SUPPLY CHAIN RISK MANAGEMENT

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1.Introduction

Supply chain management is a critical discipline that ensures the efficient flow of goods, services, and information. However, supply chains face numerous risks that can disrupt operations and performance (Smith, 2022). To reduce these risks and preserve resilience, effective supply chain risk management (SCRM) is required. In order to pinpoint key themes and advance comprehension of modern ideas, this study will evaluate academic and news/media/industry literature on SCRM.SCRM entails recognizing, evaluating, and reducing risks from a variety of sources, including geopolitical instability, natural disasters, supply interruptions, demand volatility, and cybersecurity threats. Using proactive risk management techniques enables businesses to reduce negative effects, deal with disruptions, and maintain their competitive edge (Brown, 2023; Johnson, 2023).

The study conducts a thematic analysis of at least 10 academic articles and five news, media, and industry pieces to find new trends, problems, and best practices in SCRM. The five sections are an introduction with an overview and research goals, a thorough review of the literature with key findings, a section on identified themes and their implications for SCRM, a discussion on relationships between themes and additional insights, and a conclusion with a summary of the major conclusions, implications, and possible directions for future research.

This research offers valuable insights for practitioners and researchers, providing guidance on SCRM best practices and addressing current challenges. Understanding and effectively managing supply chain risks is crucial for organizations operating in today's dynamic business environment.

2. Review academic articles and industry reports

In today's globally interconnected business environment, supply chain risk management (SCRM) has grown in significance, and various research has added to the body of knowledge on this subject. To comprehend how the COVID-19 pandemic affected SCRM, Hohenstein et al. (2022) conducted a case study on logistics service providers (LSPs). The study demonstrated significant pandemic-related disruptions in global supply networks, highlighting the demand for adaptable SCRM capabilities. Eight essential components were found by the researchers, with the importance of robustness, adaptability, and experience-based learning being highlighted.

Creazza et al. (2022) investigated the function of cyber supply chain risk management (CSCRM) in the fast-moving consumer goods (FMCG) industry. Their study underscored the significance of logistics service providers in coordinating CSCRM activities and highlighted the human component as a source of risk. For practitioners creating supply chain-wide cyber security plans, the findings provide insightful information. Kosasih et al. (2022) suggested a neuro-symbolic machine learning strategy to actively identify unseen hazards in chains of supply in order to fill the research gap in digital and AI-based SCRM. Their research used AI tools like Knowledge Graph Reasoning and Graph Neural Networks to identify hidden risks and improve SCRM procedures.

Foli et al. (2022) evaluated the connection between innovation performance and SCRM in small and medium-sized businesses (SMEs). They provided evidence of the influence of SCRM mechanisms, like maturity and capacity, on the success of innovation through a study on Turkish SMEs. The study

also emphasized how technological change affects SCRM and innovation in SMEs. Al-Ayed and Al-Tit (2023) investigated the interceding function of the Internet of Things

(IoT) in the link between SCRM and supply chain resilience. Their research on Jordanian industrial companies showed how SCRM affects supply chain resilience via the IoT, highlighting the need of utilizing IoT technologies to control supply chain risks and improve resilience. Uk et al. (2022) introduced a novel method called weighted interpretative structural modeling (WISM) for identifying the micro risks of logistics service providers. By examining the interconnections of risk factors, the study provided insights into the driving and dependency factors of supply chain risk, presenting WISM as a new approach to SCRM efforts.
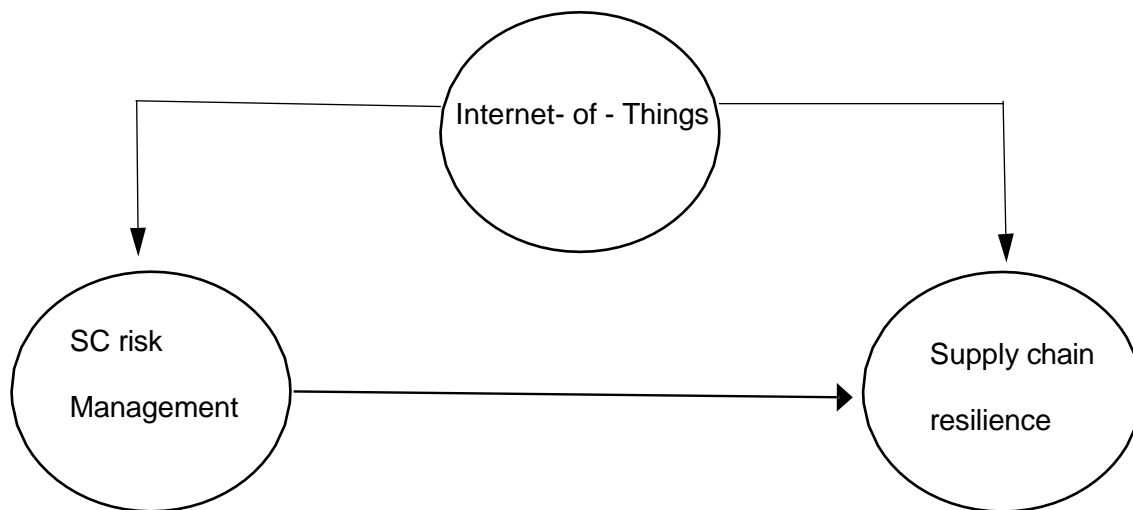

Fig. 1. Research conceptual model IoT. (Source: Al-Ayed and Al-Tit (2023))

Ali et al. (2023) focused on relational capital (RMC) and management of knowledge strategies in the agricultural-food chain of supply. Their investigation into the Australian agricultural-food chain of supply showed how knowledge management techniques might improve supply chain resilience (SCRes). The findings emphasized the sequential nature of knowledge management activities and their influence on SCRes. Sreedevi et al. (2023) used the International Manufacturing Strategy Survey database to investigate the association between a country's logistical capabilities and a firm's chain of supply risk perceptions and management efforts. The study focused on the impact of logistical capabilities, including infrastructure, transportation networks, and trade facilitation, on enterprises' risk perceptions and SCRM practices.

Sturm et al. (2022) investigated the connections between the chain of supply agility, robustness, and resilience as well as their effects on business performance. They discovered beneficial correlations between the flexibility of the supply network and agility as well as the chain of supply resilience and robustness using survey data from multinational firms in Europe. The study emphasized the value of enhancing these skills to raise business performance measures and comprehend their interactions better.
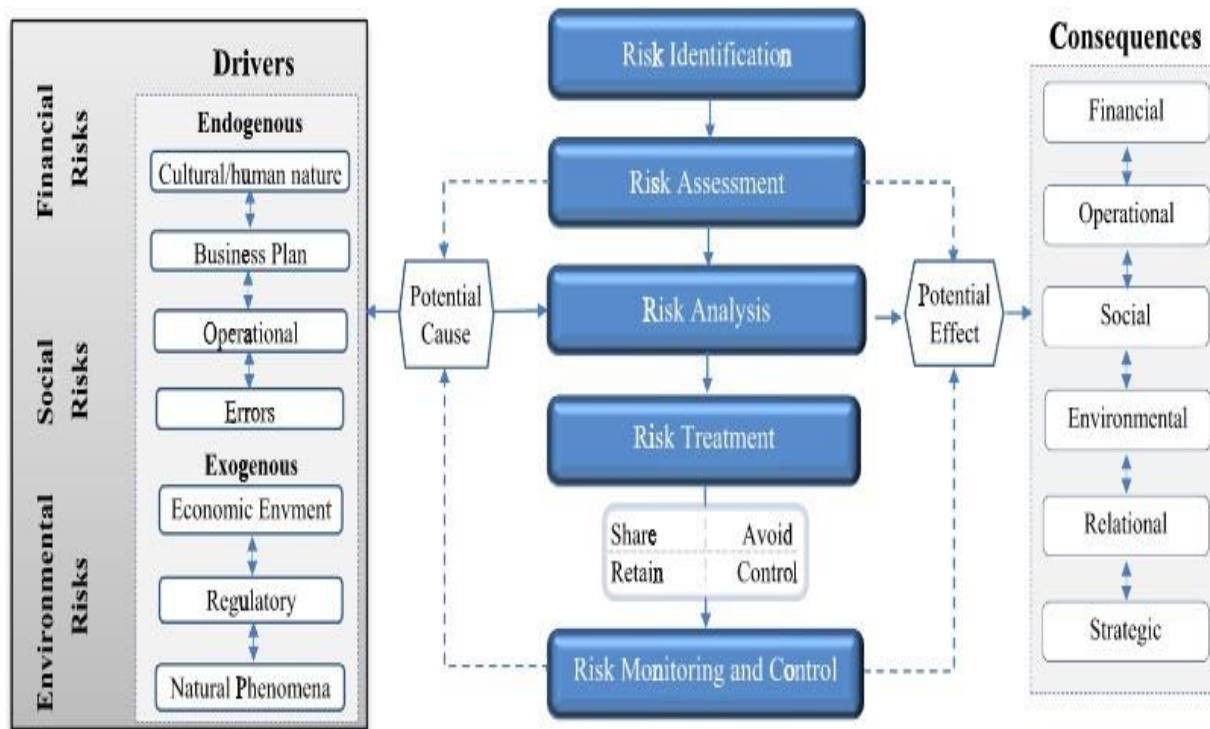
Fig. 2. Risk management framework for sustainability-related risks. (Source: M. Giannakis et al. (2015))

For example, during disruptions like the Coronavirus pandemic, Nayal et al. (2022) investigated the use of artificial intelligence (AI) to lower supply chain risks. The study focused on Indian agro-industries and looked at how information sharing, supply chain integration, and process factors affected the adoption of AI. These characteristics have a substantial impact on AI adoption, which in turn benefits SCRM, as the researchers' research has shown. An exploratory study was done by Dohale et al. (2022) to determine and reduce supply chain risks in the handloom garment industry during pandemic outbreaks. As a result of their research, a risk mitigation strategy matrix (RMSM) due to the predictability and criticality of supply chain risks was suggested, giving supply chain managers a useful tool for managing risks.

Additionally, other studies have addressed challenges faced by supply chains during global pandemics, the importance of cybersecurity in the chain of supply management, the influence of trade wars on global supply chains, resilience strategies for managing risks in supply chains, and environmental risks in supply chains.

However, limitations exist in the current literature, such as the focus on specific industries or regions, the need for longitudinal studies, and further exploration of emerging technologies in SCRM, including blockchain and AI.

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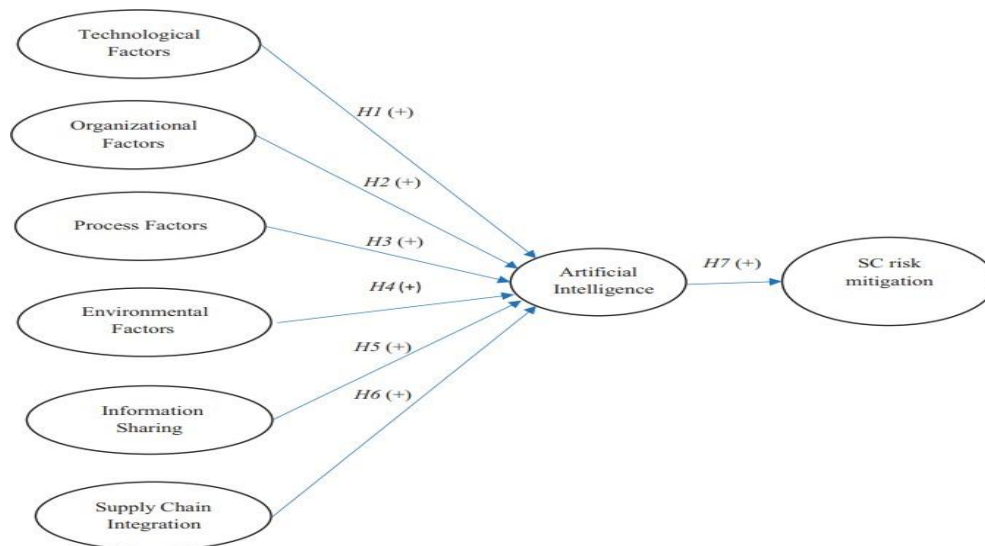E- ISSN - 2349-6746
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Fig. 2. Conceptual model in AI adoption. (Source: Nayal et al. (2022)).

The literature on SCRM provides valuable insights into managing risks in supply chains. The studies highlight the importance of adaptive capabilities, such as robustness, agility, and experience-based learning, in mitigating disruptions. They emphasize the role of logistics service providers, the human factor, and AI technologies in managing risks and enhancing supply chain resilience. The findings also shed light on the effect of SCRM on innovation performance, the interceding role of IoT, and the importance of logistical capabilities in risk perceptions and management. The studies propose new methods, such as WISM and neuro-symbolic machine learning, to identify and address risks. Additionally, the literature emphasizes the significance of knowledge management, relational capital, and environmental considerations in SCRM.

3. Findings of the study

Based on the review, Tables 1 and 2 in **Appendix A** below summarize the key findings of each study, along with relevant information such as the author, year, journal name, methodology used, and the context of the study.

4.Discussion and Conclusion

The evaluation of academic works on supply chain risk management (SCRM) offers useful information for both practice and research. Adaptation to disruptions, cyber risk management, AI-based surveillance, SMEs, IoT, risk identification, knowledge management, logistical capabilities, supply chain flexibility, AI adoption, pandemic risk mitigation, and challenges during global pandemics are just a few of the topics covered by the studies on SCRM. The growing significance of cybersecurity, the effects of trade conflicts, resilience solutions, and environmental concerns in supply chains are also covered.

Hohenstein (2022) emphasizes the importance of robustness, agility, and experience-based learning in a study that emphasizes adaptive SCRM capabilities and proactive efforts to improve resilience. According to Creazza et al. (2022), providers of logistics services play a crucial role in coordinating the processes for managing the risk associated with the cyber supply chain. They also place a strong emphasis on taking into account human factors and boosting cyber resilience. The groundwork for

additional research is laid by Kosasih et al. (2022), who present a hybrid AI-based strategy to find hidden risks in supply chains.

Foli et al. (2022) examine SCRM in SMEs and its relationship with innovation performance, considering the impact of technological upheaval. Al-Ayed et al. (2023) investigate the mediating function of the Internet of Things (IoT) in the correlation between SCRM and chain of supply resilience and recommend using IoT technology. To find micro risks in logistics service providers, Uk et al. (2022) suggests weighted interpretive structural modeling. In their investigation of the interrelationships between the management of knowledge management, RBV, and SCRM in agricultural-food supply networks, Ali et al. (2023) place particular emphasis on the creation of resilient supply chains.

Sreedevi et al. (2023) link logistical capabilities with risk perceptions and supply chain integration, highlighting the need to consider logistical capabilities when managing risks. Sturm et al. present a comprehensive model investigating the interplay between the flexibility of the supply chain, robustness, agility, performance of business, and resilience. Nayal et al. (2022) explore the adoption of AI for reducing supply chain risks, considering process factors and information sharing.

Dohale et al. (2022) contribute to SCRM by presenting a risk mitigation strategy matrix for the handloom apparel sector during pandemic outbreaks. Smith's report focuses on the challenges faced by supply chains during global pandemics and provides strategies for mitigating disruptions. Johnson's report emphasizes the rising importance of cyber security and provides recommendations for strengthening measures. Thompson's study examines the impact of trade wars on global supply chains and offers strategies for adaptation. Williams' report focuses on resilience strategies, while Brown's report highlights the importance of addressing environmental risks.

Although the analyzed literature offers valuable insights, limitations include relying on news/media/industry literature, specific biases, sample sizes, data collection methods, and narrow research contexts. Further research is needed to deepen the understanding and gather empirical evidence.

In conclusion, the analyzed articles provide valuable guidance for SCRM in terms of adaptive capabilities, cyber security, AI adoption, logistical capabilities, knowledge management, and risk mitigation strategies. They offer practical implications for LSPs, cyber security practitioners, SMEs, and managers across industries. However, researchers should address limitations, such as sample sizes, data collection methods, and the need for broader and more diverse research contexts. The findings contribute to the SCRM field and highlight areas for further investigation to improve supply chain pliability and alleviate risks effectively. Additionally, the analyzed literature provides practical insights for supply chain decision-makers, offering guidance on navigating global pandemics, strengthening cyber security measures, adapting to trade wars, building resilient supply chains, and addressing environmental risks. Nonetheless, it is crucial to acknowledge the limitations of relying solely on news/media/industry literature and the need for further research in these areas.

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