engineering proceedings

MDPI

Proceeding Paper

Analyzing Supply Chain Risks and Resilience Strategies: A Systematic Literature Review †

Shahanaj Sultana *, Nayan Paul, Maliha Tasmin, Arnab Kanti Dutta and Sharfuddin Ahmed Khan

Department of Industrial Systems Engineering, University of Regina, Regina, SK S4S 0A2, Canada; npe250@uregina.ca (N.P.); mtf473@uregina.ca (M.T.); akd043@uregina.ca (A.K.D.); sharfuddin.khan@uregina.ca (S.A.K.)

* Correspondence: sst044@uregina.ca

† Presented at the 1st International Conference on Industrial, Manufacturing, and Process Engineering (ICIMP-2024), Regina, Canada, 27–29 June 2024.

Abstract: Today's competitive business environment is filled with various risks and uncertainties, and companies are trying to adopt strategies to deal with them, as they are involved in their supply chains, while also attempting to make their strategies resilient enough. This paper investigates the types of risks involved in the supply chain and determines strategies to deal with them from the perspective of the original equipment manufacturing industry. A systematic literature review is conducted for risk and strategy identification and some proposals are also given on how to incorporate these findings in the supply chain of original equipment manufacturing.

Keywords: supply chain risk management; supply chain resilience; systematic literature review; PRISMA; original equipment manufacturing (OEM) industry

check for updates

Citation: Sultana, S.; Paul, N.; Tasmin, M.; Dutta, A.K.; Khan, S.A. Analyzing Supply Chain Risks and Resilience Strategies: A Systematic Literature Review. *Eng. Proc.* **2024**, *76*, 41. https://doi.org/10.3390/engproc2024076041

Academic Editors: Golam Kabir, Mohammad Khondoker and Hussameldin Ibrahim

Published: 25 October 2024

Copyright: © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

1. Introduction

The interlinked journey that the raw materials, components, and finished goods take before their final assembly and selling to customers is called the supply chain [1]. Supply chain risk management is the process of identifying, evaluating, and controlling the risks related to the distribution, worldwide information, and communications technology structures according to Deiva Ganesh and P. Kalpana [2]. A company's capacity to obtain production inputs from suppliers and deliver completed goods to customers to make revenue depends on its supply chain. That is why any risk related to the supply chain impacts the value of the company in terms of future expenses, income, cash flow, revenue, stock price, or any other significant operational issues [3]. According to Ribeiro and Barbosa-Póvoa (2018), "A resilient supply chain should be able to prepare, respond and recover from disturbances and afterward maintain a positive steady state operation at an acceptable cost and time". Resilient supply chains are necessary for supply chain dynamics and flexibility; lately, both the academic and industrial communities have paid little attention to this topic. Supply chains must be resilient to be able to handle disruptions and unforeseen events. Simply designing and running efficient and effective supply systems is not enough. Nevertheless, Tomlin, in a 2006 study, mentions that mitigation methods are also necessary to increase the resilience of the supply chain [4].

Manufacturing businesses, particularly equipment manufacturers, have developed globally dispersed supplier networks to enter markets around the world. These networks have a significant impact on their ability to succeed in the market [5]. Therefore, effective supply chain management and integration, along with careful supplier selection, are essential to equipment manufacturers' success. All stakeholders must fulfill their responsibilities and keep learning to support the supply chain's flexibility and continuous growth. The original equipment manufacturing (OEM) companies are dealing with a number of challenging issues that require effective risk management strategies in the wake of never-seen-before

global supply chain disruptions. Disruptions in production and operations, cybersecurity incidents, quality issues and defects, transportation and logistics disruptions, geopolitical risks and trade disputes, supplier and third-party risks, environmental risks and sustainability concerns, demand volatility and shifts, labor shortages and skill gaps, and regulatory and compliance risks are some of the difficulties that a supply chain confronts.

This research aims to identify the risk and uncertainty management in the supply chain of industrial equipment manufacturing companies. The main objectives of this research are (1) finding out how the companies deal with supply chain risks and investigating strategies for building more resilient supply chains and robust risk management approaches, from the previous literature analysis; (2) proposing how the supply chain of original equipment manufacturing (OEM) companies can manage their risk efficiently; and (3) proposing how the supply chain of OEM companies can be more resilient to deal with the frequency of disruptions like pandemics, natural disasters, geopolitical tensions, etc.

2. Research Methodology

To gain a conceptual understanding of the type of risks occurring in the supply chain of an OEM sector to build a strategy that can make that supply chain more resilient to deal with those uncertainties, we decided to use the PRISMA technique to find the appropriate relevant literature for our study.

PRISMA, or Preferred Reporting Items for Systematic Reviews and Meta-Analyses, is a minimal set of items for reporting in these types of studies that are foundational in evidence-based research [6]. To determine the most relevant literature, a comprehensive search was carried out in the Web of Science database. The keywords that we used for searching were "Industrial equipment manufacturing and supply chain resilience" and "supply chain risk management". When we searched for "Industrial equipment manufacturing and supply chain resilience", we found 17 articles, and we obtained 42 articles when we searched for "supply chain risk management". Some articles appeared in both search results, and we found that this number was four. After we removed the common articles, we had a total of 55 articles.

After conducting the initial search, we developed inclusion and exclusion criteria for articles based on their relevance to the objectives of our study. At first, we identified articles that were relevant to our research goals by analyzing their abstracts, titles, and keywords. This allowed us to eliminate fifteen articles. During the selection process, it was ensured that selected articles addressed specific challenges and strategies related to supply chain risks and resilience related to the OEM sector. Articles that avoided directly addressing supply chain dynamics or risk management techniques or that concentrated mostly on unrelated industries like retail or healthcare were excluded.

After that, the content of the 40 remaining articles was then carefully studied to determine whether it met the goals of our study. To achieve this, a thorough analysis of their methodology, conclusions, and discussion sections was conducted. It was ensured that articles provided substantive insights, empirical evidence, or theoretical frameworks on supply chain risks and resilience in the OEM industry. After this meticulous screening process, 34 more articles were excluded and finally, 6 articles were selected that were fully relevant to our study. Articles providing in-depth analysis, empirical data, or practical suggestions for reducing supply chain risks and boosting resilience in the OEM context were given priority when it came to the inclusion criteria. To ensure the validity and credibility of the chosen literature, preference was also given to articles that were published in reputable conference proceedings or peer-reviewed journals.

The PRISMA process, depicted in Figure 1, illustrates the systematic progression from the literature search to the final article selection. It provides a visual representation of the screening process, highlighting the number of articles identified, included, and excluded at each stage. Next, a framework has been proposed with the risks and risk mitigation strategies in the OEM supply chain. The framework is then described in Section 4. The framework links the mitigation strategies for different types of risks occurring in the OEM supply chain.

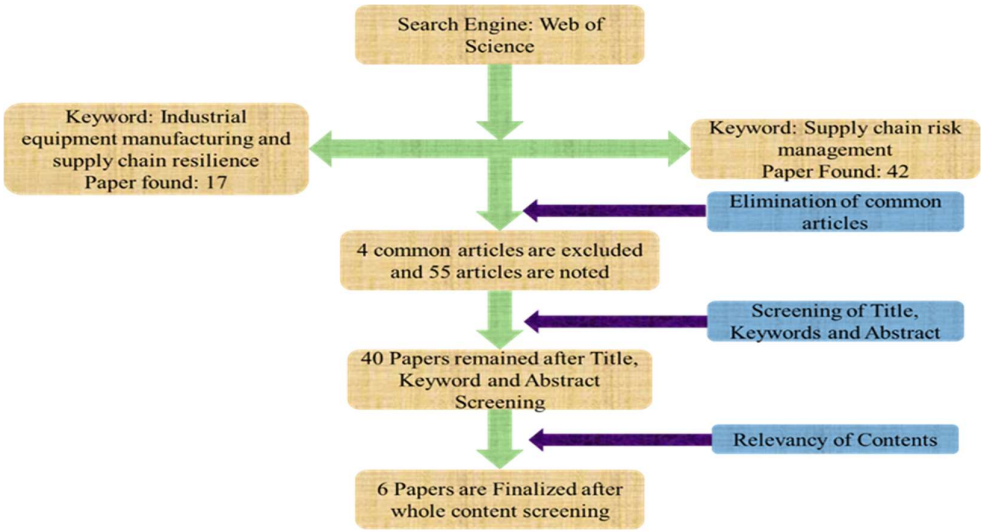


Figure 1. Flow diagram of PRISMA technique.

3. Results

From the articles reviewed, we found two main important aspects of risk management in the supply chain, namely risk categories of the supply chain and the mitigation strategies of risks.

3.1. Risks

There are some major risk categorizations like risk from the demand side and supply side, financial risk, etc. [7]. Generally, the risks affecting the supply chain network can be of various types as follows: 1. risks occurring from the coordination of supply and demand and 2. risks emerging from disruptions in regular activities and operations [8]. Various risks are mentioned in Table 1.

Table 1. Types and categories of risks from the literature.

Categories of Risks	Type and Criterion for Risk	Reference
Demand-side risk	Prediction fluctuation risks (demand fluctuation; wrong forecasting; poor understanding of customer preferences, consumer spending patterns, and economic conditions).	[7,8]
Supply-side risk	Supplier stability risks (financial stability of suppliers; technological changes and design issues; risk of raw material quality; supplier commitment risks; order fulfillment risks (insufficient collaboration between all the parties in the chain)).	[7–9]
Logistic risk	Transport mode risk (improperly utilized mode of transport; unavailability of specific type of transport and secured transport); transit risk (the loss or damage to the goods).	[7,8]
Regulatory, legal, and bureaucratic risk	Delay in obtaining governmental approvals; plans and policies which are newly developed.	[7]
Infrastructure risk	Insufficient maintenance, electricity disruptions, and failures in information technology.	[7,8]
Stock/data management risk	Data management risk (inaccurate usage of standard product identification; customer preference record keeping; inaccurate information; insufficient data governance).	[7,8],

Table 1. *Cont.*

Categories of Risks	Type and Criterion for Risk	Reference
Environmental risk	Absence of planning to meet the climatic adverse situations, terrorist attacks on infrastructure, and civil movements.	[7]
Financial risk	Issue in timely clearance of bills by customers; insufficient fund releases; over-investment of funds in high-risk ventures; financial instability, invisibility, and uncertainty.	[7,8]
Commitment risks	Management's false commitments.	[8]
Worker association risks	Dissatisfied employee union; labor disputes.	[8]
ICT risks	System and software failure risks (unwanted vulnerabilities).	[8]
Cultural difference risks	Policy difference among stakeholders.	[8]
Production schedule risk	Various other sources of uncertainty in production system.	[9]
Operational risk	Delivery problems; service problems.	[9]
External (disruption risk)	Merger/divestments; natural or human-made disasters.	[9]

3.2. Some Examples of Industrial Supply Chain Risks

Some real-life examples of risks are noteworthy to be mentioned here for the purpose of understanding the importance of risk identification and mitigation. In 2009, during the global financial crisis, many suppliers of automotive manufacturers faced bankruptcy or financial instability, disrupting the supply chain and causing production delays [10]. Tesla faced production delays for its Model 3 due to issues with its battery production at Gigafactory 1, highlighting challenges in scaling up new technologies [11]. The Boeing 737 MAX crisis in 2019 revealed issues with the quality of critical components, such as the MCAS system, supplied by external vendors [12]. In 2021, the global semiconductor shortage led to a shortage of shipping containers, causing delays in the delivery of machinery parts and components [13]. In 2016, Samsung faced significant losses when its Galaxy Note 7 smartphones caught fire during transit due to battery defects, resulting in a costly recall and supply chain disruption [14]. The delay in regulatory approvals for the Boeing 787 Dreamliner in 2013 resulted in production setbacks and financial losses for the company [15]. In 2018, the implementation of tariffs on steel and aluminum imports by the U.S. government disrupted supply chains for manufacturers reliant on these materials, leading to increased costs and production delays [16].

3.3. Risk Mitigation Strategies

For coping up with these risks, there are mainly four mitigation strategies [7], namely **risk planning** (mitigating risks through proper planning and a structured format and procedures), **risk avoidance** (utilization of the appropriate forecasting of customer demand and collaboration with supply chain parties), **risk monitoring** (**monitoring** of parameters of control like raw materials quality, supplier reliability, and IT system availability), and **risk sharing** (**reducing** the risk impact through flexible and available contracts, insurance, and financial assistance by financial partners and other supply chain parties).

Other strategies to deal with supply chain risks are generally tailored for different organizations. A robust and versatile supply chain, an appreciable reward system, a reserve or backup financial arrangement, the use of statistical data from the past, and the use of software are several other strategies that may be implemented [8].

3.4. Supply Chain Resiliency

Supply chain disruption is another major matter of concern for successful supply chain management. Disruptions may cause a delay in the delivery of products to final customers and even intermediary partners. Disruption risk requires the supply chain to be resilient and robust enough to recover and be operative during disruptions. Disruptions can happen due to various reasons, as stated by Bhattacharyya and others, such as an unexpected failure of equipment, untimely delivery, the inability to produce components with unique designs on time, etc. The recent innovation of additive manufacturing can help in achieving resiliency in case of delays in the supply chain by keeping the inventory as minimal as possible by printing in a short time and only creating the main component and no subcomponents [17].

However, there are several specific ways by which disaster recovery can be implemented and many successful supply chain management strategies involve these practices. There are a few criteria that are used to evaluate the weak parties of a chain which can lead to major disruptions, such as a supply concentration on one specific supplier and visibility issues for an insignificant supplier. In such cases, companies can halt their production during a disaster; the inability to design information's substitutability for high product specificity parts, i.e., either product or process specificity, means that design information portability from one plant to another requires some adjustment. Acting upon all these criteria is necessary for resiliency but comes at a cost of a long lead time [5].

3.5. Recovery Strategy

Building sufficient capacity: Rapid recovery from a disaster emphasizes capacity-building and/or backup rather than inventory buildup and the duplication of redundant production processes. To overcome the trade-off of resiliency and competitiveness, companies who have already faced any disruption should focus on capacity-building [5].

Improvement in the visibility of the supply chain: The manager of a given product's supply chain should work to identify the weak parties of the chain so that they can concentrate their efforts to reduce vulnerability regarding the four criteria mentioned above. During an emergency or after a disaster, the final assembler must gather detailed information quickly about the location, products, and processes so that there can be a collaborative effort to recover from the disaster for all tier suppliers [5].

Taking care of the limit of design information portability: When there is less opportunity to use substitute products due to limited design information portability, the affected firm during a disruption has only one option to recover, which is to fix the production line at the location of the disruption [5].

Restoration vs. substitution—virtual dual sourcing: If the visibility of the suppliers in the chain and the design information related to a specific product can be protected and ensured to a specified degree, there might not be any need for backup plants, backup production lines, or extra equipment for recovery by the affected firm. A combined solution, i.e., termed as virtual dual sourcing by Fujimoto, involves having different production lines for various products at regular times to gain competitiveness and ensure duplicability of the product design information of the damaged products to different lines in times of disaster, acting like virtual dual lines for a single product [5].

4. Discussion and Future Research Directions

4.1. Risks and Risk Mitigation Strategy for OEM Supply Chain

In this document, we have aimed to establish connections between the recognized risks and the original equipment manufacturing (OEM) supply chain. Additionally, we have examined mitigation strategies corresponding to each risk type, intending to assist in the reduction in these risks within the OEM supply chain. A framework has been proposed depicting the relationship between risks and mitigation strategies in Figure 2.

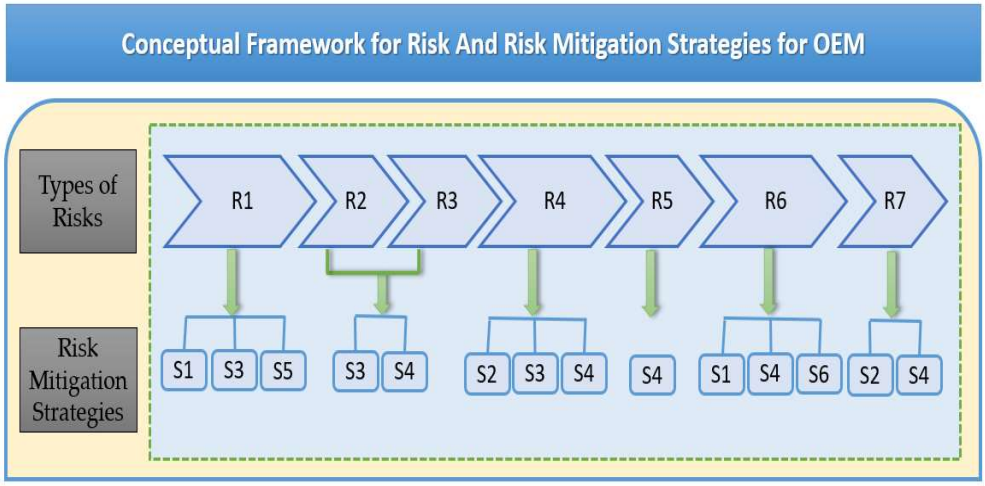


Figure 2. Risk categories and mitigation strategies for OEM supply chain [1].

[1] Legends: R1 = supply-side risk; R2 = logistic risk and operational risk; R3 = administrative risk; R4 = infrastructure risk; R5 = financial risk; R6 = external (disruption risk); R7 = demand-side risk; S1 = risk planning; S2 = risk avoidance; S3 = risk monitoring; S4 = risk sharing; S5 = risk control; S6 = building resiliency.

According to the framework, supply-side risks can be mitigated by risk sharing (financial assistance, shared commitment, etc.) and risk control and monitoring (quality monitoring of raw materials, inventory of raw materials levels, redundant suppliers, creating order visibility). When the inaccurate use of the mode of transportation, unavailability of a specific type of transport, the loss and damage of goods, and untimely and unintended delivery are the reasons for logistic and operational risk, risk planning (proper planning of regular and alternative transportation modes and network) and risk monitoring (proper equipment and trained workers for material handling) can be the best strategies. Administrative risks in OEM can happen due to external new plans and policies, the different policies among the various stakeholders, unsatisfied employee and worker unions, labor disputes, and management's failure to keep commitments. Risk planning (modification in plans according to a change to a new policy, negotiation with worker unions and workers) and risk monitoring (proper calculations, consideration about the ability to meet deadlines) can help mitigate these risks. The improper maintenance of machines, disruptions in electricity supplies, IT system failures, production schedule risk, the wrong usage of standard product identification, the improper dissemination of information, the absence of a proper data governance method, and system and software failure are the reasons of infrastructure risk. This risk can be mitigated by risk planning (maintenance plans, SOP, backup of electricity sources, and IT), risk monitoring (monitoring of maintenance activities, records of customer's past preferences and buying activities), and risk avoidance (digital backup server, proper pilot testing of software). Financial risks can occur with the failure of customers to pay bills on time, insufficient fund releases, and more focus on high-risk investments. Proper risk planning (bill payment policy for customers, proper risk assessment) is one way to mitigate such risks. When there is an incorrect anticipation of demand fluctuations, inaccurate forecasting, an insufficient comprehension of customer preferences, and a lack of insight into consumer spending patterns and economic conditions, it is highly likely for demand-side risks to occur in the OEM supply chain. To address these risks, it is essential to implement effective risk planning measures, including the use of appropriate forecasting tools, ensuring the accuracy and transparency of information. Additionally, risk avoidance strategies such as building inventory and maintaining flexible production capacity can be employed. External risks, which are commonly referred to as disruption risks is one major risk for the OEM supply chain. Merger/divestitures, man-made or natural disasters, environmental risks, terrorist attacks, and political unrest can be some factors

for such risk. However, with the help of risk sharing (communication with stakeholders, working together to recover affected parties) and risk planning (disaster recovery planning), this risk can be mitigated. There is another strategy for mitigating disruption risk, which will be described in the section below.

4.2. Recovery Strategy to Follow for Supply Chain Resiliency

Based on our comprehension of the original equipment manufacturer (OEM) supply chain, we have examined potential disruptions that can arise from various causes. Regardless of the specific reasons, it is vital to identify vulnerable links in the chain in advance. This allows for the development of contingency plans to address weaknesses in the event of disruptions. Typically, the weakest links are most susceptible to the impact of such disruptions, given their precarious financial stability, outdated machinery, and aged facilities. Therefore, achieving resilience in the supply chain necessitates the implementation of disaster recovery strategies and comprehensive recovery planning. However, it is essential to acknowledge the existence of a trade-off between cost and responsiveness in this context.

Building sufficient capacity: It is prudent and has been proven effective for companies that have faced disasters to establish flexible and ample capacity in advance to recover and reinstate production operations post-disruption. The creation of sufficient capacity involves securing redundant suppliers, especially for non-substitutable and highly critical parts of the design. During regular periods, these suppliers can be strategically utilized to prevent any idle capacity. For instance, one supplier can focus on manufacturing a high-demand product, while another simultaneously works on a low-demand product with a smaller supply chain. The latter supplier can serve as an additional asset to the overall supply chain. Another approach is to incorporate redundant facilities, carefully planned to minimize exposure to disaster risks. The global dispersion of these facilities is recommended to reduce overall vulnerability.

Different production lines and duplication of design information: An alternative approach involves maintaining distinct production lines for various products during routine operations. In the event of a disaster, this strategy entails duplicating the product design information for the affected products across different lines. To make this strategy effective, the regular design information must be adaptable for disaster recovery, necessitating preparation. Essentially, modified design information for each product must be available for use in disruption scenarios. This enables the seamless adaptation of designs to different machines and production lines during a disruption, facilitating continued production even if the primary facility is damaged due to a disaster. While this method can result in significant savings during disruptive periods, it may demand a high level of manufacturing capability and initial investments to establish diverse lines and facilities.

4.3. Future Research Direction

There are several avenues for future research to expand the findings of this study and improve their applicability as follows:

Validation of proposed framework: Future research could focus on empirically validating the proposed framework for identifying risk categories and mitigation strategies within the OEM supply chain.

Exploration of emerging risk mitigation strategies: Researchers can investigate how emerging technologies like blockchain, artificial intelligence, and the Internet of Things (IoT) can improve supply chain resilience and reduce risks. They can also identify best practices for their implementation.

Integration of risk measurement methods: By incorporating quantitative measures of risk severity, probability, and impact, researchers can develop robust tools for assessing and prioritizing risks within the supply chain in the future.

Resilience strategies post-pandemics: Pandemics like COVID-19 have caused unprecedented disruptions, which emphasize the need for robust supply chains that can adapt

to unexpected challenges. Future research can look into the development of resilience strategies tailored to mitigate the specific risks and uncertainties in the OEM industry.

5. Conclusions

With an emphasis on the original equipment manufacturing (OEM) sector, the research concludes by offering an in-depth overview of supply chain risks and resilience methods. We have identified seven categories of supply chain risks through a thorough analysis of the literature, and we have suggested mitigation strategies that are specifically designed to solve the issues that OEM faced. In order to reduce interruptions and improve supply chain resilience, our analysis emphasizes the significance of proactive risk planning, avoidance, monitoring, and sharing. We have also presented four recovery solutions that emphasize the importance of redundant suppliers, different manufacturing lines, flexible capacity, and duplicated design knowledge in order to strengthen resilience against disruptions. Although there may be initial expenses associated with these resilience-building initiatives, the long-term advantages in terms of enhanced operational continuity and risk mitigation greatly exceed the initial outlay. By implementing these strategies, OEM can enhance readiness to handle uncertainties and disturbances, guaranteeing uninterrupted operations and preserving a competitive advantage in the current unstable market conditions. Essentially, the importance of OEM, including robust risk management procedures and resilience plans within supply chain operations, is highlighted in this article. Through this approach, people can efficiently reduce possible risks, tolerate disturbances, and emerge with enhanced resilience and adaptability when confronted with forthcoming challenges.

Author Contributions: Conceptualization, A.K.D., N.P., S.S. and S.A.K.; methodology, N.P. and S.S.; software, N.P. and S.S.; validation, S.A.K. and S.S.; formal analysis, All authors were involved in the analysis; investigation, S.S. and A.K.D.; resources, S.S. and N.P.; data curation, S.S. and M.T.; writing—original draft preparation, S.S. and N.P.; writing—review and editing, S.S.; visualization, S.S. and N.P.; supervision, S.A.K.; project administration, S.A.K. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data are contained within the article.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. What Is Supply Chain and How Does It Function? | McKinsey. Available online: https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-supply-chain (accessed on 5 December 2023).
2. Emrouznejad, A.; Abbasi, S.; Sıcakyüz, Ç. Supply chain risk management: A content analysis-based review of existing and emerging topics. *Supply Chain Anal.* **2023**, *3*, 100031. [CrossRef]
3. Li, Y.; Wang, X.; He, J.; Chan, K.C. Supply chain risk disclosure and seasoned equity offering discount. *Pac.-Basin Finance J.* **2023**, *82*, 102188. [CrossRef]
4. Suryadi, A.; Rau, H. Considering region risks and mitigation strategies in the supplier selection process for improving supply chain resilience. *Comput. Ind. Eng.* **2023**, *181*, 109288. [CrossRef]
5. Fujimoto, T.; WonPark, Y. Balancing supply chain competitiveness and robustness through 'virtual dual sourcing': Lessons from the Great East Japan Earthquake. *Int. J. Prod. Econ.* **2014**, *147*, 429–436. [CrossRef]
6. Services, G.-H.L. Research Guides: Systematic Reviews: PRISMA Diagram & Checklist. Available online: https://guelphhumber.libguides.com/c.php?g=213266&p=1406923 (accessed on 2 December 2023).
7. Shenoi, V.; Rajendran, C.; Dath, S.; Shahabudeen, P. Strategic action grids: A study on supply chain risk management in manufacturing industries in India. *Benchmarking Int. J.* **2018**, *25*, 3045–3061. [CrossRef]
8. Bhalaji, R.K.A.; Sankaranarayanan, B.; Alam, S.T.; Hossain, N.U.I.; Ali, S.M.; Karuppiah, K. A decision support model for evaluating risks in a collaborative supply chain of the medical equipment manufacturing industry. *Supply Chain Forum Int. J.* **2021**, *22*, 227–251. [CrossRef]

9. Soltanisehat, L.; Ghorbani-Renani, N.; González, A.D.; Barker, K. Assessing production fulfillment time risk: Application to pandemic-related health equipment. *Int. J. Prod. Res.* **2023**, *61*, 8401–8422. [CrossRef]
10. Blome, C. Supply chain risk management in financial crises—A multiple case-study approach. *Int. J. Prod. Econ.* **2011**, *134*, 43–57. [CrossRef]
11. Tesla Model 3 Delays Persist, Reportedly Due to Gigafactory Problems. The Verge. Available online: https://www.theverge.com/2018/1/25/16933802/tesla-model-3-battery-gigafactory-production-delays (accessed on 25 January 2018).
12. Eshun, E. *The Defeathered Bird: A Case Study of the Boeing 737 Max Crisis [Film]*; East Tennessee State University: Johnson, TN, USA, 2020.
13. Why We're in the Midst of a Global Semiconductor Shortage. Harvard Business Review. Available online: https://hbr.org/2021/02/why-were-in-the-midst-of-a-global-semiconductor-shortage (accessed on 26 February 2021).
14. Mozur, P. Galaxy Note 7 Fires Caused by Battery and Design Flaws, Samsung Says. *New York Times*. Available online: https://www.nytimes.com/2017/01/22/business/samsung-galaxy-note-7-battery-fires-report.html (accessed on 22 January 2017).
15. Denning, S. What went wrong at Boeing. *Strategy Leadersh.* **2013**, *41*, 36–41. [CrossRef]
16. Cox, L. Steel Tariffs Hurt Manufacturers Downstream, Data Shows. PBS News Hour. Available online: https://www.pbs.org/newshour/economy/making-sense/steel-tariffs-hurt-manufacturers-downstream-data-shows (accessed on 7 February 2020).
17. Bhattacharyya, S.S.; Kulkarni, O.; Mishra, A. Study of emerging avenues in supply chain resilience; the case of integration of additive manufacturing with spare parts procurement. *Benchmarking Int. J.* **2022**, *30*, 4100–4118. [CrossRef]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.