IJRRS
International Journal of Reliability, Risk and Safety: Theory and Application
Online ISSN: 2676-3346
OPEN ACCESS

Vol. 6/ Issue 1/ 2023/ pp. 111-130
DOI: 10.22034/IJRRS.2023.6.1.12
Received: 30 July 2023, Revised: 30 September 2023, Accepted: 30 September 2023
Available online at: https://www.ijrrs.com

Original Research Article

A Comprehensive Review of Safety and Risk Management Strategies in Aerospace Operations for Human Casualty Mitigation

Iman Shafieenejad[*] [1], Mohammadamin Nourianpour[2], Mohammadreza Banitalebi Dehkordi[2], Karim Ansari[3]

1- Aerospace Research Institute, Ministry of Science and Research, Tehran, Iran

2- Aerospace Department, Faculty of Engineering, Islamic Azad University Sciences and Research, Tehran, Iran

3- Aerospace Department, Faculty of Engineering, Malek-Ashtar University of Technology, Tehran, Iran

*** Shafieenejad@ari.ac.ir**

Abstract

In this article, risk management in the aerospace industry based on supply chain management has been discussed to reduce risks, human casualties and the safety of air operations. The aerospace industry operates in a high-risk and sensitive environment where safety and risk management are of great importance, so that any mistake or negligence can lead to an unfortunate disaster. This paper comprehensively analyzes risk assessment methods, risk mitigation strategies, risk communication practices and continuous improvement processes in the aerospace sector. This article uses relevant case studies and industry best practices to provide insights into effective risk management techniques specific to the aerospace industry. By examining these key aspects, this following article tries to provide a better risk management scheme and its critical role in ensuring safety in the aerospace industry.

Keywords: Aerospace industry; Risk reduction; Risk management, Performance; Supply chain.

1. Introduction

With its constant drive for innovation and discovery, the aerospace industry plays a fundamental role in shaping our modern world. However, with progress, some inherent risks and dangers can profoundly affect human lives. Effective management of these risks is critical to ensuring the safety of those working in the industry and those who benefit from air travel. This article examines the importance of risk management in the aerospace industry, particularly focusing on reducing risks and human casualties. The consequences of breakdowns or accidents[1] in the aerospace industry can be severe and lead to significant financial loss, human injuries and critical damages. Therefore, the industry places great importance on implementing robust risk management practices to identify, assess and mitigate potential risks. An environment where human safety is prioritized and protected is striving to be created by aerospace organizations. The impact of hazards on human life within the aerospace industry is extensive [1]. Every aspect of the industry has potential hazards from aircraft manufacturing to maintenance, from air traffic control to pilot training. Safety faces significant challenges from technical failures, human errors, environmental factors, and external threats. Understanding and managing these risks is necessary to protect human lives and reduce casualties [2].

Risk management in the aerospace industry involves a systematic and multidimensional approach. Risk assessment identifies and evaluates potential risks, considering equipment reliability, human elements, and operational procedures. These assessments provide a basis for prioritizing risks and implementing appropriate mitigation strategies. By quantifying risks, aerospace organizations can effectively allocate resources and efforts to minimize the likelihood and severity of accidents [3]. Alleviation strategies in the aerospace industry include a wide range of measures to increase

1. Accident is an unplanned event that can cause harm or damage and occurs without deliberate intent.

How to cite this article:
I. Shafieenejad, M. Nourianpour, M. Banitalebi Dehkordi, and K. Ansari, "A Comprehensive Review of Safety and Risk Management Strategies in Aerospace Operations for Human Casualty Mitigation," *International Journal of Reliability, Risk and Safety: Theory and Application*, vol. 6, no. 1, pp. 111-130, 2023.

safety and reduce human casualties. Enhancements in aircraft, rigorous testing, maintenance procedures, and personnel training are key risk mitigation strategies. These measures aim not only to prevent breakdowns but also to reduce the consequences if an accident occurs.

The impact of risk management on human life in the aerospace industry goes beyond the immediate safety of passengers and crew. This includes the welfare of people in various roles, such as engineers, technicians, air traffic controllers, and ground staff. The lives and livelihoods of all involved are aimed to be protected by creating a safety culture and implementing effective risk management practices within the industry. Additionally, the impact of risk management is extended to the entire society. Public confidence in air travel is deeply intertwined with the industry's ability to effectively manage risks. When incidents occur, the consequences can have far-reaching effects on public trust, regulatory oversight, and even the industry's viability. Public trust has been maintained by prioritizing risk management and demonstrating a commitment to safety, and the aerospace industry has ensured the sustainable growth of aviation.

Risk management is paramount in the aerospace industry to safeguard human lives. It involves identifying and minimizing potential risks to ensure a secure environment for both work and travel, instilling confidence in people. In the upcoming pages, we will delve into different facets of risk management within the aerospace sector. This exploration will encompass methodologies, best practices, real-life examples, and emerging trends. Our objective is to provide a thorough understanding of how risk management plays a critical role in ensuring the safety of human lives in the aerospace field [4-5].

2. Background

The aerospace industry is a dynamic and technologically advanced sector that includes various activities such as designing, manufacturing, operating and maintaining aircraft. The main goal of this industry is to ensure the safety and security of aircraft, passengers and personnel involved in aviation operations. However, due to the complex nature of aerospace systems and the inherent risks associated with aviation, effective risk management is critical to identify, assess, and mitigate risks that could lead to human casualties. The history of risk management in the aerospace industry can be traced back to the early days of aviation when safety concerns arose alongside the rapid development of aircraft technology. The increasing complexity of aircraft systems, the emergence of commercial air travel, and the increasing demand for efficiency and performance have emphasized the need for strong risk management practices [6]. One important event highlighting the importance of risk management in aerospace was the Tenerife airport disaster in 1977. The collision between two Boeing 747s killed 583 people, making it the deadliest accident in aviation history [7]. The incident highlighted the critical role of effective risk management, which significantly improved air traffic control procedures, communication protocols, and pilot training. Regulatory bodies and industrial organizations have developed comprehensive safety frameworks and standards in response to such incidents. The International Civil Aviation Organization (ICAO) provides guidelines and regulations to ensure the safe operation of aircraft and implement effective risk management practices. National aviation authorities, such as the Federal Aviation Administration (FAA) in the United States and the European Union's Aviation Safety Agency (EASA) in Europe, work closely with industry stakeholders[2] to enforce safety standards and oversee risk management plans. Risk management in the aerospace industry is a multidisciplinary field that covers many aspects. This includes identifying and analyzing potential risks, assessing their likelihood and consequences, and implementing measures to reduce or eliminate risks. This includes rigorous design and manufacturing processes, thorough testing and inspection procedures, comprehensive training programs for aviation personnel, and ongoing maintenance and reliability practices. Human factors also play an important role in risk management in the aerospace industry. By understanding the impact of human errors and limitations, efforts have been made to improve human performance by improving training, cockpit design, crew resource management, and standard operating procedures [8-9].

Advances in technology have also helped evolve risk management in aerospace. Integrating advanced sensors, data analytics and artificial intelligence enables real-time monitoring of aircraft systems, early detection of potential failures and predictive maintenance practices. These technological advances have increased risk management capabilities and improved safety levels in the aerospace industry [10]. The aerospace industry has recognized the importance of risk management in dealing with hazards and reducing human casualties. Over the years, lessons learned from incidents and advances in safety practices have shaped the industry's approach to risk management. Through a combination of regulatory oversight, industry standards, technological advances and a safety culture, the aerospace industry actively strives to

2. A stakeholder is anyone with an interest in a business, organization, or project, whether or not they are directly involved.

ensure the highest levels of safety for those involved in aviation operations and the general public [11].

3. Objectives and scope of the article

The main objective of this study is to provide a comprehensive analysis of risk management in the aerospace industry, particularly focusing on reducing risks and human casualties. This article aims to examine the importance of risk management practices in the aerospace sector and highlight their role in ensuring the safety and security of aircraft, passengers, and personnel [12-13]. The scope of this article covers various aspects related to risk management in the aerospace industry. It covers identifying and assessing risks specific to aviation operations, including technical failure, human error, environmental factors, and external threats. The paper discusses industry risk mitigation strategies including design enhancements, testing protocols, maintenance procedures, and aviation personnel training [36].

In addition, this study examines the importance of effective risk communication in the aerospace industry. This article explores how stakeholders, such as aircraft manufacturers, regulatory bodies, airlines, and maintenance organizations, share risk information to improve safety and prevent hazards causing human casualties [15]. This paper also highlights the process of continuous improvement in aerospace risk management. It examines the industry's approach to learning from past incidents and implementing corrective actions to prevent future occurrences. Incorporating lessons learned, incident investigation methods, and tracking continuous improvements in safety standards are the main areas of focus in the paper [28].

The paper includes relevant case studies from the aerospace industry to provide practical insights. These case studies examine real-world scenarios, analyze risk assessment techniques, risk mitigation strategies and their impact on reducing human casualties. This article aims to provide concrete examples and best practices that can be used in the aerospace industry based on these cases. This article seeks to contribute to a better understanding of risk management in the aerospace industry, emphasizing its vital role in addressing risks and protecting human lives [18].

4. Risk management in the aerospace industry

Risk management in the aerospace industry is critical to ensure safety, reliability and success in the design, development, manufacture and operation of aerospace systems and vehicles. Due to the complex nature of aerospace operations and the potential consequences of failures or accidents, effective risk management practices are essential [19-20]. By implementing these risk management principles, aerospace companies can increase safety, reduce potential hazards, protect assets, ensure regulatory compliance, and maintain public confidence in industry operations. In the following figure (1) are some key elements of risk management in the aerospace industry:

Figure 1. Key elements of risk management in the aerospace industry

In the following paragraphs, each key element has discussed.

- **Risk identification:** Identifying potential risks is the first step in the risk management process. It involves systematically assessing and understanding risks, vulnerabilities and threats associated with aerospace activities, including technical, operational, environmental and human factors.
- **Risk assessment and analysis:** Once risks are identified, they must be analyzed to determine their likelihood and potential impact. It includes quantitative and qualitative analysis methods, such as fault tree analysis, failure mode and effects analysis (FMEA) and probabilistic risk assessment (PRA). These methods help prioritize risks based on severity and develop risk mitigation strategies.
- **Risk reduction:** Risk reduction aims to reduce the probability and impact of identified risks. Strategies may include engineering controls, redundancy systems, safety protocols, training and education, quality control processes, and compliance with regulations and standards. The goal is to design, build and operate aerospace systems with internal safety features and procedures.
- **Regulatory Compliance:** The aerospace industry is subject to strict regulatory frameworks imposed by national and international aviation authorities. Compliance with these regulations, standards and guidelines is critical to ensure safety and reduce risks. This includes adherence to certification processes, maintenance requirements, safety inspections and reporting obligations.

- **Safety Management Systems (SMS):** SMS is a comprehensive framework that integrates risk management into the day-to-day operations of aerospace organizations. It includes policies, procedures and processes to identify, assess, mitigate and monitor risks throughout the life cycle of aerospace systems. SMS promotes a proactive safety culture and continuous improvement in risk management practices.
- **Incident Investigation and Lessons Learned:** When accidents or incidents occur, a thorough investigation is conducted to determine the root causes and contributing factors. Lessons learned from this research are important in improving risk management processes and preventing future occurrences. Organizations share these insights across the industry to enhance overall safety and risk management practices.
- **Supply Chain Management:** Aerospace companies often rely on a complex network of suppliers and contractors[3]. Managing risks in the supply chain is critical to ensure the quality, reliability and safety of components and subsystems. Strong supplier qualification processes, regular audits and clear contractual obligations help reduce the risks associated with supply chain disruptions, counterfeit parts or substandard materials.
- **Continuous monitoring and evaluation:** Risk management is an ongoing process that requires continuous monitoring, evaluation and feedback. Regular risk assessment, safety audits, data analysis, and performance metrics are used to identify emerging risks, evaluate the effectiveness of risk mitigation strategies, and drive continuous improvement in risk management practices.

5. The importance of risk management in the aerospace industry

Risk management in the aerospace industry is critical to prioritizing safety, increasing reliability, meeting regulatory requirements, reducing costs, protecting reputation, fostering innovation, driving continuous improvement, and managing supply chain complexities [21-22]. It is an integral part of ensuring the success and sustainability of aerospace operations. Risk management in the aerospace industry is very important for key reasons: In the following figure (2) are some items that are very important in the aerospace industry:

Figure 2. Important items in the aerospace industry

In the following paragraphs, each key element has discussed.

- **Safety:** The aerospace industry deals with complex, high-risk operations involving human lives. Effective risk management practices help identify and mitigate potential risks and reduce the likelihood of accidents, incidents or failures. Prioritizing safety through risk management ensures the well-being of passengers, crew members and the public.
- **Reliability:** Aerospace systems and vehicles are expected to operate with maximum reliability. By implementing risk management strategies, companies can identify potential risks and take preventive measures to minimize the possibility of failure. This improves aerospace systems' reliability and overall performance and reduces downtime, delays and costly repairs.
- **Cost reduction:** Effective risk management helps identify potential risks and associated costs. By proactively addressing risks, companies can prevent or minimize potential financial losses from accidents, operational disruptions or legal liabilities. This includes reducing insurance premiums, optimizing maintenance schedules and preventing costly system failures.
- **Public reputation and trust:** The aerospace industry relies on maintaining a strong reputation and public trust. A single incident can significantly affect an organization's brand and reputation. By prioritizing risk management, companies demonstrate their commitment to safety, reliability and responsible operations. It helps to build and maintain trust with customers, shareholders and the general public.
- **Advancement of Innovation and Technology:** The aerospace industry continuously strives for innovation and technological advancements. Risk management allows organizations to explore new technologies, materials, and processes while mitigating the associated risks. By understanding and effectively

3. Contractors are hired individuals or firms that provide specific services or complete projects for organizations on a contractual basis.

managing risks, companies can embrace innovation without compromising safety or reliability [23].

- **Continuous improvement:** Risk management is an iterative process that encourages continuous improvement. Organizations can improve their operations, processes and systems by learning from incidents, accidents and near misses. Risk management fosters a culture of continuous learning and improvement, driving innovation and best practices throughout the aerospace industry [24].
- **Increasing performance:** Improving performance in aerospace engineering involves enhancing various aspects of aircraft and spacecraft design, manufacturing, and operation. In the following figure (3), are some key areas to focus on to achieve better performance:

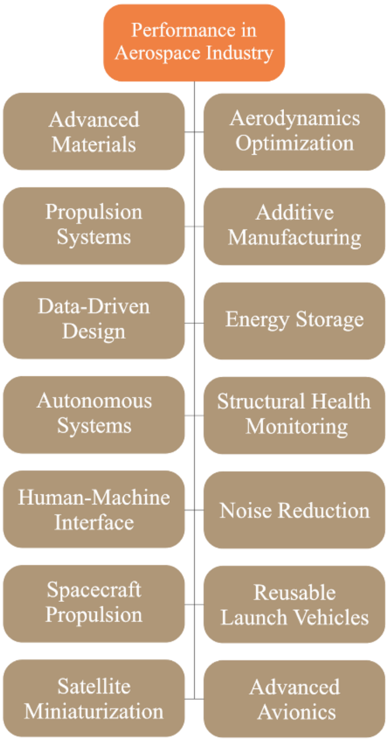

Figure 2. Some key areas to focus on to achieve better performance

Remember that making these improvements may involve a lot of research, testing, and cooperation between aerospace experts, scientists, and different people involved in the industry. Additionally, advancements in materials science, computer modeling, and other cutting-edge technologies can be crucial in achieving significant performance improvements in aerospace engineering.

- **Human resource training:** Human resource training in aerospace is essential to ensure that the workforce is equipped with the necessary skills, knowledge, and competencies to meet the specific demands of the aerospace industry [25].

6. Risks in the aerospace industry

The aerospace industry is fraught with various risks due to the complex nature of aerospace operations. Risks can arise from technological, operational challenges, environmental, and human factors. To reduce these risks, the aerospace industry uses strong risk management strategies, safety protocols, strict regulations, advanced technologies, and continuous training to increase safety, reliability, and operational excellence [26-28]. Here are some common hazards in the aerospace industry:

- **Structural failures:** Aerospace vehicles like airplanes and spacecraft are subjected to extreme operational stresses. Structural failures may occur due to material fatigue, manufacturing defects, or inadequate maintenance. These breakdowns can lead to catastrophic accidents and loss of life.
- **Engine failure:** Failure of propulsion systems such as aircraft engines or rocket engines can pose significant risks. Engine failure can result in loss of power, in-flight shutdown, or even out-of-control engine failure. These incidents can lead to loss of control, forced landing or crash.
- **Fire and explosion:** Aerospace vehicles carry highly flammable fuels such as jet fuel or rocket propellants. Fires and explosions can occur due to fuel leaks, electrical malfunctions, or other ignition sources. These accidents pose a serious risk to the vehicle and the crew/passengers.
- **System failure:** Various systems in aerospace vehicles, such as avionics systems, flight control systems, navigation systems, and life support systems, may fail. These defects can affect the vehicle's safety, performance and control and lead to dangerous situations.
- **Weather conditions:** Weather-related hazards, including turbulence, severe storms, frost, lightning strikes and extreme temperatures, can affect aerospace operations. Adverse weather conditions can affect the stability, visibility and navigation of an aircraft or spacecraft, creating hazards for crew and passengers.
- **Human error:** Human factors play a significant role in aerospace hazards. Errors by pilots, air traffic controllers, ground crew and maintenance personnel can lead to accidents or incidents. Also Fatigue, stress, miscommunication, or inadequate training can contribute to human error [30].
- **Foreign Object Damage (FOD):** FOD refers to lose objects or damage on a runway, taxiway, or airport that can damage an aircraft during takeoff or landing. FOD can cause a tire blowout, engine damage, or foreign object ingestion, leading to a crash or failure.
- **Space debris:** In space exploration, space debris creates dangers for satellites, spacecraft and astronauts. Collisions with space debris can damage or destroy equipment, disrupt communications systems, and pose hazards to crew members.

- **Security threats:** The aerospace industry faces terrorism, sabotage, or cyber-attacks. These threats can target airports, aircraft, satellite systems or critical infrastructure, potentially leading to catastrophic consequences [31].
- **Supply Chain Risks:** Risks can also arise from the complex global supply chain of the aerospace industry. Issues such as counterfeit parts, substandard materials, or supply disruptions can affect the reliability and safety of aerospace systems.

7. Risk assessment in the aerospace industry

Risk assessment in the aerospace industry involves a systematic process to identify, analyze, and evaluate risks associated with aerospace operations, systems, and activities. The purpose of risk assessment is to understand potential hazards, their likelihood of occurrence, and the potential consequences they may have. Risk assessment in the aerospace industry is a comprehensive and continuous process that helps organizations identify, analyze and mitigate potential risks [32-34]. By systematically assessing risks, organizations can make informed decisions, allocate resources effectively, and prioritize safety in aerospace operations. Here are the key steps involved in risk assessment in the aerospace industry:

- **Risk identification:** The first step in risk assessment is identifying potential risks. It systematically examines all aspects of aerospace operations, including design, construction, maintenance and operation to identify hazards, vulnerabilities and potential threats. This can be done through various methods such as brainstorming, checklists, historical data analysis and expert knowledge.
- **Risk Analysis:** Once risks are identified, a detailed analysis assesses their likelihood and potential impact. There are quantitative and qualitative methods for risk analysis in the aerospace industry. Quantitative methods, such as fault tree analysis and probabilistic risk assessment, involve mathematical modeling and data analysis to estimate the probabilities of various events and their consequences. Qualitative methods, such as failure mode and effects analysis (FMEA) and hazard and performance (HAZOP) studies, focus on identifying failure modes, their causes, and the severity of their potential consequences.
- **Risk assessment:** In this step, the identified risks are evaluated based on severity and probability. This assessment helps prioritize risks and determine which risks require immediate attention and mitigation. Risk assessment often involves assigning risk levels or scores based on predefined criteria or risk matrices.
- **Risk mitigation:** After assessing the risks, mitigation measures are developed and implemented to reduce the likelihood and potential impact of the identified risks. Risk mitigation strategies can include engineering controls, redundancy systems, safety protocols, training and education programs, quality control processes, and compliance with regulations and industry standards. The aim is to design, build and operate aerospace systems with internal safety features and procedures [6].
- **Risk monitoring and review:** Risk assessment is an ongoing process and risks must be continuously monitored and reviewed to ensure their effectiveness. Regular monitoring helps identify emerging risks, assess the effectiveness of mitigation measures, and identify the need for adjustments or improvements. Lessons learned from incidents, accidents or near misses are incorporated into the risk assessment to improve risk management practices.
- **Documentation and communication:** An effective risk assessment requires clear documentation of identified risks, analysis methods, assessment results and mitigation strategies. This documentation ensures that risks are well documented and understood throughout the organization. In addition, clear communication of risks with stakeholders, including employees, contractors, and regulatory authorities, is essential for effective risk management.

8. Demand risk assessment

Several researchers analysed the impact of demand volatility on inventory management (Ballou and Burnetas [9]; Cachon [17]; Talluri, Cetin, and Gardner [99], Betts and Johnston [14]; Sodhi [163]; Xiao and Yang [143]; Radke and Tseng [71]). Some of them provided useful insights on safety stock reduction. Ballou and Burnetas compared a traditional inventory planning approach with one based on filling customer demand from any of several stocking locations, referred to as cross filling, while considering the dispersion of demand among stocking locations. It was revealed that cross filling can help reducing safety stocks.

Talluri, Cetin, and Gardner developed and benchmarked a safety stock model with existing models for managing make-to-stock inventories under demand and supply variations. Based on a case study at an over-the-counter pharmaceutical company, the proposed safety stock model performed well in cost savings. Betts and Johnston presented the multi-item constrained inventory model to compare just-in-time (JIT) replenishment with component substitution under stochastic demand. The analysis showed that JIT replenishment is more effective than component substitution because of less investment in safety stock. Some other scholars analysed the impact of demand visibility and bullwhip effect on supply chain performance.

Sucky [97] suggested that the variability of orders increases as they move up the supply chain from retailers to wholesalers to manufacturers to suppliers. He concluded that the bullwhip effect is overestimated if a simple supply chain is assumed and risk pooling effects are present. A common limitation of the above articles is that most of the proposed methods were not implemented in real industrial cases (Ballou and Burnetas; Smaros et al.; Cachon; Betts and Johnston; Sodhi; Xiao and Yang; Reiner and Fichtinger; Sucky; Radke and Tseng).

Smaros et al. [89] used a discrete-event simulation model to show that a partial improvement of demand visibility can improve production and inventory control efficiency.

Reiner and Fichtinger [76] developed a dynamic model to evaluate supply chain process improvements under consideration of different forecast methods. They pointed out that dampening of the order variability decreases the bullwhip effect and the average on-hand inventory but with the problem of a decreasing service level.

Lack of actual implementation and verification would make the potential users doubtful about the effectiveness and efficiency of the proposed methods. Besides, several articles above simplified the studied problems with stylised supply chains (Ballou and Burnetas; Smaros et al.; Cachon).

9. Manufacturing risk assessment

There exist three research studies on manufacturing risk assessment. They applied different methods to assess different manufacturing risks in different supply chains. Cigolini and Rossi [20] proposed the fault tree approach to analyse and assess the operational risk at the oil supply chain's drilling, primary transport and refining stages. They concluded that different stages are affected by various operational risks according to plant differences. Therefore, each plant should have a specifically conceived risk management process.

Dietrich and Cudney [144] applied a Pugh method adaption to assess risk and manufacturing readiness level for emerging technologies in a global aerospace supply chain. They revealed that executive management can evaluate the emerging technology portfolio more effectively with the proposed methodology.

Tse and Tan [114] constructed a product quality risk and visibility assessment framework using the margin incremental analysis for a toy manufacturing company. They argued that better risk visibility in supply tiers could minimise the quality risk. There exist limitations in the above articles.

Cigolini and Rossi only focused on three stages of an oil supply chain, while ignoring operational risk assessment at some other crucial stages (e.g. design, construction and outsourcing). The risk assessment matrix proposed by Dietrich and Cudney is fairly simplistic as it is based on only three levels (i.e. ‘green’, ‘yellow’ and ‘red’).

Tse and Tan neither quantified risks and their factors, nor proposed any mitigating actions for the identified manufacturing risk.

10. Supply risk assessment

Supply risk assessment has attracted much attention. Most of the articles studied the supplier evaluation and selection problem while considering a variety of supply risks, such as poor quality (Talluri and Narasimhan [99]; Talluri, Narasimhan, and Nair [100]), late delivery (Talluri and Narasimhan [101]; Talluri, Narasimhan, and Nair [102]), uncertain capacity (Kumar, Vrat, and Shankar [40]; Viswanadham and Samvedi [190], dispersed geographical location (Chan and Kumar [23]), supplier failure (Kull and Talluri ; Ravindran et al.[144]; Ruiz-Torres, Mahmoodi, and Zeng [148]), supplier’s financial stress (Lockamy and McCormack[121]), supply disruption (Wu and Olson[120]; Meena, Sarmah, and Sarkar [57]), poor supplier service (Wu et al. [121]; Chen and Wu [122]), suppliers’ risk management ability and experience (Ho, Dey, and Lockström [81]) and lack of supplier involvement (Chaudhuri, Mohanty, and Singh [82]). A wide range of quantitative methods have been proposed to deal with this problem, including mathematical programming and data envelopment analysis (DEA) approaches (Talluri and Narasimhan; Kumar, Vrat, and Shankar; Talluri, Narasimhan, and Nair; Ravindran et al.; Wu and Olson; Wu et al.; Meena, Sarmah, and Sarkar), multicriteria decision-making and AHP approaches (Chan and Kumar; Blackhurst, Scheibe, and Johnson; Kull and Talluri; Ho, Dey, and Lockström; Chen and Wu; Viswanadham and Samvedi), Bayesian networks (Lockamy and McCormack), decision tree approach (Ruiz-Torres, Mahmoodi, and Zeng) and fuzzy-based failure mode and effect analysis (FMEA) with ordered weighted averaging approach (Chaudhuri, Mohanty, and Singh).

Xanthopoulos [133]), supplier non-conformance risk (Wiengarten, Pagell, and Fynes [198]), supplier incapability (Johnson, Elliott, and Drake [88]) and supplier unreliability (Cheong and Song [30]). Unlike the above approaches focusing on assessing supply risks, the following articles studied supply risk assessment methods and models.

Zsidisin et al. [214-218] examined tools and techniques that purchasing organisations implement for assessing supply risk within an agency theory context. They indicated that purchasing organisations can assess supply risk with techniques that focus on addressing supplier quality issues, improving supplier processes and reducing the likelihood of supply disruptions.

Ellegaard [25] applied a case-based methodology to analyse the supply risk management practices of 11 small company owners (SCOs). They confirmed that the 11 studied SCOs applied almost the same supply risk management practices, which can be characterised as defensive.

Wu and Olson [63] used simulated data to compare risk evaluation models: chance-constrained programming, DEA and multi-objective programming.

Results from three models are consistent with each other in selecting preferred suppliers.

Azadeh and Alem [5] benchmarked three supplier selection models under certainty, uncertainty and probabilistic conditions, including DEA, Fuzzy DEA and chance-constrained DEA. Results from three models are also consistent with each other concerning the worst suppliers. Supplier evaluation and selection has attracted the most attention is this category. Many of these articles focused on conceptual model development and demonstration using simulated data (Chan and Kumar; Ravindran et al.; Wu and Olson; Wu et al.; Meena, Sarmah, and Sarkar; Viswanadham and Samvedi; Ruiz-Torres, Mahmoodi, and Zeng). Thus, the use of real data to test the efficacy of these methods is still missing.

Moreover, some of these articles have other technical limitations. For example, Talluri, Narasimhan and Talluri, and Narasimhan, and Nair only utilised a single input measure in the DEA analyses. Kull and Talluri assumed current supplier capabilities will remain unchanged into the future. Lockamy and McCormack assumed that all suppliers are willing to share their accurate and reliable risk profile data with their customers. Ruiz-Torres, Mahmoodi, and Zeng assumed all the input parameters and supplier characteristics to be deterministic.

Tsai [112-113] modelled the supply-chain-related cash flow risks by the standard deviations of each period's cash inflows, outflows and net flows in a planning horizon. They recommended the best policy of using assetbacked securities to finance accounts receivable to shorten the cash conversion cycle and lower the cash inflow risk.

Liu and Nagurney [50] developed a variational inequality model to study the impact of foreign exchange risk and competition intensity on supply chain companies involved in offshore-outsourcing activities. Their simulation results indicated that the risk-averse firm generally has lower profitability and risk than the risk-neutral firm. On the other hand, two of the studies focused on generic financial risk.

Franca et al. [145] formulated a multiobjective programming model with the Six Sigma concepts to evaluate financial risk. They showed that the financial risk decreases as the sigma level increases.

Liu and Cruz [51] studied the impact of corporate financial risk and economic uncertainty on supply chains' values, profits and decisions. They found that suppliers are willing to sacrifice some profit margins to gain more businesses from manufacturers with lower financial risk and with lower sensitivity to economic uncertainty. A common drawback with these approaches is that they focused on simulated data instead of real case data.

11. Information risk assessment

Durowoju, Chan, and Wang [124] used discrete-event simulation to investigate the impact of disruption in the flow of critical information needed in manufacturing operations on collaborating members. They revealed that the retailer experiences the most uncertainty in the supply chain, while the holding cost constitutes the most unpredictable cost measure when a system failure breach occurs. In their study, a generic information technology risk was studied and no risk factors were identified nor quantified.

12. General risk assessment

Articles that do not assess specific risk types are described in this section. The topics of these articles are diversified and there are four major categories. First, several researchers attempted to evaluate, assess and quantify generic supply chain risks.

Brun et al. [18] developed a so-called supply network opportunity assessment package methodology to evaluate advanced planning, scheduling, and supply chain management implementation projects with risk analysis. Bogataj [15] used parametric linear programming model to measure the costs of risk based on the net present value of activities.

Wu, Blackhurst, and O’grady [128] proposed a disruption analysis network approach to determine how changes or disruptions propagate in supply chains and calculated their impact on the supply chain system.

Kumar, Tiwari, and Babiceanu [38] applied the artificial bee colony technique, genetic algorithms and particle swarm optimisation to identify operational risk factors, their expected value and probability of occurrence, and associated additional cost.

Khilwani, Tiwari, and Sabuncuoglu [99] proposed the hybrid Petri-net approach for modelling, performance evaluation and risk assessment of a supply chain.

Olson and Wu [63] used DEA and the Monte Carlo simulation to identify various risk performance measures for outsourcing, and compared expected performance of vendors under risk and uncertainty in a supply chain.

Wang et al. [108] applied fuzzy AHP to assess risk of implementing various green initiatives in the fashion industry.

Samvedi, Jain, and Chan [80] applied fuzzy AHP and fuzzy TOPSIS approaches to quantify the risks in a supply chain, and aggregated the values into a comprehensive risk index. The second category assesses the relationship between supply chain risks and strategies.

Craighead et al. [43] suggested that the best practices in purchasing, including supply base reduction, global sourcing and sourcing from supply clusters, might negatively impact the severity of supply chain disruptions.

Laeequddin et al. [41] suggested that the supply chain members should strive to reduce the membership risk levels to build trust rather than to reduce the risk.

Tomlin [108] found that contingent sourcing is preferred to supplier diversification as the supply risk increases, while diversification is preferred to contingent sourcing as the demand risk increases.

Hult, Craighead, and Ketchen [29] studied supply chain investment decisions when facing high levels of risk uncertainty. They extended real options theory to the supply chain context by examining how options are approached relative to supply chain project investments.

Wang, Gilland, and Tomlin [109] applied the unconstrained and constrained mathematical programming models to assess the relationship between various supply chain strategies and the regulatory trade risk. They established that the direct and split strategy profits increase in the non-tariff barriers price variance but decrease in the mean price.

Eliza, Ioana, Apostol., Aurel, Mihail, Ţîţu., Petrică, Tertereanu., Iuliana, Moisescu[148] discusses the importance of risk management in the aerospace industry and its role in improving safety and aircraft performance.

Jüttner and Maklan [35] revealed that knowledge management seems to enhance the supply chain resilience by improving flexibility, visibility, velocity and collaboration capabilities of the supply chain.

Pettit, Croxton, and Fiksel [67] suggested a correlation between increased resilience and improved supply chain performance.

Wagner and Neshat [121] assessed supply chain vulnerability. Wagner and Neshat concluded that if supply chain managers were more capable of measuring and managing supply chain vulnerability, they could reduce the number of disruptions and their impact.

Berle, Norstad, and Asbjørnslett [13] argued that identifying the 'vulnerability inducing bottlenecks' of transportation systems allows for realising more robust versions of these systems cost-effectively.

Xin, Hui., Kai, Li., Chong, Wang., Chen, Zhang., Zhengcheng, Gu. [149], proposes a method of "prevention first, risk moving forward and differentiated management" for risk management in the aerospace stand-alone device supply chain.

13. An overview of risk assessment methods in the aerospace industry

Various risk assessment methods are used in the aerospace industry to identify, analyze, and evaluate risks associated with aerospace operations, systems, and activities [35]. These methods are often combined, depending on the specific needs and complexity of the aerospace project or system. They provide structured approaches to identify and assess risks, enabling organizations to make informed decisions, allocate resources effectively, and implement appropriate risk mitigation measures in the aerospace industry [36]. In the figure (4) is an overview of some common risk assessment methods in the aerospace industry:

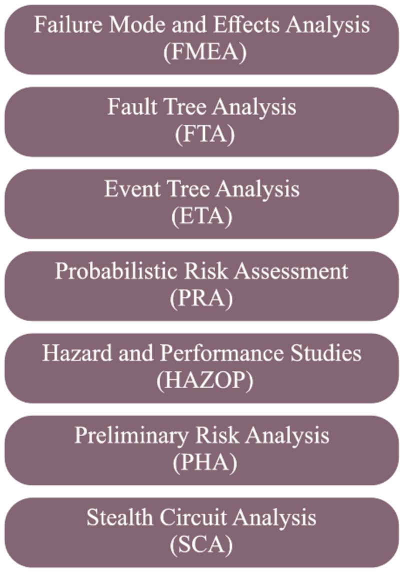

Figure 4. overview common risk assessment methods

In the following paragraphs, each method has discussed.

- **Failure Mode and Effects Analysis (FMEA):** FMEA is a systematic and proactive approach to identifying and evaluating potential failure modes and their effects on aerospace systems. This includes analyzing failures' potential causes, effects, and severity and assigning a Risk Priority Number (RPN) to prioritize mitigation actions. FMEA helps identify critical failure modes and their associated hazards.
- **Fault Tree Analysis (FTA):** FTA is a deductive, top-down approach that examines the various events or failures leading to a specific adverse event. It uses graphical representations to identify the combination of events that can lead to an adverse event. FTA quantifies the probability of an adverse event and helps identify critical events or failures that must be addressed.
- **Event Tree Analysis (ETA):** ETA is a complementary method to FTA that focuses on the consequences of specific events or failures. It examines potential outcomes and their probabilities after an initiating event. ETA helps assess the overall risk associated with an adverse event and supports decision-making to reduce risk.
- **Probabilistic Risk Assessment (PRA):** PRA is a comprehensive and quantitative method used to assess risks by modeling the probabilities and consequences of various events and failures. It integrates probabilistic modeling techniques, data analysis, and simulation to quantify the risk associated with complex systems. PRA provides insights into the overall risk profile and supports decision making for risk mitigation strategies.
- **Hazard and Performance Studies (HAZOP):** HAZOP is a systematic technique that focuses on

identifying potential hazards and performance issues in aerospace systems and processes. It involves a multidisciplinary team that reviews the system's design, performance, and control parameters to identify deviations from intended operation and potential consequences. HAZOP helps to discover design or operational weaknesses and enables the development of risk reduction strategies [19].

- **Preliminary Risk Analysis (PHA):** A PHA is a preliminary, high-level assessment conducted early in the development phase of an aerospace project. Identifies potential hazards and risks based on basic system information, requirements, and design concepts. The PHA helps guide early design decisions by identifying major hazards and initiating hazard mitigation activities.
- **Stealth Circuit Analysis (SCA):** SCA is a specialized method used to identify and evaluate electrical circuits or systems' hidden or undetected failure modes. This includes examining electrical systems' design, architecture, and behavior to identify potential hidden circuits that could lead to hazardous conditions. SCA helps prevent or reduce the risks associated with electrical failures.

14. Training and consideration of human resources in aviation

The industry's goal is to increase safety, performance and overall operational effectiveness by focusing on comprehensive training programs and integrating human factors considerations into aviation practices. These efforts support a culture of continuous learning, improvement and risk reduction. Training considerations and human factors are important in aviation safety and performance [37-38].

15. Initial training of pilots

The first case can be mentioned pilot training, in this field, the initial training of pilots takes place at the beginning [56]. In this training, pilots go through a rigorous training program to receive their license. This training includes classroom training, simulator training and flight hours to acquire the necessary knowledge and skills. In the continuation of the rating and rating training of the pilots, the pilots receive a specific type of rating training for the different types of aircraft that they are going to fly. This training focuses on unique aircraft features, systems and procedures. And further for higher experience and mastery, pilots undergo frequent training at regular intervals to maintain their proficiency and stay updated on new regulations, procedures, and technological developments [41-43].

16. Crew Resource Management

Another important aspect of human resource training is crew resource management, which emphasizes effective communication, teamwork, and decision-making in the cockpit. This increases situational awareness, risk management and the ability to handle unexpected events. Crew training encourages open and assertive communication, active listening, and mutual respect among crew members and promotes a supportive and collaborative environment [44-45].

17. Maintenance training

In this area, maintenance technicians receive comprehensive training to ensure they have the knowledge and skills to inspect, maintain and maintain aircraft and related systems, as well as ongoing training and frequent assessments to update technicians on new technologies. Maintenance procedures and regulatory requirements are met [46].

18. Considerations of human factors

Human factors focus on understanding human capabilities and limitations and how they affect aviation performance, safety, and well-being. Human factors considerations cover areas such as workload management, situational awareness, decision making, communication, fatigue management, and stress management [9]. includes the design of the aircraft, cockpit interfaces and procedures by considering the principles of human factors helps to optimize performance and reduce the possibility of error.

19. Fatigue management

Fatigue poses significant risks to aviation safety. There are regulations and guidelines to manage and reduce fatigue-related risks for flight crew members and air traffic controllers. Airlines and regulatory authorities implement policies and procedures to ensure adequate rest periods, work hour limits and effective fatigue risk management systems [48].

20. Culture and reporting only

Encouraging a culture of correctness promotes open reporting of incidents, errors, and near misses without fear of safety-related disciplinary action. This facilitates the identification of systemic issues and promotes learning and improvement. On the other hand, reporting systems, such as confidential safety reporting systems, enable people to report safety concerns, errors, or dangerous conditions anonymously or with protection [51].

21. Human factors in design

Considering human factors in aircraft and system design aims to optimize usability, efficiency and safety. This includes cockpit layout, control interfaces, displays, warning systems and automation design. Usability testing, human-in-the-loop simulations, and feedback from pilots and other stakeholders are used to evaluate and refine designs to ensure they align with human factors principles [50-88].

22. Case studies in aerospace risk management Aircraft accident investigation and risk reduction

In this case study, an aircraft accident investigation and subsequent risk reduction measures implemented to prevent similar incidents in the future are examined: The first step is to check the background of the incident. On a commercial flight, an airplane suffered an uncontrolled engine failure shortly after takeoff, resulting in significant engine and airframe damage. The plane crew managed to land safely and had no injuries to the passengers and crew. The incident triggered an investigation to determine the cause and implement appropriate risk mitigation measures [102].

The investigative team, consisting of aviation experts, engineers and regulators, conducted a detailed review of the engine, aircraft components, maintenance records, and flight data. The investigation identified a manufacturing defect in a critical engine component that led to its failure. became. This defect was not detected during regular inspections and maintenance procedures. The review also identified potential deficiencies in the maintenance process, including inadequate inspection procedures for specific engine components [100].

After that, based on the findings of the incident investigation, several measures were implemented to reduce the risk:

The engine manufacturer initiated a recall and inspection program for all engines of that particular model to identify and correct manufacturing defects. The manufacturing process was also reviewed and improved to ensure proper quality control measures and prevent similar defects in the future [34].

The airline revised its maintenance procedures to include specific inspections and checks for identified engine components [6]. At that company, training programs for maintenance technicians were updated to educate them about possible defects and emphasize the importance of thorough inspections. On the other hand, the regulator issued an airworthiness directive that mandates industry-wide inspections and maintenance procedures for identified engine components. The authority also reviewed its certification processes to ensure more rigorous evaluation and testing of critical components during the certification process [58].

Among other actions taken, research findings and lessons learned were shared with other airlines, manufacturers and industry organizations through safety bulletins, conferences and workshops, as well as industry-wide collaboration, dissemination of best practices and increased risk awareness. It facilitated the potential associated with the identified defect [59].

The airline further established a monitoring system to track compliance with revised maintenance procedures and ensure the effectiveness of risk mitigation measures, and the regulatory authority conducted periodic audits to assess implementation and compliance with airworthiness directives and the effectiveness of certification processes. did up to date [60].

The incident served as a catalyst for improved safety culture in airlines and the industry as a whole. A focus on continuous improvement was emphasized through increased reporting of safety concerns, anonymous safety reporting systems, and the promotion of a just culture. Lessons learned from this incident were integrated into pilot and maintenance technician training programs to increase awareness of potential hazards and increase effective risk reduction strategies. The aerospace industry can increase safety, prevent similar accidents, and maintain public confidence in the reliability and safety of air travel by conducting a complete accident investigation, implementing targeted risk reduction measures, and promoting a culture of continuous improvement [61-63].

23. Human factors analysis and risk reduction

Using human factors analysis and targeted risk mitigation strategies, the organization has successfully reduced risks related to human performance, improved safety, and improved operational performance in the aerospace industry [64]. In this case study, the application of human factors analysis and risk reduction strategies in the aerospace industry has been investigated:

First, we will discuss the background of the incident. An aviation maintenance organization experienced a series of incidents related to errors made by maintenance technicians during routine inspections and repairs. These errors led to delays, costly rework, and potential safety hazards [65]. The organization also recognized the need to address human factors and implement risk mitigation measures, which led to a human factors analysis. The first method of analyzing human factors is the root cause. An interdisciplinary team analyzed root cause to identify underlying factors contributing to maintenance errors [66]. Analysis revealed several human factors, including a lack of standard procedures, poor communication, time pressure, and inadequate training.

Another method is task analysis, which the team performed task analysis to understand the complexity and cognitive requirements of maintenance tasks. This involved examining each step of the inspection and repair processes to identify potential sources of error and areas where human performance could be improved. The team evaluated the types and frequency of human errors observed during incidents using the human error evaluation and reduction method or the human factors analysis and classification system [67]. It provided insights into specific human performance issues that contribute to errors. Based on the analysis of human factors, the organization implemented various risk reduction strategies, which include the following figure (5) [68]:

Figure 3. risk reduction strategies

In the following paragraphs, each strategy has discussed.

- **Standardized procedures:** The organization developed and implemented standardized procedures for maintenance tasks that clearly define procedures, tools, and safety requirements. These procedures were regularly reviewed and updated based on feedback from technicians.
- **Improved communication:** Emphasis is placed on effective communication between technicians, supervisors and other stakeholders involved in the maintenance process. Communication channels including regular meetings, digital platforms and clear documentation of guidelines and changes were established.
- **Education and Training:** The organization increased training programs for maintenance technicians, providing comprehensive training on human factors, error prevention and situational awareness. The training emphasized the importance of following procedures, recognizing potential errors, and promoting a safety culture.
- **Fatigue management:** Fatigue management measures were implemented to minimize fatigue-related errors, including scheduling practices that ensure adequate rest periods and reduced overtime. Awareness programs were conducted to educate employees about the impact of fatigue on human performance [70].
- **Error reporting and feedback:** The organization implemented a non-punitive reporting system to encourage technicians to report errors, near misses and safety concerns. Regular feedback loops were established to provide timely feedback to technicians, promoting learning and improvement [72-73].

As a result of these actions, many benefits were obtained, including the following:

- **Error Reduction:** Implementation of risk reduction strategies significantly reduced maintenance errors and related incidents, improving operational efficiency and safety.
- **Improved safety culture:** A focus on human factors and risk reduction fostered a safety culture in the organization, where employees felt comfortable reporting errors, suggesting improvements, and actively participating in safety initiatives.
- **Improved operational performance:** By addressing human performance factors, the organization experienced improved productivity, reduced rework and improved overall operational performance.
- **Continuous learning and improvement:** The organization created a continuous learning and improvement culture by actively seeking feedback, conducting regular assessments, and incorporating lessons learned into training and procedures.

24. Conclusion

As a result, risk management in the aerospace industry is of utmost importance to ensure the safety, reliability and success of aerospace operations. The complex nature of aerospace systems and the potential consequences of failures or accidents necessitate effective risk management measures. Key elements of risk management in the aerospace industry include risk identification, assessment, mitigation, regulatory compliance, safety management systems, incident investigation, supply chain management, and continuous monitoring and evaluation.

By implementing these risk management principles, aerospace companies can prioritize safety, mitigate potential risks, protect assets, ensure regulatory compliance, and maintain public trust. Organizations can proactively implement risk reduction measures and improve safety practices by identifying and assessing risks. This includes robust training programs, human factors considerations, safety protocols and continuous improvement initiatives. Risk management in the aerospace industry is a continuous and iterative process that requires the commitment and participation of all stakeholders. The aerospace industry can increase safety, reliability and operational excellence by strengthening the safety culture, sharing lessons learned and being alert in identifying and addressing emerging risks.

Effective risk management in aerospace is vital for safety, reliability, and success due to complex systems and potential consequences. Key elements include risk identification, assessment, mitigation, compliance, safety systems, and continuous monitoring.

Implementing these principles enhances safety, compliance, and public trust, with proactive risk reduction measures, like training, safety protocols, and continuous improvement.

Risk management in aerospace is an ongoing, stakeholder-driven process. Strengthening safety culture, sharing lessons, and addressing emerging risks increase safety, reliability, and operational excellence. Additionally, risk management contributes to cost control and efficiency, protecting investments in technology and innovation, fostering collaboration, and supporting the industry's growth, innovation, and sustainability.

Overall, effective risk management practices enable the aerospace industry to navigate the complexities of aerospace operations, protect lives, maintain regulatory compliance, and maintain its reputation as a safe and secure mode of transportation.

25. References

[1] A. Adhitya, R. Srinivasan, and I. A. Karimi, "Supply Chain Risk Identification Using a HAZOP-based Approach," *AIChE Journal*, vol. 55, pp. 1447-1463, 2009. doi: https://doi.org/10.1002/aic.11764

[2] P. Aggarwal and R. Ganeshan, "Using Risk-management Tools on B2Bs: An Exploratory Investigation," *International Journal of Production Economics*, vol. 108, pp. 2-7, 2007. doi: https://doi.org/10.1016/j.ijpe.2006.12.044

[3] F. J. Arcelus, S. Kumar, and G. Srinivasan, "Risk Tolerance and a Retailer’s Pricing and Ordering Policies within a Newsvendor Framework," *Omega*, vol. 40, pp. 188-198, 2012. doi: https://doi.org/10.1016/j.omega.2011.05.007

[4] N. Azad and H. Davoudpour, "Designing a Stochastic Distribution Network Model under Risk," *The International Journal of Advanced Manufacturing Technology*, vol. 64, pp. 23-40, 2013. doi: https://doi.org/10.1007/s00170-012-4000-z

[5] A. Azadeh and S. M. Alem, "A Flexible Deterministic, Stochastic and Fuzzy Data Envelopment Analysis Approach for Supply Chain Risk and Vendor Selection Problem: Simulation Analysis," *Expert Systems with Applications*, vol. 37, pp. 7438-7448, 2010. doi: https://doi.org/10.1016/j.eswa.2010.04.022

[6] A. Azaron, K. N. Brown, S. A. Tarim, and M. Modarres, "A Multi-objective Stochastic Programming Approach for Supply Chain Design Considering Risk," *International Journal of Production Economics*, vol. 116, pp. 129-138, 2008. doi: https://doi.org/10.1016/j.ijpe.2008.08.002

[7] A. Baghalian, S. Rezapour, and R. Z. Farahani, "Robust Supply Chain Network Design with Service Level against Disruptions and Demand Uncertainties: A Real-life Case," *European Journal of Operational Research*, vol. 227, pp. 199-215, 2013. doi:https://doi.org/10.1016/j.ejor.2012.12.017

[8] N. Bakshi and P. Kleindorfer, "Co-opetition and Investment for Supply-chain Resilience," *Production and Operations Management*, vol. 18, pp. 583-603, 2009. doi: https://doi.org/10.1111/j.1937-5956.2009.01031.x

[9] R. H. Ballou and A. Burnetas, "Planning Multiple Location Inventories," *Journal of Business Logistics*, vol. 24, pp. 65-89, 2003. doi: https://doi.org/10.1002/j.21581592.2003.tb00046.x

[10] D. Bandaly, A. Satir, Y. Kahyaoglu, and L. Shanker, "Supply Chain Risk Management – I: Conceptualization, Framework and Planning Process," *Risk Management*, vol. 14, pp. 249-271, 2012. doi: https://doi.org/10.1057/rm.2012.7

[11] A. Ben-Tal, B. D. Chung, S. R. Mandala, and T. Yao, "Robust Optimization for Emergency Logistics Planning: Risk Mitigation in Humanitarian Relief Supply Chains," *Transportation Research Part B: Methodological*, vol. 45, pp. 1177-1189, 2011. doi: https://doi.org/10.1016/j.trb.2010.09.002

[12] P. D. Berger, A. Gerstenfeld, and A. Z. Zeng, "How Many Suppliers Are Best? A Decision-analysis Approach," *Omega*, vol. 32, pp. 9-15, 2004. doi: https://doi.org/10.1016/j.omega.2003.09.001

[13] Ø. Berle, I. Norstad, and B. E. Asbjørnslett, "Optimization, Risk Assessment and Resilience in LNG Transportation Systems," *Supply Chain Management: An International Journal*, vol. 18, pp. 253-264, 2013. doi: https://www.emerald.com/insight/content/doi/10.1108/SCM-03-2012-0109/full/html

[14] J. M. Betts and R. B. Johnston, "Just-in-time Component Replenishment Decisions for Assemble-to-order Manufacturing under Capital Constraint and Stochastic Demand," *International Journal of Production Economics*, vol. 95, pp. 51-70, 2005. doi: https://doi.org/10.1016/j.ijpe.2003.10.020

[15] D. Bogataj and M. Bogataj, "Measuring the Supply Chain Risk and Vulnerability in Frequency Space," *International Journal of Production Economics*, vol. 108, pp. 291-301, 2007. doi: https://doi.org/10.1016/j.ijpe.2006.12.017

[16] A. Brun, M. Caridi, K. F. Salama, and I. Ravelli, "Value and Risk Assessment of Supply Chain Management Improvement Projects," *International Journal of Production Economics*, vol. 99, pp. 186-201, 2006. doi: https://doi.org/10.1016/j.ijpe.2004.12.016

[17] G. P. Cachon, "The Allocation of Inventory Risk in a Supply Chain: Push, Pull, and Advance-purchase

Discount Contracts," *Management Science*, vol. 50, pp. 222-238, 2004. doi: https://doi.org/10.1287/mnsc.1030.0190

[18] F. T. S. Chan and N. Kumar, "Global Supplier Development Considering Risk Factors Using Fuzzy Extended AHP-based Approach," *Omega*, vol. 35, pp. 417-431, 2007. doi:https://doi.org/10.1016/j.omega.2005.08.004

[19] T. Cheong and H. S. Song, "The Value of Information on Supply Risk under Random Yields," *Transportation Research Part E: Logistics and Transportation Review*, vol. 60, pp. 27-38, 2013. doi: https://doi.org/10.1016/j.tre.2013.09.006

[20] R. Cigolini and T. Rossi, "Managing Operational Risks along the Oil Supply Chain," *Production Planning & Control*, vol. 21, pp. 452-467, 2010. doi: https://doi.org/10.1080/09537280903453695

[21] R. A. Dowty and W. A. Wallace, "Implications of Organizational Culture for Supply Chain Disruption and Restoration," *International Journal of Production Economics*, vol. 126, pp. 57-65, 2010. doi: https://doi.org/10.1016/j.ijpe.2009.10.024

[22] D. M. Dietrich and E. A. Cudney, "Methods and considerations for the development of emerging manufacturing technologies into a global aerospace supply chain," *International Journal of Production Research*, vol. 49, no. 10, pp. 2819-2831, 2011, doi: https://doi.org/10.1080/00207541003801275.

[23] T. C. T. Du, H. M. Lee, and A. Chen, "Constructing Federated Databases in Coordinated Supply Chains," *Decision Support Systems*, vol. 36, pp. 49-64, 2003. doi: https://doi.org/10.1016/S0167-9236(02)00131-8

[24] O. A. Durowoju, H. K. Chan, and X. Wang, "Entropy Assessment of Supply Chain Disruption," *Journal of Manufacturing Technology Management*, vol. 23, pp. 998-1014, 2012. [Online]. Available:https://www.emerald.com/insight/content/doi/10.1108/17410381211276844/full/html?fullSc=1&fullSc=1&mbSc=1&fullSc=1&fullSc=1

[25] C. Ellegaard, "Supply Risk Management in a Small Company Perspective," *Supply Chain Management: An International Journal*, vol. 13, pp. 425-434, 2008. doi:

[26] W. Ho, P. K. Dey, and M. Lockström, "Strategic Sourcing: A Combined QFD and AHP Approach in Manufacturing," *Supply Chain Management: An International Journal*, vol. 16, pp. 446-461, 2011. [Online]. Available:https://www.emerald.com/insight/content/doi/10.1108/13598541111171093/full/html?fullSc=1&mbSc=1

[27] E. Hofmann, "Natural Hedging as a Risk Prophylaxis and Supplier Financing Instrument in Automotive Supply Chains," *Supply Chain Management: An International Journal*, vol. 16, pp. 128-141, 2011. [Online]. Available:https://www.emerald.com/insight/content/doi/10.1108/13598541111115374/full/html

[28] H. Y. Huang, Y. C. Chou, and S. Chang, "A Dynamic System Model for Proactive Control of Dynamic Events in Full-load States of Manufacturing Chains," *International Journal of Production Research*, vol. 47, pp. 2485-2506, 2009. doi: https://doi.org/10.1080/00207540701484913

[29] G. T. M. Hult, C. W. Craighead, and D. J. Ketchen Jr., "Risk Uncertainty and Supply Chain Decisions: A Real Options Perspective," *Decision Sciences*, vol. 41, pp. 435-458, 2010.doi: https://doi.org/10.1111/j.1540-5915.2010.00276.x

[30] S. J. Hung, "Activity-based Divergent Supply Chain Planning for Competitive Advantage in the Risky Global Environment: A DEMATEL-ANP Fuzzy Goal Programming Approach," *Expert Systems with Applications*, vol. 38, pp. 9053-9062, 2011. doi: https://doi.org/10.1016/j.eswa.2010.09.024

[31] K. T. Hung and S. Ryu, "Changing Risk Preferences in Supply Chain Inventory Decisions," *Production Planning & Control*, vol. 19, pp. 770-780, 2008. doi: https://doi.org/10.1080/09537280802550146

[32] E. Iakovou, D. Vlachos, and A. Xanthopoulos, "A Stochastic Inventory Management Model for a Dual Sourcing Supply Chain with Disruptions," *International Journal of Systems Science*, vol. 41, pp. 315-324, 2010. doi: https://doi.org/10.1080/00207720903326894

[33] G. Ji and C. Zhu, "A Study on Emergency Supply Chain and Risk Based on Urgent Relief Service in Disasters," *Systems Engineering Procedia*, vol. 5, pp. 313-325, 2012. doi: https://doi.org/10.1016/j.sepro.2012.04.049

[34] N. Johnson, D. Elliott, and P. Drake, "Exploring the Role of Social Capital in Facilitating Supply Chain Resilience," *Supply Chain Management: An International Journal*, vol. 18, pp. 324-336, 2013. [Online]. Available:https://www.emerald.com/insight/content/doi/10.1108/SCM-06-2012-0203/full/html

[35] U. Jüttner, "Supply Chain Risk Management: Understanding the Business Requirements from a Practitioner Perspective," *The International Journal of Logistics Management*, vol. 16, pp. 120-141, 2005. doi: https://doi.org/10.1016/j.ijpe.2020.107667

[36] U. Jüttner and S. Maklan, "Supply Chain Resilience in the Global Financial Crisis: An Empirical Study," *Supply Chain Management: An International Journal*, vol. 16, pp. 246-259, 2011. [Online]. Available:https://www.emerald.com/insight/content/doi/10.1108/09574090510617385/full/html

[37] U. Jüttner, H. Peck, and M. Christopher, "Supply Chain Risk Management: Outlining an Agenda for Future Research," *International Journal of Logistics: Research and Applications*, vol. 6, pp. 197-210,

2003. doi: https://doi.org/10.1080/13675560310001627016

[38] S. Kumar and T. Havey, "Before and after Disaster Strikes: A Relief Supply Chain Decision Support Framework," *International Journal of Production Economics*, vol. 145, pp. 613-629, 2013. doi: https://doi.org/10.1016/j.ijpe.2013.05.016

[39] M. Kumar, P. Vrat, and R. Shankar, "A Fuzzy Programming Approach for Vendor Selection Problem in a Supply Chain," *International Journal of Production Economics*, vol. 101, pp. 273-285, 2006. doi: https://doi.org/10.1016/j.ijpe.2005.01.005

[40] M. Laeequddin, G. D. Sardana, B. S. Sahay, K. A. Waheed, and V. Sahay, "Supply Chain Partners' Trust Building Process through Risk Evaluation: The Perspectives of UAE Packaged Food Industry," *Supply Chain Management: An International Journal*, vol. 14, pp. 280–290, 2009. [Online]. Available:https://www.emerald.com/insight/content/doi/10.1108/13598540910970117/full/html

[41] O. Lavastre, A. Gunasekaran, and A. Spalanzani, "Supply Chain Risk Management in French Companies," *Decision Support Systems*, vol. 52, pp. 828–838, 2012. doi: https://doi.org/10.1016/j.dss.2011.11.017

[42] H. Q. Le, S. Arch-int, H. X. Nguyen, and N. Arch-int, "Association Rule Hiding in Risk Management for Retail Supply Chain Collaboration," *Computers in Industry*, vol. 64, pp. 776–784, 2013. [Online]. Available:https://doi.org/10.1016/j.compind.2013.04.011

[43] D. Lei, J. Li, and Z. Liu, "Supply Chain Contracts under Demand and Cost Disruptions with Asymmetric Information," *International Journal of Production Economics*, vol. 139, pp. 116–126, 2012. doi: https://doi.org/10.1016/j.ijpe.2011.11.031

[44] M. A. Lejeune, "Preprocessing Techniques and Column Generation Algorithms for Stochastically Efficient Demand," *Journal of the Operational Research Society*, vol. 59, pp. 1239–1252, 2008. doi: https://doi.org/10.1057/palgrave.jors.2602475

[45] Q. Li, "Risk, Risk Aversion and the Optimal Time to Produce," *IIE Transactions*, vol. 39, pp. 145–158, 2007. doi: https://doi.org/10.1080/07408170600735512

[46] J. Li, S. Wang, and T. C. E. Cheng, "Competition and Cooperation in a Single-retailer Two-supplier Supply Chain with Supply Disruption," *International Journal of Production Economics*, vol. 124, pp. 137–150, 2010. doi: https://doi.org/10.1016/j.ijpe.2009.10.017

[47] Y. Lin and L. Zhou, "The Impacts of Product Design Changes on Supply Chain Risk: A Case Study," *International Journal of Physical Distribution & Logistics Management*, vol. 41, pp. 162–186, 2011. doi: https://www.emerald.com/insight/content/doi/10.1108/09600031111118549/full/html

[48] Z. Liu and J. M. Cruz, "Supply Chain Networks with Corporate Financial Risks and Trade Credits under Economic Uncertainty," *International Journal of Production Economics*, vol. 137, pp. 55–67, 2012. doi: https://doi.org/10.1016/j.health.2022.100120

[49] Z. Liu and A. Nagurney, "Supply Chain Outsourcing under Exchange Rate Risk and Competition," *Omega*, vol. 39, pp. 539–549, 2011. doi: https://doi.org/10.1016/j.omega.2010.11.003

[50] A. Lockamy III and K. McCormack, "Analyzing Risks in Supply Networks to Facilitate Outsourcing Decisions," *International Journal of Production Research*, vol. 48, pp. 593–611, 2010. doi: https://doi.org/10.1016/j.ijdrr.2020.101607

[51] J. F. Lundin, "Redesigning a Closed-loop Supply Chain Exposed to Risks," *International Journal of Production Economics*, vol. 140, pp. 596–603, 2012. doi; https://doi.org/10.1016/j.ijpe.2011.01.010

[52] H. Y. Mak and Z. J. M. Shen, "Risk Diversification and Risk Pooling in Supply Chain Design," *IIE Transactions*, vol. 44, pp. 603–621, 2012. doi; https://doi.org/10.1080/0740817X.2011.635178

[53] I. Manuj and J. T. Mentzer, "Global Supply Chain Risk Management Strategies," *International Journal of Physical Distribution & Logistics Management*, vol. 38, pp. 192–223, 2008. [Online]. Available:https://www.emerald.com/insight/content/doi/10.1108/09600030810866986/full/html

[54] P. L. Meena and S. P. Sarmah, "Multiple Sourcing under Supplier Failure Risk and Quantity Discount: A Genetic Algorithm Approach," *Transportation Research Part E: Logistics and Transportation Review*, vol. 50, pp. 84–97, 2013. doi; https://doi.org/10.1016/j.tre.2012.10.001

[55] P. L. Meena, S. P. Sarmah, and A. Sarkar, "Sourcing Decisions under Risks of Catastrophic Event Disruptions," *Transportation Research Part E: Logistics and Transportation Review*, vol. 47, pp. 1058–1074, 2011. doi: https://doi.org/10.1016/j.tre.2011.03.003

[56] K. Nakashima and S. M. Gupta, "A Study on the Risk Management of Multi Kanban System in a Closed Loop Supply Chain," *International Journal of Production Economics*, vol. 139, pp. 65–68, 2012. doi:https://doi.org/10.1016/j.ijpe.2012.03.016

[57] A. Norrman and U. Jansson, "Ericsson's Proactive Supply Chain Risk Management Approach after a Serious Sub-supplier Accident," *International Journal of Physical Distribution & Logistics Management*, vol. 34, pp. 434–456, 2004. Available [Online]:https://www.emerald.com/insight/content/doi/10.1108/09600030410545463/full/html?jo

[58] J. Oehmen, A. Ziegenbein, R. Alard, and P. Schönsleben, "System-oriented Supply Chain Risk Management," *Production Planning & Control*, vol. 20, pp. 343–361, 2009. doi: https://doi.org/10.1080/09537280902843789

[59] A. Oke and M. Gopalakrishnan, "Managing Disruptions in Supply Chains: A Case Study of a Retail Supply Chain," *International Journal of Production Economics*, vol. 118, pp. 168–174, 2009. doi: https://doi.org/10.1016/j.ijpe.2008.08.045

[60] D. L. Olson and D. D. Wu, "A Review of Enterprise Risk Management in Supply Chain," *Kybernetes*, vol. 39, pp. 694–706, 2010. doi: https://www.emerald.com/insight/content/doi/10.1108/03684921011043198/full/html?utm_campaign=Emerald_Engineering_PPV_Dec22_RoN

[61] D. Olson and D. Wu, "Risk Management Models for Supply Chain: A Scenario Analysis of Outsourcing to China," *Supply Chain Management: An International Journal*, vol. 16, pp. 401–408, 2011. [Online]. Available: https://www.emerald.com/insight/content/doi/10.1108/13598541111171110/full/html

[62] S. Park, T. E. Lee, and C. S. Sung, "A Three-level Supply Chain Network Design Model with Risk-pooling and Lead times," *Transportation Research Part E: Logistics and Transportation Review*, vol. 46, pp. 563–581, 2010. doi: https://doi.org/10.1016/j.tre.2009.12.004

[63] H. Peck, "Drivers of Supply Chain Vulnerability: An Integrated Framework," International Journal of *Physical Distribution & Logistics Management*, vol. 35, pp. 210–232, 2005. [Online], Available: https://www.emerald.com/insight/content/doi/10.1108/09600030510599904/full/html

[64] T. J. Pettit, K. L. Croxton, and J. Fiksel, "Ensuring Supply Chain Resilience: Development and Implementation of an Assessment Tool," *Journal of Business Logistics*, vol. 34, pp. 46–76, 2013. doi: https://doi.org/10.1111/jbl.12009

[65] C. A. Poojari, C. Lucas, and G. Mitra, "Robust Solutions and Risk Measures for a Supply Chain Planning Problem under Uncertainty," *Journal of the Operational Research Society*, vol. 59, pp. 2–12, 2008. doi: https://doi.org/10.1057/palgrave.jors.2602381

[66] I. N. Pujawan and L. H. Geraldin, "House of Risk: A Model for Proactive Supply Chain Risk Management," *Business Process Management Journal*, vol. 15, pp. 953–967, 2009. Available [Online]:https://www.emerald.com/insight/content/doi/10.1108/14637150911003801/full/html

[67] P. Qiang and A. Nagurney, "A bi-criteria Indicator to Assess Supply Chain Network Performance for Critical Needs under Capacity and Demand Disruptions," *Transportation Research Part A*, vol. 46, pp. 801–812, 2012. doi: https://doi.org/10.1016/j.tra.2012.02.006

[68] A. M. Radke and M. M. Tseng, "A Risk Management-based Approach for Inventory Planning of Engineering-to-order Production," *CIRP Annals-Manufacturing Technology*, vol. 61, pp. 387–390, 2012. doi: https://doi.org/10.1016/j.cirp.2012.03.064

[69] N. R. S. Raghavan and V. K. Mishra, "Short-term Financing in a Cash-constrained Supply Chain," *International Journal of Production Economics*, vol. 134, pp. 407–412, 2011. doi: https://doi.org/10.1016/j.ijpe.2009.11.014

[70] S. Rao and T. J. Goldsby, "Supply Chain Risks: A Review and Typology," *The International Journal of Logistics Management*, vol. 20, pp. 97–123, 2009. [Online]. Available:https://www.emerald.com/insight/content/doi/10.1108/09574090910954864/full/html?fullSc=1&mbSc=1&fullSc=1&fullSc=1&fullSc=1

[71] U. S. Rao, J. M. Swaminathan, and J. Zhang, "Demand and Production Management with Uniform Guaranteed Lead Time," *Production and Operations Management*, vol. 14, pp. 400–412, 2005. doi: https://doi.org/10.1111/j.1937-5956.2005.tb00229.x

[72] A. R. Ravindran, R. U. Bilsel, V. Wadhwa, and T. Yang, "Risk Adjusted Multicriteria Supplier Selection Models with Applications," *International Journal of Production Research*, vol. 48, pp. 405–424, 2010. doi: https://doi.org/10.1080/00207540903174940

[73] G. Reiner and J. Fichtinger, "Demand Forecasting for Supply Processes in Consideration of Pricing and Market Information," *International Journal of Production Economics*, vol. 118, pp. 55–62, 2009. doi: https://doi.org/10.1016/j.ijpe.2008.08.009

[74] B. Ritchie and C. Brindley, "An Emergent Framework for Supply Chain Risk Management and Performance Measurement," *Journal of the Operational Research Society*, vol. 58, pp. 1398–1411, 2007. doi: https://doi.org/10.1057/palgrave.jors.2602412

[75] A. J. Ruiz-Torres and F. Mahmoodi, "The Optimal Number of Suppliers Considering the Costs of Individual Supplier Failures," *Omega*, vol. 35, pp. 104–115, 2007. doi: https://doi.org/10.1016/j.omega.2005.04.005

[76] A. J. Ruiz-Torres, F. Mahmoodi, and A. Z. Zeng, "Supplier Selection Model with Contingency Planning for Supplier Failures," *Computers & Industrial Engineering*, vol. 66, pp. 374–382, 2013. doi: https://doi.org/10.1016/j.cie.2013.06.021

[77] A. Samvedi, V. Jain, and F. T. S. Chan, "Quantifying Risks in a Supply Chain through Integration of Fuzzy AHP and Fuzzy TOPSIS," *International Journal of Production Research*, vol. 51, pp. 2433–2442, 2013. doi: https://doi.org/10.1080/00207543.2012.741330

[78] T. Sawik, "Selection of Resilient Supply Portfolio under Disruption Risks," *Omega*, vol. 41, pp. 259–269, 2013. doi: https://doi.org/10.1016/j.omega.2012.05.003

[79] H. E. Sayed, H. A. Gabbar, and S. Miyazaki, "A Hybrid Statistical Genetic-based Demand

Forecasting Expert System," *Expert Systems with Applications*, vol. 36, pp. 11662–11670, 2009. doi: https://doi.org/10.1016/j.eswa.2009.03.014

[80] A. J. Schmitt and M. Singh, "A Quantitative Analysis of Disruption Risk in a Multi-echelon Supply Chain," *International Journal of Production Economics*, vol. 139, pp. 22–32, 2012. doi: https://doi.org/10.1016/j.ijpe.2012.01.004

[81] A. J. Schmitt, L. V. Snyder, and Z. J. M. Shen, "Inventory Systems with Stochastic Demand and Supply: Properties and Approximations," *European Journal of Operational Research*, vol. 206, pp. 313–328, 2010. doi: https://doi.org/10.1016/j.ejor.2010.02.029

[82] T. Schoenherr, V. M. R. Tummala, and T. P. Harrison, "Assessing Supply Chain Risks with the Analytic Hierarchy Process: Providing Decision Support for the Offshoring Decision by a US Manufacturing Company," *Journal of Purchasing & Supply Management*, vol. 14, pp. 100–111, 2008. doi: https://doi.org/10.1016/j.pursup.2008.01.008

[83] Y. Shi, F. Wu, L. K. Chu, D. Sculli, and Y. H. Xu, "A Portfolio Approach to Managing Procurement Risk Using Multi-stage Stochastic Programming," *Journal of the Operational Research Society*, vol. 62, pp. 1958–1970, 2011. doi: https://doi.org/10.1057/jors.2010.149

[84] H. Shin and W. C. Benton, "A Quantity Discount Approach to Supply Chain Coordination," *European Journal of Operational Research*, vol. 180, pp. 601–616, 2007. doi: https://doi.org/10.1016/j.ejor.2006.04.033

[85] P. R. Sinha, L. E. Whitman, and D. Malzahn, "Methodology to Mitigate Supplier Risk in an Aerospace Supply Chain," *Supply Chain Management: An International Journal*, vol. 9, pp. 154–168, 2004. [Online]. Available: https://www.emerald.com/insight/content/doi/10.1108/13598540410527051/full/html

[86] J. B. Skipper and J. B. Hanna, "Minimizing Supply Chain Disruption Risk through Enhanced Flexibility," *International Journal of Physical Distribution & Logistics Management*, vol. 39, pp. 404–427, 2009. [Online], Available: https://www.emerald.com/insight/content/doi/10.1108/09600030910973742/full/html?fullSc=1

[87] J. Smaros, J. M. Lehtonen, P. Appelqvist, and J. Holmström, "The Impact of Increasing Demand Visibility on Production and Inventory Control Efficiency," *International Journal of Physical Distribution & Logistics Management*, vol. 33, pp. 336–354. doi: https://doi.org/10.1108/09600030310478801

[88] G. E. Smith, K. J. Watson, W. H. Baker, and J. A. Pokorski II, "A Critical Balance: Collaboration and Security in the IT-enabled Supply Chain," *International Journal of Production Research*, vol. 45, no. 11, pp. 2595–2613, 2007. doi: https://doi.org/10.1080/00207540601020544

[89] L. V. Snyder, M. S. Daskin, and C. P. Teo, "The Stochastic Location Model with Risk Pooling," *European Journal of Operational Research*, vol. 179, pp. 1221–1238, 2007. doi: https://doi.org/10.1016/j.ejor.2005.03.076

[90] M. S. Sodhi, "Managing Demand Risk in Tactical Supply Chain Planning for a Global Consumer Electronics Company," *Production and Operations Management*, vol. 14, pp. 69–79, 2005.doi: https://doi.org/10.1111/j.1937-5956.2005.tb00010.x

[91] M. S. Sodhi, B. G. Son, and C. S. Tang, "Researchers' Perspectives on Supply Chain Risk Management," *Production and Operations Management*, vol. 21, pp. 1–13, 2012. doi: https://doi.org/10.1111/j.1937-5956.2011.01251.x

[92] M. S. Sodhi and C. S. Tang, "Modeling Supply-chain Planning under Demand Uncertainty Using Stochastic Programming: A Survey Motivated by Asset–Liability Management," *International Journal of Production Economics*, vol. 121, pp. 728–738, 2009. doi: https://doi.org/10.1016/j.ijpe.2009.02.009

[93] J. Y. Son and R. K. Orchard, "Effectiveness of Policies for Mitigating Supply Disruptions," *International Journal of Physical Distribution & Logistics Management*, vol. 43, pp. 684–706, 2013. doi: https://doi.org/10.1108/IJPDLM-04-2012-0109

[94] C. Speier, J. M. Whipple, D. J. Closs, and M. D. Voss, "Global Supply Chain Design Considerations: Mitigating Product Safety and Security Risks," *Journal of Operations Management*, vol. 29, pp. 721–736, 2011. doi: https://doi.org/10.1016/j.jom.2011.06.003

[95] E. Sucky, "The Bullwhip Effect in Supply Chains – An Overestimated Problem?" *International Journal of Production Economics*, vol. 118, pp. 311–322, 2009. doi: https://doi.org/10.1016/j.ijpe.2008.08.035

[96] J. Sun, M. Matsui, and Y. Yin, "Supplier Risk Management: An Economic Model of P-chart Considered Due-date and Quality Risks," *International Journal of Production Economics*, vol. 139, pp. 58–64, 2012. doi: https://doi.org/10.1016/j.ijpe.2012.03.004

[97] S. Talluri, K. Cetin, and A. J. Gardner, "Integrating Demand and Supply Variability into Safety Stock Evaluations," *International Journal of Physical Distribution & Logistics Management*, vol. 34, pp. 62–69, 2004. doi: https://doi.org/10.1108/09600030410515682

[98] S. Talluri, T. J. Kull, H. Yildiz, and J. Yoon, "Assessing the Efficiency of Risk Mitigation Strategies in Supply Chains," *Journal of Business Logistics*, vol. 34, pp. 253–269, 2013. doi: https://doi.org/10.1111/jbl.12025

[99] S. Talluri and R. Narasimhan, "Vendor Evaluation with Performance Variability: A Max–Min Approach," *European Journal of Operational Research*, vol. 146, pp. 543–552, 2003. doi: https://doi.org/10.1016/S0377-2217(02)00230-8

[100] S. Talluri, R. Narasimhan, and W. Chung, "Manufacturer Cooperation in Supplier Development under Risk," *European Journal of Operational Research*, vol. 207, pp. 165–173, 2010. doi: https://doi.org/10.1016/j.ejor.2010.03.041

[101] S. Talluri, R. Narasimhan, and A. Nair, "Vendor Performance with Supply Risk: A Chance-constrained DEA Approach," *International Journal of Production Economics*, vol. 100, pp. 212–222, 2006. doi: https://doi.org/10.1016/j.ijpe.2004.11.012

[102] C. S. Tang, "Perspectives in Supply Chain Risk Management," *International Journal of Production Economics*, vol. 103, pp. 451–488, 2006. doi: https://doi.org/10.1016/j.ijpe.2005.12.006

[103] C. S. Tang, "Robust Strategies for Mitigating Supply Chain Disruptions," *International Journal of Logistics: Research and Applications*, vol. 9, pp. 33–45, 2006. doi: https://doi.org/10.1080/13675560500405584

[104] O. Tang and S. N. Musa, "Identifying Risk Issues and Research Advancements in Supply Chain Risk Management," *International Journal of Production Economics*, vol. 133, pp. 25–34, 2011. doi: https://doi.org/10.1016/j.ijpe.2010.06.013

[105] O. Tang, S. N. Musa, and J. Li, "Dynamic Pricing in the Newsvendor Problem with Yield Risks," *International Journal of Production Economics*, vol. 139, pp. 127–134, 2012. doi: https://doi.org/10.1016/j.ijpe.2011.01.018

[106] C. S. Tang and B. Tomlin, "The Power of Flexibility for Mitigating Supply Chain Risks," *International Journal of Production Economics*, vol. 116, pp. 12–27, 2018. doi: https://doi.org/10.1016/j.ijpe.2008.07.008

[107] J. Thun and D. Hoenig, "An Empirical Analysis of Supply Chain Risk Management in the German Automotive Industry," *International Journal of Production Economics*, vol. 131, pp. 242–249, 2011. doi: https://doi.org/10.1016/j.ijpe.2009.10.010

[108] B. Tomlin, "On the Value of Mitigation and Contingency Strategies for Managing Supply Chain Disruption Risks," *Management Science*, vol. 52, pp. 639–657, 2006. doi: https://doi.org/10.1287/mnsc.1060.0515

[109] B. Tomlin, "Disruption-management Strategies for Short Life-cycle Products," *Naval Research Logistics*, vol. 56, pp. 318–347, 2009. doi: https://doi.org/10.1002/nav.20344

[110] D. R. Towill, "The Impact of Business Policy on Bullwhip Induced Risk in Supply Chain Management," *International Journal of Physical Distribution & Logistics Management*, vol. 35, pp. 555–575, 2005. [Online], Available: https://www.emerald.com/insight/content/doi/10.1108/09600030510623339/full/html

[111] P. Trkman and K. McCormack, "Supply Chain Risk in Turbulent Environments – A Conceptual Model for Managing Supply Chain Network Risk," *International Journal of Production Economics*, vol. 119, pp. 247–258, 2009. doi: https://doi.org/10.1016/j.ijpe.2009.03.002

[112] C. Y. Tsai, "On Supply Chain Cash Flow Risks," *Decision Support Systems*, vol. 44, pp. 1031–1042, 2008. doi: https://doi.org/10.1016/j.dss.2007.12.006

[113] M. C. Tsai, C. H. Liao, and C. S. Han, "Risk Perception on Logistics Outsourcing of Retail Chains: Model Development and Empirical Verification in Taiwan," *Supply Chain Management: An International Journal*, vol. 13, pp. 415–424, 2008. doi: https://doi.org/10.1108/13598540810905679

[114] Y. K. Tse and K. H. Tan, "Managing Product Quality Risk in a Multi-tier Global Supply Chain," *International Journal of Production Research*, vol. 49, pp. 139–158, 2011. doi: https://doi.org/10.1080/00207543.2010.508942

[115] R. Tummala and T. Schoenherr, "Assessing and Managing Risks Using the Supply Chain Risk Management Process (SCRMP)," *Supply Chain Management: An International Journal*, vol. 16, pp. 474–483, 2011. doi: https://doi.org/10.1108/13598541111171165

[116] G. Tuncel and G. Alpan, "Risk Assessment and Management for Supply Chain Networks: A Case Study," *Computers in Industry*, vol. 61, pp. 250–259, 2010. doi: https://doi.org/10.1016/j.compind.2009.09.008

[117] M. Vedel and C. Ellegaard, "Supply Risk Management Functions of Sourcing Intermediaries: An Investigation of the Clothing Industry," *Supply Chain Management: An International Journal*, vol. 18, pp. 509–522, 2013. doi: https://doi.org/10.1108/SCM-09-2012-0295

[118] N. Viswanadham and A. Samvedi, "Supplier Selection Based on Supply Chain Ecosystem, Performance and Risk Criteria," *International Journal of Production Research*, vol. 51, pp. 6484–6498, 2013. doi: https://doi.org/10.1080/00207543.2013.825056

[119] S. M. Wagner and C. Bode, "An Empirical Investigation into Supply Chain Vulnerability," *Journal of Purchasing & Supply Management*, vol. 12, pp. 301–312, 2009. doi: https://doi.org/10.1016/j.pursup.2007.01.004

[120] S. M. Wagner and C. Bode, "An Empirical Examination of Supply Chain Performance Along Several Dimensions of Risk," *Journal of Business Logistics*, vol. 29, pp. 307–325, 2008. doi: https://doi.org/10.1002/j.2158-1592.2008.tb00081.x

[121] S. M. Wagner and N. Neshat, "Assessing the Vulnerability of Supply Chains Using Graph Theory," *International Journal of Production Economics*, vol. 126, pp. 121–129, 2010. doi: https://doi.org/10.1016/j.ijpe.2009.10.007
[122] S. M. Wagner and V. Silveira-Camargos, "Managing Risks in Just-in-sequence Supply Networks: Exploratory Evidence from Automakers," *IEEE Transactions on Engineering Management*, vol. 59, pp. 52–64, 2012. doi: 10.1109/TEM.2010.2087762
[123] T. Wakolbinger and J. M. Cruz, "Supply Chain Disruption Risk Management through Strategic Information Acquisition and Sharing and Risk-sharing Contracts," *International Journal of Production Research*, vol. 49, pp. 4063–4084, 2011. doi: https://doi.org/10.1080/00207543.2010.501550
[124] X. Wang, H. K. Chan, R. W. Y. Yee, and I. Diaz-Rainey, "A Two-stage Fuzzy-AHP Model for Risk Assessment of Implementing Green Initiatives in the Fashion Supply Chain," *International Journal of Production Economics*, vol. 135, pp. 595–606, 2012. doi: https://doi.org/10.1016/j.ijpe.2011.03.021
[125] Y. Wang, W. Gilland, and B. Tomlin, "Regulatory Trade Risk and Supply Chain Strategy," *Production and Operations Management*, vol. 20, pp. 522–540, 2013. doi: https://doi.org/10.1111/j.1937-5956.2010.01167.x
[126] F. Wiengarten, M. Pagell, and B. Fynes, "The Importance of Contextual Factors in the Success of Outsourcing Contracts in the Supply Chain Environment: The Role of Risk and Complementary Practices," *Supply Chain Management: An International Journal*, vol. 18, pp. 630–643, 2013. Doi: https://doi.org/10.1108/SCM-03-2013-0071
[127] T. Wu, J. Blackhurst, and V. Chidambaram, "A Model for Inbound Supply Risk Analysis," *Computers in Industry*, vol. 57, pp. 350–365, 2006. doi: https://doi.org/10.1016/j.compind.2005.11.001
[128] T. Wu, J. Blackhurst, and P. O'grady, "Methodology for Supply Chain Disruption Analysis," *International Journal of Production Research*, vol. 45, pp. 1665–1682, 2007. doi: https://doi.org/10.1080/00207540500362138
[129] D. Wu and D. L. Olson, "Supply Chain Risk, Simulation, and Vendor Selection," *International Journal of Production Economics*, vol. 114, pp. 646–655, 2008. doi: https://doi.org/10.1016/j.ijpe.2008.02.013
[130] D. D. Wu and D. Olson, "Enterprise Risk Management: A DEA VaR Approach in Vendor Selection," *International Journal of Production Research*, vol. 48, pp. 4919–4932, 2010. doi: https://doi.org/10.1080/00207540903051684
[131] D. Wu, D. D. Wu, Y. Zhang, and D. L. Olson, "Supply Chain Outsourcing Risk Using an Integrated Stochastic-fuzzy Optimization Approach," *Information Sciences*, vol. 235, pp. 242–258, 2013. doi: https://doi.org/10.1016/j.ins.2013.02.002
[132] D. D. Wu, Y. Zhang, D. Wu, and D. L. Olson, "Fuzzy Multi-objective Programming for Supplier Selection and Risk Modeling: A Possibility Approach," *European Journal of Operational Research*, vol. 200, pp. 774–787, 2010. doi: https://doi.org/10.1016/j.ejor.2009.01.026
[133] A. Xanthopoulos, D. Vlachos, and E. Iakovou, "Optimal Newsvendor Policies for Dual-sourcing Supply Chains: A Disruption Risk Management Framework," *Computers & Operations Research*, vol. 39, pp. 350–357, 2012. doi: https://doi.org/10.1016/j.cor.2011.04.010
[134] D. Xia and B. Chen, "A Comprehensive Decision-making Model for Risk Management of Supply Chain," *Expert Systems with Applications*, vol. 38, pp. 4957–4966, 2011. doi: https://doi.org/10.1016/j.eswa.2010.09.156
[135] Y. Xia, K. Ramachandran, and H. Gurnani, "Sharing Demand and Supply Risk in a Supply Chain," *IIE Transactions*, vol. 43, pp. 451–469, 2011. doi: : https://doi.org/10.1080/0740817X.2010.541415
[136] T. Xiao and D. Yang, "Price and Service Competition of Supply Chains with Risk-averse Retailers under Demand Uncertainty," *International Journal of Production Economics*, vol. 114, pp. 187–200, 2008. doi: https://doi.org/10.1016/j.ijpe.2008.01.006
[137] T. Xiao and D. Yang, "Risk Sharing and Information Revelation Mechanism of a One-manufacturer and One-retailer Supply Chain Facing an Integrated Competitor," *European Journal of Operational Research*, vol. 196, pp. 1076–1085, 2015. doi: https://doi.org/10.1016/j.ejor.2008.05.004
[138] Z. B. Yang, G. Aydın, V. Babich, and D. R. Beil, "Supply Disruptions, Asymmetric Information, and a Backup Production Option," *Management Science*, vol. 55, pp. 192–209, 2009. doi: https://doi.org/10.3233/JIFS-169341
[139] B. Yang and Y. Yang, "Postponement in Supply Chain Risk Management: A Complexity Perspective," *International Journal of Production Research*, vol. 48, pp. 1901–1912, 2010. doi: 10.4236/ajibm.2018.812154
[140] H. Yu, A. Z. Zeng, and L. Zhao, "Single or Dual Sourcing: Decision-making in the Presence of Supply Chain Disruption Risks," *Omega*, vol. 37, pp. 788–800, 2019. doi: https://doi.org/10.1016/j.promfg.2020.01.281
[141] K. Zhang, Y. Chai, S. X. Yang, and D. Weng, "Pre-warning Analysis and Application in Traceability Systems for Food Production Supply Chains," *Expert Systems with Applications*, vol. 38, pp. 2500–2507, 2011.doi:https://doi.org/10.1016/j.eswa.2010.08.039
[142] G. A. Zsidisin and L. M. Ellram, "An agency theory investigation of supply risk m anagement,"

Journal of supply chain management, vol. 39, no. 2, pp. 15-27, 2003.doi: https://doi.org/10.1111/j.1745-493X.2003.tb00156.x

[143] T. Xiao and D. Yang, "Risk Sharing and Information Revelation Mechanism of a One-manufacturer and One-retailer Supply Chain Facing an Integrated Competitor," *European Journal of Operational Research*, vol. 196, pp. 1076–1085, 2019. doi: https://doi.org/10.1016/j.ejor.2008.05.004

[144] D. M. Dietrich and E. A. Cudney, "Methods and Considerations for the Development of Emerging Manufacturing Technologies into a Global Aerospace Supply Chain," *International Journal of Production Research*, vol. 49, pp. 2819–2831, 2021. doi: https://doi.org/10.1080/00207541003801275

[145] R. B. Franca, E. C. Jones, C. N. Richards, and J. P. Carlson, "Multi-objective Stochastic Supply Chain Modeling to Evaluate Tradeoffs between Profit and Quality," *International Journal of Production Economics*, vol. 127, pp. 292–299, 2010. doi: https://doi.org/10.1016/j.ijpe.2009.09.005

[146] S. Bolan, H. Wijesekara, M. Tanveer, V. Boschi, L. P. Padhye, M. Wijesooriya, ... & N. Bolan, "Beryllium contamination and its risk management in terrestrial and aquatic environmental settings," *Environmental Pollution*, vol. 121077, 2023.doi: https://doi.org/10.1016/j.envpol.2023.121077

[147] N. Mendes, J. G. V. Vieira, & A. P. Mano, "Risk management in aviation maintenance: A systematic literature review," *Safety science*, vol. 153, 105810, 2022. doi: https://doi.org/10.1016/j.ssci.2022.105810

[148] I. Eliza, A. M. Apostol, M. Ţîţu, P. Tertereanu, I. Moisescu, "Specific aspects of quality and safety management in aerospace field," *Proceedings of the ... International Management Conference*, 2023. [Online].Available: http://conference.management.ase.ro/archives/2022/pdf_IMC_2022/1_1.pdf

[149] H. Xin, K. Li, C. Wang, C. Zhang, Z. Gu, "Risk Management of Aerospace Stand-Alone Device Supply Chain," in *2022 International Conference on Industrial IoT, Big Data and Supply Chain (IIoTBDSC)*, 2022: IEEE, pp. 272-277. doi: https:/doi.org/10.3390/pr11030710