global trade has drastically decreased, which has had one of the biggest effects on the transportation and logistics sector. Reduced consumer demand, travel restrictions, and lockdowns have all contributed to a drop in the amount of items being carried. As a result, shipping companies and transportation companies are finding it challenging to fill their fleets and sustain profitability. The relevance of digitalization in the transportation and logistics sector has also been brought to light by the pandemic. Businesses who had already made investments in e-commerce platforms and digital technology were better able to adjust to the shifting market dynamics. Digital solutions had to be quickly implemented by many enterprises in order to keep running during lockdowns and social seclusion measures. A shortage of qualified workers in the sector has been one of the pandemic's major effects. Companies have struggled to keep their staff as many employees have been forced to stay at home owing to illness or quarantine restrictions. This has caused delivery times to be delayed and business costs to rise. Overall, the transportation and logistics sector has been severely impacted by the COVID-19 outbreak. Several businesses have found it difficult to survive the shifting market conditions, while others have been able to adapt and even thrive in them. It is expected that the industry will continue to face major changes and difficulties as the world struggles to deal with the pandemic and its effects.

http://dx.doi.org/10.21511/ppm.19(4).2021.37

6. **Dilek Ozdemir, Mahak Sharma, Amandeep Dhir &Tugrul Daim (2022). Supply chain resilience during the COVID-19 pandemic**

This study aimed to understand how well existing solutions facilitated supply chain resilience in the UK perishable goods market. Consistent with this aim, they developed a research model based on the supply chain resilience literature and tested it with

covariance-based structural equation modeling. Data were collected from 282 retail employees. Supply chain velocity was the preferred measure of resilience. The findings demonstrate that pandemic-related disruptions have affected resilience-building activities. While both proactive and reactive approaches have promoted resilience building during the pandemic, they have not been sufficient to ameliorate all the pandemic's negative effects. Innovation featured as the most effective factor, followed by robustness, empowerment, and risk management via reduced risk. The effect of firm size was significant only on supply chain risk management, with larger companies more efficiently applying risk management practices. The results emphasize the importance of innovation for supply chain resilience. Regardless of firm size, innovation works for every company. Empowerment is another costless and effective tool. Therefore, it is safe to conclude that innovation and empowerment can help organizations to manage their supply chains effectively during crises. Companies can strengthen their supply chain resilience by developing strong relationships with their suppliers and employees.

https://www.sciencedirect.com/science/article/pii/S0160791X21003225

7. **Fonseca, L. M., & Azevedo, A. L. (2020). COVID-19: outcomes for global supply chains.** ***Management & Marketing. Challenges for the Knowledge Society*****,** ***15*****(s1), 424-438.**

This paper has identified and analyzed the possible impacts of the Coronavirus crisis in the global supply chains. From the various lessons learned, it is recognized that companies and supply chains need to improve their resilience by adopting new organizational and management policies and practices and technologies for digitizing their interrelated processes to have greater visibility up and downstream. Also in this paper, theoretical background on Supply Chains and Supply Chain Management are presented.
-(p.4) Supply Chain Management (SCM) incorporates the range of activities coordinated by an organization to procure and manage supplies (Oliver and Webber, 1982). SCM is an ‘‘umbrella construct’’ that incorporates supplier and network sourcing, and demand and value chain and integrated logistics management (Croom et al., 2000; Romano and Vinelli, 2001; Kotzab and Otto, 2004, Fonseca & Lima, 2015). A supply chain involves all parties that directly or indirectly fulfill a customer request (Chopra and Meindl, 2007).
-(p.12) The acceleration of the end-to-end digital transformation, both on the demand and the supply side, means that consumers will have to adapt to the contact-free economy, less low-cost supply chains, and put additional emphasis on service levels. Moreover, Governments will reinforce the focus in the health sector supply chain and will increase spending in the health and social care sectors.

https://sciendo.com/pdf/10.2478/mmcks-2020-0025

8. **Ghadge A, Wurtmann H, Seuring S. Managing climate change risks in global supply chains: a review and research agenda.** ***International Journal of Production Research*****. 2020;58(1):44-**

64. doi:10.1080/00207543.2019.1629670

In this article the authors utilize text mining to identify high level themes in published literature relating to climate change and supply chain management (SCM). The authors then presented a framework to understand the impact of climate change on SCM, including risk identification, risk assessment, and risk mitigation. They suggest that a holistic management approach is needed to mitigate climate changes' impact on SCM, including topics such as household recycling, energy consumption, over-processing, and waste disposal. Natural resource scarcity, food shortages, external disruptions, and facility changes are common topics explored with regards to SCM and climate change. There are five identified "control drivers" for climate change: regulatory, physical, market, resources, and combined. Government, policy makers, and end customers are the key drivers / barriers to climate change mitigation. Finally, they named supply chain risk mitigation strategies, including carbon mapping, user of alternative fuels, shift to intermodal transportation, and environmentally friendly product design.
https://proxyiub.uits.iu.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=140854878&site=eds-live&scope=site

9. **Ghazi M. magableh. (2021). Supply Chains and the COVID-19 Pandemic: A Comprehensive Framwork.**

   This study examines the impact of the COVID-19 pandemic on SCs regarding its disruptions, associated challenges, and trends. It conducts an analysis of SCs stages, phases, and manifestations regarding the consequences, opportunities, and developments induced by the pandemic. A framework for the SC with COVID-19 is presented towards a future global value chain and continuous improvements. It explores and connects the relevant elements to address the relations of SC-COVID19 (SCC19). This study is novel as it identifies, categorizes, and frames the essential factors and their interrelationships in a comprehensive framework. The SCC19 framework can be of value for decision-makers and researchers, and can be generalized to other industries.

   https://onlinelibrary.wiley.com/doi/full/10.1111/emre.12449

10. **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., Environ Syst Decis 40, 222–243**

    This paper reviews supply chain resilience literature that focuses on resilience modeling and quantification and connects the supply chain to other networks, including transportation and command and control. We observe a fast increase in the number of relevant papers (only 47 relevant papers were published in 2007–2016, while 94 were found in 2017–2019). We observe that specific disruption scenarios are used to develop

and test supply chain resilience models, while uncertainty associated with threats including consideration of “unknown unknowns” remains rare. Publications that utilize more advanced models often focus just on supply chain networks and exclude associated system components such as transportation and command and control (C2) networks, which creates a gap in the research that needs to be bridged. In the case of the COVID-19 pandemic, viable treatment options are dependent on: (1) the efficacy of the drug itself and (2) the ability of the supply chain to withstand demand. The common goal of supply chain modeling is to optimize efficiency and reduce costs, but trade-offs of efficiency and leanness with flexibility and resilience may not be fully addressed. We conclude that a comprehensive approach to network resilience quantification encompassing the supply chain in the context of other social and physical networks is needed to address the emerging challenges in the field. The connection to systemic threats, such as disease pandemics, is specifically discussed.

https://link.springer.com/article/10.1007/s10669-020-09777-w

11. **Goli Arji et al.(2023). Identifying resilience strategies for disruption management in the healthcare supply chain during COVID-19 by digital innovations: A systematic literature review**

This paper is analyzes existing studies mitigating strategies for disruption management in the healthcare supply chain during COVID-19. Using a systematic approach, we recognized 35 related papers. Artificial intelligence (AI), block chain, big data analytics, and simulation are the most important technologies employed in supply chain management in healthcare. The findings reveal that the published research has concentrated mainly on generating resilience plans for the management of COVID-19 impacts. Furthermore, the vulnerability of healthcare supply chains and the necessity of establishing better resilience methods are emphasized in most of the research. However, the practical application of these emerging tools for managing disturbance and warranting resilience in the supply chain has been examined only rarely. This article provides directions for additional research, which can guide researchers to develop and conduct impressive studies related to the healthcare supply chain for different disasters.This manuscript systematically identified and analyzed current studies on identifying key strategies to mitigate disturbances in the healthcare SC. This manuscript contributes to the research in various ways. According to the analysis, healthcare supply chain management in pandemics concentrates on six domains such as vaccine distribution, personal protective equipment, drug supply chain, blood supply chain, healthcare delivery strategy, and medical supply tracking methods.Although this paper contributes to the healthcare SC, it also has some restrictions. In this paper, we analyzed papers published merely up to June 20, 2022 and only those in the English language; books, conference proceedings, and gray literature were not included in the current research. Furthermore, we searched Scopus and Web of Science for these papers. It is possible that some other papers not included in the mentioned databases have been

ignored. Therefore, the results presented in this paper may not demonstrate the whole facts in this field.This research can be extended by focusing on the key supply chain issues, methodological innovations, and theoretical research based on hypothesis development. Moreover, future research may focus more on the uncertainty modeling approach in healthcare supply chain operations during the COVID-19 pandemic.

https://www.sciencedirect.com/science/article/pii/S2352914823000412

12. **Hald, K. S., & Coslugeanu, P. (2022). The preliminary supply chain lessons of the COVID-19 disruption—What is the role of digital technologies?. *Operations Management Research*, *15*(1-2), 282-297.**

    This research seeks to understand how the COVID-19 event leads to impacts, lessons, and proposed solutions for the operations of global supply chains. Six supply chain vulnerabilities are identified: 1) overreliance on cost efficiency, 2) globalized supply chains, 3) lack of flexibility, 4) lack of visibility, 5)lack of preparedness for disruptions and 6) interconnectivity of supply chains. The literature analysis revealed that the most frequently proposed solutions are: 1) Regionalization, 2) redundancy, 3) risk management, 4) flexibility, 5) visibility and 6) collaboration. Investment in digital solutions emerged as the most often discussed long-term strategy for protecting the supply chain from large-scale pandemic-caused disruptions.The research introduces the digital solutions: IoT, artificial intelligence, machine learning, robotics, three-dimensional printing, augmented reality etc.

    https://link.springer.com/article/10.1007/s12063-021-00207-x#Sec10

13. **Handfield, R. B., Graham, G., & Burns, L. (2020). Coronavirus, tariffs, trade wars and supply chain evolutionary design. *International Journal of Operations & Production Management*, *40*(10), 1649-1660.**

    In this paper, the authors have the viewpoint that major disruptions of the global economy are a function of events that are indeed part of the natural evolution of supply chains, which follow the constructal law of physics, as applied to supply chains. Authors report interview findings with two senior VPs(one a multi-national automobile parts supplier and the other is a earth-moving equipment manufacturer) from two multinational corporations being disrupted by COVID-19. The authors believe that COVID-19 and other trade disruptions such as Brexit and the USA imposing tariffs is creating new obstacles that will redirect the future flow of supply chains. By interview, the authors suggest there are four pathway topics going forward: the future state of global sourcing, the unique nature of a combined “demand” and “supply shortage” bullwhip effect, the resurrection of lean and local production systems and the development of risk-recovery contingency strategies to deal with pandemics.

- (p.12) Organizations that have more tightly compressed and responsive supply chains are enjoying a significant benefit during the COVID-19 crisis and are no longer being held hostage to the impacts of political decisions of governments of another country. During a crisis, countries become very selfish, as illustrated by the hoarding of N95 masks in China by the Communist Party, even though a large number of masks are produced by 3M, an American company with a factory in China.

https://eprints.whiterose.ac.uk/161923/1/PDF_Proof%20%282%29.PDF

14. **Javid Moosavi, Amir M. Fathollahi-Fard, and Maxim A. Dulebenets. (2022). Supply chain disruption during the COVID-19 pandemic: Recognizing potential disruption management strategies.**

The catastrophic impact of the COVID-19 pandemic prompted scholars to develop innovative SC disruption management strategies and disseminate them via numerous scientific articles. However, there is still a lack of systematic literature survey studies that aim to identify promising SC disruption management strategies through the bibliometric, network, and thematic analyses. In order to address this drawback, this study presents a set of up-to-date bibliometric, network, and thematic analyses to identify the influential contributors, main research streams, and disruption management strategies related to the SC performance under the COVID-19 settings. The conducted analyses reveal that resilience and sustainability are the primary SC topics. Furthermore, the major research themes are found to be food, health-related SCs, and technology-aided tools (e.g., artificial intelligence (AI), internet of things (IoT), and blockchains). Various disruption management strategies focusing on resilience and sustainability themes are extracted from the most influential studies that were identified as a part of this work. In addition, we draw some managerial insights to ensure a resilient and sustainable supply of critical products in the event of a pandemic, such as personal protective equipment (PPE) and vaccines.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9027543/#abs0010title

15. **Kazi Safowan Shahed, Adbullahil Azeem, Syed Mithun Ali & Md.Abdul Moktadir. (2021). A supply chain disruption risk mitigation model to manage COVID-19 pandemic risk.**

This study develops a mathematical model to mitigate disruptions in a three-stage (i.e., supplier, manufacturer, retailer) supply chain network subject to a natural disaster like COVID-19 pandemic. This optimization model aims to manage supply chain disruptions for a pandemic situation where disruptions can occur to both the supplier and the retailer. This study proposes an inventory policy using the renewal reward theory for maximizing profit for the manufacturer under study. Tested using two heuristics algorithms, namely the genetic algorithm (GA) and pattern search (PS), the proposed inventory-based

disruption risk mitigation model provides the manufacturer with an optimum decision to maximize profits in a production cycle. A sensitivity analysis was offered to ensure the applicability of the model in practical settings. Results reveal that the PS algorithm performed better for such model than a heuristic method like GA. The ordering quantity and reordering point were also lower in PS than GA. Overall, it was evident that PS is more suited for this problem. Supply chain managers need to employ appropriate inventory policies to deal with several uncertain conditions, for example, uncertainties arising due to the COVID-19 pandemic. This model can help managers establish and redesign an inventory policy to maximize the profit by considering probable disruptions in the supply chain network.In this research, we considered the reliability as a decision variable that is non-integer by value and deterministic. In future research, reliability can be considered as probabilistic to modify the model. A manufacturer may have multiple suppliers. In this study, only a single supplier was considered for the manufacturer. Therefore, the work can be extended by considering multiple suppliers for the manufacturer considering the epidemic outbreak. In this research, zero lead time has been considered, although in reality, there is always a finite lead time associated with the orders. Hence, lead time may be introduced in the model. Furthermore, instead of a continuous-time Markov chain (CTMC), a semi-Markov chain can be used for transient probabilities.

https://link.springer.com/article/10.1007/s11356-020-12289-4

16. **Khizar Hayat, Zhu JianJun, Sharafat Ali, Muhammad Adeel Khan (2021). Exploring factors** of the sustainable supply chain in the post-COVID-19 pandemic: SWARA approach

The COVID-19 pandemic and the necessity for enterprises to adopt sustainable practices in their operations are both highlighted in the study as being important factors in sustainable supply chain management. The aspects of a sustainable supply chain are ranked using the SWARA (Step-wise Weight Assessment Ratio Analysis) approach in the article. The SWARA approach is a multi-criteria decision-making (MCDM) technique that assesses the significance of numerous aspects using ratio-based weights. In the post-COVID-19 pandemic period, the study highlights nine characteristics that have an impact on the supply chain's sustainability. These elements include innovation, stakeholder engagement, digitalization, agility, supply chain transparency, social responsibility, environmental sustainability, and economic viability. The article comes to the conclusion that the most crucial elements in developing a sustainable supply chain in the post-COVID-19 pandemic period are social responsibility, environmental sustainability, and economic viability. The study also makes the suggestion that companies give these elements the top priority in their supply chain management strategies in order to improve operations' sustainability and resilience. The SWARA approach document, taken as a whole, offers helpful insights into the elements that companies must take into account to create a sustainable supply chain in the post-COVID-19 pandemic age. The study emphasizes the significance of sustainable supply chain management techniques and

offers a practical methodology for deciding which important variables should come first in order to achieve sustainability and resilience in supply chain operations.

https://link.springer.com/article/10.1007/s11356-021-16908-6

17. **M.C. Mangano et al.(2021). The aquaculture supply chain in the time of covid-19 pandemic: Vulnerability, resilience, solutions and priorities at the global scale**

    In this paper, they performed a rapid global assessment to evaluate the effects of the COVID-19 pandemic and related emerging control measures on the aquaculture supply chain. Socio-economic effects of the pandemic were analyzed by surveying the perceptions of stakeholders, who were asked to describe potential supply-side disruption, vulnerabilities and resilience patterns along the production pipeline with four main supply chain components: 1. hatchery, 2. production/processing, 3. distribution/logistics and 4. market. Also assessed different farming strategies, comparing land- *vs.* sea-based systems; extensive *vs.* intensive methods; and with and without integrated multi-trophic aquaculture, IMTA. In addition to evaluating levels and sources of economic distress, interviewees were asked to identify mitigation solutions adopted at local / internal (*i.e.,* farm-site) scales, and to express their preference on national / external scale mitigation measures among a set of *a priori* options. Survey responses identified the potential causes of disruption, ripple effects, sources of food insecurity, and socio-economic conflicts. They also pointed to various levels of mitigation strategies. Adopted and preferred mitigation solutions at internal and external scale.

    https://www.sciencedirect.com/science/article/pii/S146290112100294X

18. **Margaritis I, Madas M, Vlachopoulou M. Big Data Applications in Food Supply Chain Management: A Conceptual Framework. *Sustainability*. 2022; 14(7):4035. https://doi.org/10.3390/su14074035**
    Authors review literation on big data applications in the context of food supply chain management. They concluded that the technology as applied to the industry is still relatively primitive and highly fragmented across domains. In addition to supply chain issues, food quality and safety, and food loss are also common topics. Tracking and tracing agriculture producs, decision making, social media analytics, tackling food insecurity, and data -driven city logistics are some of the current domain categories. Finally, authors suggested potential future topics for research, including the development of data analytics capability withing food supply chain, increasing food quality, examining food loyalty programs, and the role of big data in future food supply chain resilience.
    https://www.mdpi.com/2071-1050/14/7/4035
19. **Mason Frye, Bill McTier, Dr. Umiy Saglam (2022). Exploring Inventory Management's Effects on a Company's Profitability**

In this paper, we examine how inventory control affects a company's profitability in depth. JIT inventory management, economic order quantity (EOQ), and ABC analysis are among the inventory management techniques examined in this study. Research from previously released studies on inventory management is presented in order to provide a conceptual framework to address the relevance query. The EOQ method is useful for balancing ordering costs with carrying costs, but it is based on the assumption that demand will remain constant.Interviews with accomplished business people in the area also shed more light on the precise inventory management techniques that impact performance and profitability. Also, these experts go into how the techniques are still used successfully in the modern world. Finally, this thesis will examine unique difficulties the coronavirus epidemic poses for inventory managers around the world and solutions being used by experts in the field through these difficult times. It is concluded in the article that an organization's profitability can be greatly increased through effective inventory management. Since there is no one-size-fits-all approach to managing inventory, companies must carefully consider their particular needs and circumstances before making a decision.

https://dc.etsu.edu/cgi/viewcontent.cgi?article=1887&context=honors

20. **Moustafa Mohamed Nazief Haggag Kotb Kholaif, Xiao Ming (2022). COVID-19's fear-uncertainty effect on green supply chain management and sustainability performances: the moderate effect of corporate social responsibility**

The COVID-19 pandemic's consequences on green supply chain management and sustainability performance are examined in the article, with a focus on the function of corporate social responsibility (CSR) in minimizing these effects. It opens with a brief introduction of the COVID-19 epidemic and its effects on international supply chains and sustainability initiatives. The idea of "fear-uncertainty" is then introduced, which describes the fear and apprehension businesses feel in times of crises like the COVID-19 pandemic. Fear and uncertainty can have a negative effect on the sustainability and green supply chain management performances because businesses may put short-term survival aims ahead of long-term sustainability objectives. The authors contend that CSR can reduce the detrimental impacts of fear and uncertainty on the management of sustainable supply chains. They characterize CSR as a company's voluntarily taken initiatives that go above and beyond what is legally required and support social, environmental, and economic sustainability. According to the authors, businesses with robust CSR programs are better able to maintain their sustainability initiatives in emergency situations. The authors surveyed 182 manufacturing companies in China to test their theory, asking them about their CSR, sustainability, and green supply chain management strategies. The survey's findings confirmed the authors' theory that companies with stronger CSR practices were more likely to continue their sustainability initiatives throughout the COVID-19 epidemic. Overall, the research emphasizes the value

of CSR in reducing the detrimental impacts of anxiety and uncertainty on the operation of sustainable supply chains. The results of this study imply that investing in CSR can assist to foster resilience and lessen the negative effects of fear-uncertainty, which has practical implications for businesses looking to maintain their sustainability initiatives in times of crisis.

https://link.springer.com/article/10.1007/s11356-022-21304-9

21. **Nakano K. Future risk of dengue fever to workforce and industry through global supply chain. *Mitigation & Adaptation Strategies for Global Change*. 2018;23(3):433-449. doi:10.1007/s11027-017-9741-4**
    Published in 2017, this article analyses the most pressing risks of dengue fever to the global supply chain . Authors concluded that more than 10% of the workers involved in the supply chain of all major industries in the USA, China, Japan, and Germany could be considered at risk of contracting dengue fever by 2030, and closer to 70% of workers in India and Brazil. Authors utilized input-output tables to determine the ripple effects of production losses. Authors recommended downstream customers introduce health management systems with their business partners. Authors utilized the life cycle assessment framework for adaptive planning (LCA-AP).
    https://proxyiub.uits.iu.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=tsh&AN=127734948&site=ehost-live&scope=site
22. **Nakano K. Screening of climatic impacts on a country's international supply chains: Japan as a case study. *Mitigation & Adaptation Strategies for Global Change*. 2017;22(4):651-667. doi:10.1007/s11027-015-9692-6**
    The author utilized the life cycle assessment technique to evaluate the supply chains of products imported to Japan and identified through land use results that that agricultural products imported from the USA are highly vulnerable to climate change impacts. In addition, through human results, the author identified that electronics and textile imports are also vulnerable. The author recommends that Japan collaborate with key trade partners to increase resilience to climate change, such introducing flood control measures and enhanced health information management. The author recommends and MRIO analysis such as the Global Trade Analysis Project (GTAP) and EXIOBASE) to increase country data reliability, and ultimately called for a database including more detailed sector activities.
    https://proxyiub.uits.iu.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=tsh&AN=122047378&site=ehost-live&scope=site
23. **Nils-Ole Hohenstein (2021). Supply chain risk management in the COVID-19 pandemic: strategies and empirical lessons for improving global logistics service providers' performance**

    The article is based on research on how the COVID-19 pandemic has impacted the performance and supply chain risk management strategies of global logistics service

providers (GLSPs) (SCRM). The report also offers empirical takeaways and suggestions for future GLSP performance enhancement. The investigation was carried out by polling 102 GLSPs from various parts of the world. According to the study's findings, the COVID-19 pandemic has had a substantial impact on how well GLSPs work and has presented them with a number of difficulties, including supply chain disruptions, transportation constraints, a labor and raw material shortage. GLSPs have undertaken a variety of solutions, including supplier diversity, raising safety inventories, and using other modes of transportation, to address these issues. The study also discovered that the degree of preparedness, flexibility, and cooperation between GLSPs and their clients and suppliers all had an impact on how well they performed throughout the epidemic. In order to increase their productivity and resilience, the report advises GLSPs to concentrate on boosting their SCRM capabilities, improving their interactions with clients and suppliers, and implementing digital technology. Overall, the paper offers insightful information about how the COVID-19 pandemic has affected the effectiveness of GLSPs and their SCRM initiatives. The study's empirical insights and suggestions can help GLSPs perform better in the future and be better equipped to handle similar crises.

https://www.researchgate.net/publication/343852256_Supply_Chain_Risk_Management_under_Covid-19_A_Review_and_Research_Agenda

24. **Nyoman Pujawan & Alpha Umaru Bah. (2021). Supply chains under COVID-19 disruptions: literature review and research agenda**

This paper presents a review of literature that addresses supply chains under disruptions due to COVID-19 pandemic. Papers are classified based on issues addressed. The major findings or recommendations are discussed. Five major issues have been discussed, namely the rising importance of safety, digitizing the supply chain, localizing the supply chain, rethinking the meaning of efficiency, and vaccine production and distribution. It shows that most mitigation actions proposed prior to COVID-19 such as redundancy and flexibility are still considered as possible strategies to mitigate supply chain disruptions due to COVID-19, but there are stronger pressures for digitalisation and supply-based localisation. The research agenda is also outlined at the end of the paper.

https://www.tandfonline.com/doi/full/10.1080/16258312.2021.1932568?scroll=top&needAccess=true&role=tab

25. **Olsen, David L. A Review of Supply Chain Data Mining Publications. *Jounral of Supply Chain Management Science.* 2020;1(1-2). doi: 10.18757/jscms.2015.955**

The author classifies supply chain application of data mining, big data, and other forms of knowledge management across all functions to supply change, utilizing scholarly articles sources through SCOPUS and EBSCO Business search engines. This is a field he calls supply

chain analytics (SCA). The author found a wide number of techniques and perspectives, such as knowledge management, big data (risk mitigation, mass customization, impact of planning), forecasting in supply chain management, supplier selection, transportation network and risk analysis, customer feedback analysis. He also highlights many tools, such as cluster analysis, decision tree algorithms, and sentiment analysis.
https://journals.open.tudelft.nl/jscms/article/view/955

26. **Pankratz NMC, Schiller CM. Climate Change and Adaptation in Global Supply-Chain Networks. *Working Papers -- US Federal Reserve Board's Finance & Economic Discussion Series*. August 2022:1-80. doi:10.17016/FEDS.2022.056**
The authors utilized data on global supply-chains, firm financial performance, and local climate exposure to understand the impact of adverse weather events (heat and floods) on firm performance. Data on customer-supplier relationships were from the FactSet Reserve, quarterly financial performance data is from Worldscope, firm locations was from FactSet Fundamentals and Orbis. They found that heat and floods in the supplied locations negatively impact the financial performance of downstream customers. Floods were most disruptive than heat. They suggest that firms may eventually decide to terminate relationships with supplies that frequently exhibit adverse weather events, especially if weather events are worse than expected. This highlights the importance of accurately predicting weather events. Finally, if customers change supplies due to adverse weather, they are likely to select a new supplier that experiences lower temperatures. In effect, this means that developing countries which are more likely to experience the impact of climate change are also more likely to lose their place in the global supply chain.
https://proxyiub.uits.iu.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=edb&AN=159074134&site=eds-live&scope=site

27. **Panwar, R., Pinkse, J., & De Marchi, V. (2022). The future of global supply chains in a post-COVID-19 world. *California Management Review*, *64*(2), 5-23.**

The author says that automation and digitalization are likely to play a key role in transitions of global supply chains. Developing visibility into suppliers' inventories and actions will be a key priority for companies. Companies should strengthen demand forecasting capabilities, something that went amiss in handling the COVID-19 induced supply-chain disruptions. Also companies should make more investments in the development of micro-supply chains that are characterized by finite, decentralized, agile mini operating models, with flexible supplier contracts and relationships, and manufacturing closer to the point of purchase. Micro-supply chains can help companies reduce complexities and avoid long-term contractual commitments. Lastly, companies should make efforts to transport e-commerce orders to customers without relying on human workers, an automation trend we expect to see rising throughout supply chains.
-(p.18) Machine learning (ML) tools can pick changes in retail trends in as short a timeframe as three-to-four weeks and swiftly adjust demand projections. Investing in

developing in-house ML capabilities will be important for supply-chain resilience. More broadly, investment in automation to bolster such technologies as the Internet of Things, cloud computing, and 5G can make it possible to create new sources of data from the physical attributes of a supply chain (e.g., machine vibration tolerance, truck route deviations). Furthermore, artificial intelligence (AI) and robotics can help in improving efficiency and productivity.

https://journals.sagepub.com/doi/pdf/10.1177/00081256211073355

28. **Petersen, E., Ntoumi, F., Hui, D. S., Abubakar, A., Kramer, L. D., Obiero, C., ... & Zumla, A. (2022). Emergence of new SARS-CoV-2 Variant of Concern Omicron (B. 1.1. 529)-highlights Africa's research capabilities, but exposes major knowledge gaps, inequities of vaccine distribution, inadequacies in global COVID-19 response and control efforts.** ***International Journal of Infectious Diseases*****,** ***114*****, 268-272.**

The explosive global spread of COVID-19 pandemic generated international consensus in principle, between the WHO, vaccine developers, governments, funders, donors and industry, with agreement on the need to develop an effective COVID vaccine and plans for fair and equitable rollout to all countries. However, richer nations focused on being the first to develop and roll out COVID-19 vaccines to their own populations, rather than focus on what was best for all of humanity. The emergence of the VOC Omicron variant and its rapid spread reflects the legacy of wealthy nations' failure to equitably distribute COVID-19 vaccines globally. This failure also contributes to prolonging the pandemic, and has placed the whole world at continued risk of COVID-19 and continuing impact on their economies.

-(p.269) Whilst in Europe an average of 60% of the population have received COVID vaccines, in Africa only 5-10% (24% in South Africa) of the population have received the first dose (WHO 2021g).Vaccine acceptance rates have also been low in some African countries. Tragically, concerns regarding access to COVID-19 vaccines in Africa are similar to those raised during the HIV pandemic in the mid-1990s and early 2000s, when highly active antiretroviral treatment (HAART) was accessible in high-income countries but was too expensive for rollout in African countries (Nachega et al., 2021a) - a disparity that resulted in many preventable deaths in these high-burden settings.

-(p.270) Richer countries need to take heed of the WHO slogan that 'none of us is safe until all of us are safe' which has been highlighted ad nauseam.

https://www.ijidonline.com/action/showPdf?pii=S1201-9712%2821%2900888-2

29. **Raj A, Mukherjee AA, de Sousa Jabbour ABL, Srivastava SK.(2022). Supply chain management during and post-COVID-19 pandemic: Mitigation strategies and practical lessons learned.**

In this paper, investigates the supply chain challenges that manufacturing organizations have faced due to the COVID-19 outbreak, particularly in emerging economies. Ten major challenges are identified based on a literature review, evaluation of several news articles, and discussions with experts.We categorize these challenges in three different clusters as supply side, demand side and logistical side. Ten major challenges are 1. Uncertainty of demand. So that triggered an all-time low demand for certain commodities, leading to a significant impact on manufacturing sector companies and their upstream suppliers. 2. Inconsistency of supply. Because of this, poor visibility across supply chains created inconsistency of supply in supply chain. 3. Scarcity of material.(Due to lockdown) 4. Delays in delivery. The COVID-19 pandemic has led to restrictions in transportation and movement of goods and materials, especially through areas that are under restricted or containment categories. 5. Adoption of suboptimal substitutes. 6. Scarcity of labor. 7.Suboptimal manufacturing.Owing to an unprecedented surge in demand for certain products and lack of demand for other products, it has been a challenge for manufacturing companies to manage their product portfolio mix, typically in cases where products share resources such as equipment, infrastructure, raw material and labor. 8. Constraint in capacity (storage). 9.Vehicle unavailability and delays. 10. Last mile delivery challenges. With a view to analyzing the findings and developing a suitable way forward to mitigate the challenges identified to supply chains, it shared our observations with four senior level industry practitioners. It identified these experts based on a purposive sampling approach. It ensured that this group of experts did not include those who participated in the initial pairwise comparison which is required for Grey-DEMATEL analysis.Inconsistency of Supply (PIS) has been identified as the most prominent challenge and is associated with uncertainty of supply from upstream vendors, irregular and indefinite lead times and price volatility. Similarly, Scarcity of Material (SSM) is the second most influencing challenge and is associated with panic buying, hoarding, artificial scarcity, increase in per unit price, import restrictions and questionable continuity of suppliers.Before I mentioned, about three categories, They divided it into short-term and long-term strategies.This has created an opportunity for managers to foster better preparedness to cope with future pandemics and disasters. Our discussion in this study not only helps to mitigate the current ongoing crisis rather it will also help to mitigate future disruptions. In the subsequent subsections, we highlight important implications to literature and managers.

https://www.sciencedirect.com/science/article/pii/S0148296322000492?via%3Dihub

30. **Ramani, V., Ghosh, D., & Sodhi, M. S. (2022). Understanding systemic disruption from the Covid-19-induced semiconductor shortage for the auto industry. *Omega*, *113*, 102720.**

This paper explores how disruptions start, propagate, and continue over time by examining the semiconductor chip shortage faced by the auto industry during the years following Covid-19 in 2020. The main themes identified for the cause of semiconductor

chip shortage include global pandemic, supply disruptions, auto supply chain complexity, chip manufacturing realignment, post-pandemic recovery, and geopolitical risks. The effects of semiconductor chip shortage were: production disruption, inflationary pressures, labor issues, and end consumer and dealer issues. The systemic disruption by Covid-19 has led to additional supply chain issues such as worker shortage in the transportation, shipping, and retail sectors further contributing to within-sector and cross-sector impact. In the future, managers have to consider a systemic view of supply chains that goes beyond immediate upstream or downstream entities. Furthermore, with systemic disruptions, it is unlikely that a company's mitigation efforts would be enough, so it would have to work with the ecosystem of suppliers, competitors, and governments.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9363154/

31. **Remko van Hoek (2020). Responding to COVID-19 Supply Chain Risks—Insights from Supply Chain Change Management, Total Cost of Ownership and Supplier Segmentation Theory**

    Global supply networks have been affected by the COVID-19 epidemic, posing serious problems for enterprises. Supply chain change management, total cost of ownership (TCO), and supplier segmentation theory can all be used to address these issues. In order to increase the effectiveness and efficiency of the supply chain, supply chain change management entails examining and putting changes into place. This can entail finding different suppliers, altering the way things are transported, or changing the way things are produced in the context of COVID-19. Total cost of ownership is a notion that includes not only the cost of the product or service itself, but also costs for things like transportation, inventory management, and quality control. Businesses can reduce supply chain risks by using TCO analysis to assist them make better decisions regarding sourcing, inventory control, and supplier relationships. According to the principle of supplier segmentation, suppliers are grouped according to how important they are to the company and how well they can execute. This can assist companies in allocating resources effectively and prioritizing supplier relationships. In the context of COVID-19, this would entail putting an emphasis on crucial suppliers and making investments in their resilience to reduce supply chain disruption. The research concludes that by putting these three ideas into practice, firms may more effectively manage the risks related to the COVID-19 pandemic and create supply chains that are more robust in the long run.

    https://www.researchgate.net/publication/345415163_Responding_to_COVID-19_Supply_Chain_Risks-Insights_from_Supply_Chain_Change_Management_Total_Cost_of_Ownership_and_Supplier_Segmentation_Theory

32. **Saleheen, F., & Habib, M. M. (2022). Global supply chain disruption management post Covid 19. *American Journal of Industrial and Business Management*, *12*(3), 376-389.**

The current global disruptions emphasize the importance of a new paradigm to improve supply chain resilience at a significant level. The study classified ten supply chain performance measurement attributes to diagnose the performance and efficiency of an organization: Financial Health (FH), Collaboration (CL), Velocity (VC), Resilience (RE), Reliability (RL), Continuous Improvement (CI), Visibility (VS), Work People Health (WPH), Sustainability (SS), and Service Excellence (SE). This study also demonstrates an Integrated Supply Chain Performance Measurement (ISCPM) model connected to these attributes that can supersede the currently practiced models which are not sufficient to address all the issues in the current context.

https://www.scirp.org/journal/paperinformation.aspx?paperid=116191

33. Sanjoy Kumar Paul er al. (2021). Supply chain recovery challenges in the wake of COVID-19 pandemic

The main objectives of this study were to identify and analyze supply chain recovery challenges related to the COVID-19 pandemic in the RMG industry to assist practitioners in formulating strategies and reimagining value chains in its aftermath. The study provided a comprehensive set of recovery challenges for use in a variety of research and planning contexts. Further, it analyzed the interrelationships between recovery challenges to identify cause-effect groups of the challenges. The findings can help decision-makers set their priorities in allocating resources in the recovery process to optimize the outcome. As the global COVID-19 pandemic is relatively unprecedented, recovery challenges have yet to be fully evaluated in research. Despite some learning from previous financial, environmental, and political crises, the uniqueness of this crisis makes it difficult to predict outcomes and potential challenges for recovery. For this reason, a survey using a Delphi method was conducted to identify new recovery challenges related to the COVID-19 pandemic. A grey DEMATEL method was then applied to analyze the recovery challenges and explore the interrelationships between them. This exploratory study contributes to the literature by focusing on a new and recent topic and by integrating the Delphi method with grey DEMATEL to arrive at some potential research and practical implications. Through the Delphi survey with 10 industry experts, the study identified and confirmed 23 recovery challenges specifically related to the COVID-19 pandemic for the supply chain of the RMG industry in Bangladesh. Further analysis using grey DEMATEL revealed that 12 out of the 23 recovery challenges directly influence the remaining 11 recovery challenges. It was observed that the shortage of physical and financial resources, global economic recession in a longer term, sharp fall of demand for a longer period, reduction in sourcing options, and increase in price of raw materials are the top five challenges in the priority ranking. The sensitivity analysis conducted analyzed the changes in the priority ranking of recovery challenges. Further, it showed that the shortage of physical and financial resources was the top recovery challenge across all scenarios, indicating a relative consensus among the respondents. This study and its findings are significant in practice. It assists decision-makers by providing a list of potential

recovery challenges they may face during and beyond the COVID-19 pandemic. Awareness of these challenges can help them formulate appropriate strategies and reimagine their supply chains in the post-COVID-19 era. All the findings of this study, such as the list of recovery challenges, their priority rankings, and cause-and-effect relationships among challenges, will be useful in formulating the recovery strategies. This study is exploratory in nature and, like other exploratory studies, limited by some inadequacies. These limitations provide the opportunity for further research. One limitation is that the results are a snapshot in time, as they are based on expert opinion at a particular time. Relationships between the various recovery challenges may change as the pandemic progresses. Therefore, longitudinal studies of these shifts are recommended. Also, the study's findings and suggestions are only valid for industries that have experienced shrinkage in market demand because of the pandemic, such as apparel manufacturing. However, some other industries, such as food and health, may have different impacts and challenges that could be investigated in future research. Moreover, this study could be extended to a full empirical study to help formulate recovery strategies and evaluate their impacts on the recovery challenges. This broader study could help generalize the findings to other emergent crises. Another limitation is that the sample was drawn from one industry and one country. In future research, the same methodology can identify and analyze recovery challenges for other types of supply chains—such as electronics, food, healthcare, and pharmaceuticals—and other regions for comparison.

https://www.sciencedirect.com/science/article/pii/S0148296321005464

34. **Scott R. Baker, Nicholas Bloom, Steven J. Davis, Kyle Kost, Marco Sammon, Tasaneeya Viratyosin (2021). Economic Uncertainty before and during COVID-19 pandemic**

The extent and effects of economic uncertainty on the US economy before and during the COVID-19 pandemic are examined in this research. The economic policy uncertainty index, stock market volatility, and company and consumer surveys are the different variables utilized to gauge economic uncertainty. The American economy has been going through some mild economic concern before the outbreak. Nonetheless, the COVID-19 epidemic considerably exacerbated economic uncertainty, which had an impact on many elements of the economy, including employment, investment, and consumption. Compared to other moments of uncertainty, the rise in economic ambiguity during the pandemic was far greater and more pervasive. The impact of government policy responses—such as the CARES Act—on economic ambiguity during the pandemic is also covered in this paper. Although these policy actions were successful in lowering economic uncertainty, the authors point out that it is still higher than it was before the pandemic. In conclusion, the article offers insightful information about how economic ambiguity affected the US economy prior to and during the COVID-19 pandemic. The authors

contend that in order to support economic stability and recovery, governments must continue to monitor and resolve economic uncertainty.

https://www.sciencedirect.com/science/article/pii/S0047272720301389

35. **Shah SM, Lütjen M, Freitag M. Text Mining for Supply Chain Risk Management in the Apparel Industry. *Applied Sciences*. 2021; 11(5):2323. https://doi.org/10.3390/app11052323.**
Authors provide an overview of research articles on the application of text mining techniques to he filed of Supply Chain Risk Management an the apparel industry. They conclude that extracting useful information from online newspapers through text mining could enhance the ability to monitor supply chain risks. They identified the following text sources: news, research articles, reports, blogs, social media, item descriptions, and reviews.
https://www.mdpi.com/2076-3417/11/5/2323

36. **Vidya, C. T., & Prabheesh, K. P. (2020). Implications of COVID-19 pandemic on the global trade networks. *Emerging Markets Finance and Trade*, *56*(10), 2408-2421.**

The article measures the trade interconnectedness among countries before and after the COVID-19 outbreak, and forecasts the future direction of trade. Using Trade Network Analysis and Artificial Neural Networks, the findings show that there is a drastic reduction in trade interconnectedness, connectivity, and density among countries after the COVID-19 outbreak. Also there is a visible change in the structure of trade-network. However, China's 'center' position in the trade network is not affected by the pandemic.

https://www.tandfonline.com/doi/abs/10.1080/1540496X.2020.1785426

37. **W. Daoud BenAmor, A. Labella, H. Moalla Frikha, L. Martinez Lopez (2022). Pharmaceutical Supply Chain Risk Assessment During COVID-19 Epidemic**

The global pharmaceutical supply chain is facing unprecedented difficulties as a result of the COVID-19 epidemic. The Journal of Risk Research issued an article in 2021 with the title "Pharmaceutical supply chain risk assessment during COVID-19 outbreak" in response. The goal of the study is to present a thorough understanding of the hazards that the pharmaceutical supply chain encountered during the pandemic and to suggest a paradigm for risk assessment to reduce those risks. The impact of COVID-19 on the pharmaceutical supply chain is first described in the paper. This impact includes disruptions in the manufacturing and distribution of pharmaceutical products as a result of the closure of factories and transportation systems, shortages of raw materials and active pharmaceutical ingredients, and an increase in demand for specific medical

products. The main players in the pharmaceutical supply chain, including manufacturers, distributors, regulators, and customers, are then listed along with their respective duties by the writers. The report then suggests a framework for risk assessment of the pharmaceutical supply chain during the pandemic. The framework has four stages: risk identification, risk analysis, risk evaluation, and risk treatment. It is based on the ISO 31000 risk management standard. To guarantee a thorough awareness of the risks encountered by the pharmaceutical supply chain, the authors stress the significance of including all stakeholders in the risk assessment process. The limits of the suggested risk assessment methodology are discussed in the paper's conclusion, along with potential future research topics that could enhance its usefulness. In order to reduce the risks brought on by the COVID-19 pandemic and guarantee the ongoing availability of crucial medical supplies, the authors further emphasize the necessity of cooperation and coordination among all parties involved in the pharmaceutical supply chain. In conclusion, the article offers a thorough overview of the hazards encountered by the pharmaceutical supply chain throughout the COVID-19 pandemic and suggests a paradigm for risk assessment to reduce these risks. Pharmaceutical firms, government agencies, and other interested parties can utilize the framework to evaluate the risks and take the necessary action to maintain the supply of important medicinal supplies.

https://doi.org/10.1016/j.ifacol.2022.10.035

38. **Xu, Z., Elomri, A., Kerbache, L., & El Omri, A. (2020). Impacts of COVID-19 on global supply chains: Facts and perspectives. IEEE Engineering Management Review, 48(3), 153-166.**

    The study showed that the COVID-19 pandemic has resulted in unprecedented disruptions to the mechanics of most GSCs such as pharmaceuticals, food, electronics, automotive industry, etc. Unlike previous major disruptions, COVID-19 has adversely affected GSCs throughout all their stages with major turbulence in manufacturing, processing, transport, and logistics, as well as significant shifts in demand. The analysis pinpointed that enhancing the supply chain resilience is the main key driver to reducing vulnerability in disruptive times. Furthermore, the analysis indicated that the post-COVID-19 GSCs will tend to be shorter through revamped strategies focusing more on relocations and back-shoring.

    https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9174793

39. **Yang M, Lim MK, Qu Y, Ni D, Xiao Z. Supply chain risk management with machine learning technology: A literature review and future research directions. *Computers & Industrial Engineering*. 2023;175. doi:10.1016/j.cie.2022.108859**
    Authors reviewed common machine leaning (ML) algorithms utilizes in supply chain risk management (SCRM). This is a field undergoing rapid development and scholarly interest

and is still spread across many fields and journals. Authors identified 11 ML algorithms applies to SCRM: deep learning, neural networks, support vector machine, clustering, Bayesian network, random forest logistic regression, decision tree, ensemble learning, extreme learning machine, and naïve bayes. ML was mainly applied to risk assessment, risk mitigation, and risk monitoring, and included a table the specific articles referenced in their analysis. Authors suggested a few future direction of research: enhancement of ML interpretability (i.e. removing the "black box" models); increasing the safety of more advanced technology such as blockchain; involve more external, unstructured data, such as finance status, online news / social media comments, and competitor / partner data, and building supply chain resiliency, such as utilizing ML algorithms to evaluate suppliers and decrease disruptions.
https://proxyiub.uits.iu.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=edselp&AN=S0360835222008476&site=eds-live&scope=site

40. **Ye, Y., Zhang, Q., Wei, X., Cao, Z., Yuan, H. Y., & Zeng, D. D. (2022). Equitable access to COVID-19 vaccines makes a life-saving difference to all countries. *Nature human behaviour*, *6*(2), 207-216.**

Access to vaccines in high-income countries (HICs) is far greater than in low- and middle-income countries (LMICs). Vaccine inequity provides only limited and short-term benefits to HICs. Sharper disparities in vaccine allocation between HICs and LMICs lead to earlier and larger outbreaks of new waves. Equitable vaccine allocation strategies, in contrast, substantially curb the spread of new strains. For HICs, making immediate and generous vaccine donations to LMICs is a practical pathway to protect everyone.
-(p.211) However, we found that, as vaccines are still limited currently, if HICs donate a certain portion of vaccine supplies to LMICs instead of vaccinating their entire population as the top priority, enormous public health benefits can be seen for both HICs and LMICs. Furthermore, for HICs, donating a small portion of vaccines to LMICs could lower the risk of future waves than waiting for the epidemic to be controlled in their own countries. Additionally, donating vaccines to more LMICs rather than only directly neighboring LMICs is more efficient in curbing the spread of the virus.

https://www.nature.com/articles/s41562-022-01289-8