Resilient and sustainable B2B chemical supply chain capacity expansions: a systematic literature review

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Abstract

Purpose – This work conducts a comprehensive analysis of how to incorporate resilience and sustainability into capacity expansion strategies for business-to-business (B2B) chemical supply chains. This study aims to guide both researchers and managers on ensuring profitability in B2B chemical supply chains while minimizing environmental impacts, complying with regulations and mitigating disruptions and risks.

Design/methodology/approach – A systematic literature review is conducted to analyze the interplay between sustainability and resilience in chemical B2B supply chains, specify the quantitative and qualitative methods used to tackle this challenge and identify the drivers and barriers concerning capacity expansion. In addition, a comprehensive conceptual framework is suggested to outline a compelling research agenda.

Findings – The findings emphasize the increasing importance of modeling and resolving decision-making challenges related to sustainable and resilient supply chains, particularly in capital-intensive chemical industries. Yet, there is no standardized strategy for addressing these challenges. The predominant solution methods are heuristic and metaheuristic, and the selection of performance metrics tends to be empirical and tailored to specific cases. The main barriers to achieving sustainability and resilience arise from resource limitations within the supply chain. Conversely, the key drivers of performance focus on enhancing efficiency, competitiveness, cost effectiveness and risk management.

Practical implications – This work offers practitioners a conceptual framework that synthesizes the knowledge and tackles the challenges of designing sustainable and resilient supply chains as well as managing their operations in the context of B2B chemical supply chains. Results provide a practical guide for navigating the complex interplay of sustainability, resilience and chemical supply chain expansion.

Originality/value – The key concepts and dimensions associated with capacity expansion planning for a resilient and sustainable chemical supply chain are identified through structured and comprehensive analyses of existing literature. A conceptual framework is proposed for delineating the intersections among sustainability, resilience and chemical supply chain expansions. This mapping endeavor aims to facilitate a future characterized by the deployment of a nexus of resilience and sustainability in chemical supply chains. To this end, a promising future research agenda is accordingly outlined.

Keywords Sustainability, Resilience, Systematic literature review, Capacity expansion, B2B chemical supply chain

Paper type Literature review

1. Introduction

According to the latest United Nations reports, the global population is projected to reach 8.5 billion by 2030, 9.7 billion by 2050 and 10.4 billion by 2100 (Samir and Lutz, 2017). In addition, recent studies predict that life expectancy at birth is poised to ascend from 72.8 years in 2019 to 77.2 years by 2050 (Zheng and Guo, 2022). These statistics support the substantial shifts expected in future demands for manufactured goods, commodities and energy. Moreover, these projections underscore the potential disruptions and uncertainties that might arise due to factors such as epidemics, geopolitical conflicts or even climate

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change. As a result, firms striving to expand sustainably in response to population growth and potential disruptions must prioritize success in the current competitive, volatile, ambiguous and uncertain world to maintain a harmonious balance between profitability and environmental concerns. This is particularly amplified for capital-intensive industries, such as the chemical processing industry (Villa *et al.*, 2016). This very industry experiences increasing demand, technological advancements and changing global markets, driving companies to plan efficiently their supply chain capacity expansions. Strategic capacity expansion, from this viewpoint, emerges as a key driver of growth, involving the upscaling of production capacity in existing plants or the construction of new facilities (Luss, 1982).

Market-driven supply chain planning is a challenge for chemical supply chains, especially from a strategic perspective. Excessive capacity can lead to unjustified cost increases and therefore reduced profitability, while insufficient capacity can result in supply shortages and missed market opportunities. To tackle this challenge, chemical processing companies race time to develop very sophisticated demand planning models and market intelligence tools to predict future demand and adjust their capacity accordingly (Broeren *et al.*, 2014; Childerhouse *et al.*, 2020). Fundamentally, developing an effective supply chain capacity expansion strategy involves several key steps. First, precise demand forecasting is essential to avoid stock-outs or excessive investment. Second, exploring alternatives such as adding equipment, expanding facilities or outsourcing production is imperative. Each requires a thorough assessment of costs, implementation timescales and their specific impact on the business performance. Crucially, the human aspect must not be neglected. Assessing talent requirements and planning the appropriate training for the new workforce are essential elements of this strategic equation. Therefore, careful and detailed planning of these critical aspects is essential to the success of a supply chain capacity expansion project (Brown *et al.*, 2001).

However, effective supply chain planning should be driven by a sustainable and resilient approach. A resilient supply chain possesses the capacity to resist shocks and disruptions and can bounce back quickly from changes, ensuring continued operation. Conversely, a sustainable one focuses on meeting current needs without compromising the environment for future generations. Recent research underscores the importance of integrating these considerations into planning strategies (Perrings, 2006; Marchese *et al.*, 2018). Recently, Zavala-Alcívar *et al.* (2020) proposed a conceptual framework as a guide for managing resilience and enhancing sustainability. Meanwhile, Grzybowska and Stachowiak (2022) investigated global change and supply chain disruption and highlighted the need for a sustainable and resilient approach to supply chain management. In a recent study, Sirisomboonsuk and Burns (2023) highlighted the importance of sustainability in supply chains by advocating fast capacity increases to minimize disruptions, while emphasizing the importance of anticipating and mitigating potential disruption. The interplay between supply chain sustainability and resilience has also attracted the attention of Fahimnia and Jabbarzadeh (2016). This work considers that both concepts are complementary and can be addressed with an integrated approach to supply chain planning.

However, supply chain capacity expansion for chemical processing companies faces specific complexities, making it challenging to ensure safety, sustainability and resilience. Farashah *et al.* (2021) developed a dynamic model to formulate effective capacity expansion policies for the Iranian petrochemical industry. The objective was to enhance the production of a portfolio comprising higher-value-added products, aiming to maximize revenue for the benefit of the country and facilitate long-term development. Similarly, Radatz *et al.* (2019) compared various capacity expansion strategies for chemical production plants, emphasizing the necessity of a comprehensive approach to capacity expansion. Their approach should not only consider production capacity but also account for the availability of raw materials, energy and infrastructure. In addition to these considerations, sustainability emerges as a critical factor in the chemical supply chain. From an environmental perspective, Zhang and Yousaf (2020) investigated green supply chain coordination in the petroleum industry, emphasizing the importance of government intervention, green investment and customer preferences in promoting sustainability in the supply chain. They highlighted the need for companies to adopt a proactive approach to sustainability, integrating it into their capacity expansion strategies.

The growing focus on supply chain resilience, and sustainability for supply chain capacity expansions, requires us imperatively to emphasize the importance of examining business-to-business (B2B) supply chains, particularly in the current context characterized by an increase in unforeseen events. Recent research has focused on these critical aspects. For instance, Gligor *et al.* (2020) explored the complex relationship between supply chain agility, customer value and satisfaction, with a specific emphasis on loyal B2B customers and business-to-consumer end-customers. Guillot *et al.* (2024) examined the measurement systems designed to evaluate supply chain risks within B2B contexts, using the Supply Chain Operations Reference model as a pivotal framework. In addition, Nurhayati *et al.* (2023) investigated the multifaceted factors that influence decision-making processes within collaborative B2B supply chains, encompassing various drivers, facilitators and barriers. However, studies specifically addressing the aspects relevant to this study have not been identified. Thus, recognizing the primordial importance of this facet, this study is centered on the B2B chemical supply chain field, acknowledging its contemporary relevance and complexity. Throughout this study, this field will simply be referred to as the chemical supply chain, a term that offers a more comprehensive and standardized description.

To the best of our knowledge, no systematic literature review has addressed supply chain capacity expansion while accounting for the impact of sustainability engagement and resilience capability, particularly within the context of the B2B chemical processing industry. While various studies have addressed related topics, they have primarily been treated separately and with different emphases. For instance, Colicchia and Strozzi (2012) conducted a systematic literature review on supply chain risk management. They emphasized the importance of effective risk management in ensuring the resilience and competitiveness of supply chains, particularly in the face of complex and uncertain business environments. In the same context, Singh *et al.* (2019) provided a comprehensive review of the literature on supply chain resilience, examining different definitions and dimensions of resilience. They proposed a conceptual framework for measuring supply chain

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resilience. Taking a different approach, Tachizawa and Yew Wong (2014) conducted a systematic literature review on sustainable supply chains, with a specific focus on identifying key themes and concepts related to multi-tier sustainability. Subsequently, they presented a framework for understanding and managing multi-tier sustainability. In addition, Moreno-Camacho *et al.* (2019) explored a systematic literature review on sustainability metrics for supply chain network design, focusing on identifying key themes and concepts related to real case applications. They proposed a framework for selecting sustainability metrics for supply chain network design. Similarly, Salam and Bajaba (2023) elaborated a moderated-mediation analysis to investigate how the alignment between marketing and supply chain management influences firm performance. They also explored the role of supply chain resilience and absorptive capacity in this relationship. In the same context, Shrivastava (2023) discussed, through a review analysis, the recent trends in supply chain management, particularly focusing on B2B firms. The authors provided insights into the current state of B2B supply chain practices and suggested directions for future research in this area. Moreover, Vanharanta and Wong (2022) proposed a conceptual framework or model related to critical realist multilevel research in business marketing. They focused on the concept of resilience within the context of business marketing, possibly proposing a new framework for understanding resilience in this domain. Martinelli and Tunisini (2019) provided a comprehensive literature review on the topic of customer integration into supply chains. They explored how customers can be effectively integrated into supply chain processes to improve overall performance and competitiveness. The authors also studied various aspects such as the benefits, challenges and strategies related to customer integration. More recently, Larrea-Gallegos *et al.* (2022) focused on the concepts of sustainability, resilience and complexity within supply networks. They conducted a literature review on these topics and proposed an integrated agent-based approach. Their study led to the proposition of four principles that constitute the conceptual foundations that should guide the development of any complexity-driven sustainability assessment methodology. In the same context, Sadeghi Asl *et al.* (2023) elaborated a systematic literature review focusing on green supply chain, resilient supply chain, agile supply chain, cold supply chain and lean supply chain. The authors synthesized and analyzed various approaches to managing and optimizing supply chains, providing insights for academics and practitioners alike. From another perspective, Negri *et al.* (2021) investigated integrating sustainability and resilience in the supply chain. They conducted a systematic literature review and examined several major observations and directions for highlighting the importance of this integration. In contrast to Negri *et al.* (2021), this work marks a significant starting foundation for investigating sustainable and resilient supply chain capacity expansion problems, especially within the chemical processing industry. While the mentioned studies have studied several aspects of supply chain management, risk management, resilience and sustainability, as well as their integration, there seems to be a gap in the specific analysis of the Sustainable and Resilient Supply Chain Capacity Expansion problem (SRSC-CapEx) for capital intensive industries in particular.

This study explores the integration of resilience and sustainability commitment within the expansion of chemical supply chains, a topic less addressed in the existing literature. It aims to fill this gap by conducting a comprehensive systematic literature review, using rigorous analytical methodologies to elucidate the dimensions, barriers and drivers associated with this nexus. Furthermore, this study investigates potential trade-offs between these factors, seeking to determine whether they exhibit mutually reinforcing dynamics. The findings are particularly relevant to the B2B chemical supply chain landscape, which is characterized by its complexity and the need to successfully manage a diverse range of risks and unforeseen challenges to meet the needs of a rapidly expanding market. Despite its crucial importance, the resilience–sustainability nexus, for chemical supply chain expansions, remains unexplored. Therefore, this study provides both theoretical and managerial insights from diverse chemical processing industries, including pharmaceuticals, agrochemicals, crude oil and natural gas suppliers, petrochemicals, polymerization and plastics, lending it a unique and original perspective. The main contributions are as follows:

- Conducting an initial review to underscore the significance of the studied problem.
- Carrying out both quantitative and qualitative analyses to gain a better understanding of the drivers, risks and barriers associated with the studied problem.
- Developing a conceptual framework to provide a synthesized understanding of the SRSC-CapEx problem. This framework serves as a tool to enhance comprehension of the complexities associated with the problem and to develop a future research agenda.

The remainder of this paper is structured as follows: First, in Section 2, we introduce the interplay between sustainability and resilience. Then, Section 3 provides an overview of the specificity of B2B chemical supply chains. Section 4 describes the methodology used in our study. Subsequently, Section 5 presents the results and discussion from the systematic literature review. Next, Section 6 unveils the conceptual framework as well as the resulting research agenda. Finally, Section 7 addresses the conclusions, limitations and future perspectives.

2. Resilience and sustainability nexus

In this section, an overview of recent literature on resilience and sustainability in supply chain expansion strategies with a particular focus on the chemical processing industry is provided.

Sustainability and resilience are both vital for the long-term success of a supply chain (Fahimnia *et al.*, 2019; Paul *et al.*, 2023). Sustainability focuses on minimizing negative environmental and social impacts while maximizing economic benefits, while resilience focuses on the ability of a supply chain to withstand and recover from disruptions. They are interconnected and mutually reinforcing. A supply chain that is designed with sustainability in mind is likely to be more resilient, as it will have built-in redundancies, diversification and contingency plans (Sutcliffe *et al.*, 2021; Singh *et al.*, 2023). Gligor *et al.* (2019) emphasized the interdependence of resilience and sustainability in ecological-economic systems. They argued that considering both dimensions is essential for long-term system viability and robustness. Edgeman and Wu (2016) focused on supply chain criticality and highlighted the need to integrate sustainability practices to enhance resilience. They identified critical elements in the supply chain and emphasized the importance of sustainable strategies for risk mitigation. Eltantawy (2016) explored the relationship between sustainable supply management, governance and resilience capabilities. Their study highlighted the role of effective governance structures and practices in promoting sustainability and resilience in supply chains. Fahimnia and Jabbarzadeh (2016) discussed the integration of supply chain sustainability and resilience, emphasizing the complementarity of these concepts. They argued that combining sustainability and resilience strategies improves overall supply chain performance. Fahimnia *et al.* (2019) highlighted the importance of designing and managing sustainable and resilient supply chains. They provided insights into key principles and practices, such as collaboration, agility and resource optimization that can enhance both sustainability and resilience. Also, Fiksel (2003) discussed designing resilient and sustainable systems. The study emphasized the need for proactive strategies that enhance system flexibility, adaptability and resource efficiency to achieve sustainability and resilience. Furthermore, Fiksel (2006) provided a systems approach to sustainability and resilience, emphasizing their interdependencies and the need for integrated strategies. The study highlighted the importance of considering the broader system context when addressing sustainability and resilience in supply chains. He *et al.* (2021) proposed a novel approach to optimize risk resilience solutions for sustainable supply chains. Their study emphasized the importance of considering sustainability objectives alongside risk mitigation strategies to achieve a balanced and robust supply chain. Ivanov (2018) conducted a simulation study to reveal the interfaces of supply chain resilience and sustainability. The findings emphasized the need to balance trade-offs and identify synergies between the two dimensions for improved supply chain performance. Jabbarzadeh *et al.* (2018) analyzed the resilient and sustainable design of supply chains under disruption risks. The study emphasized the importance of sustainability analysis in identifying vulnerabilities and enhancing supply chain resilience. Kaur and Singh (2019) focused on sustainable procurement and logistics for disaster-resilient supply chains. The study highlighted the role of sustainable practices in enhancing the ability of supply chains to withstand and recover from disruptions. Kaur *et al.* (2020) addressed the sustainable stochastic production and procurement problem for resilient supply chains. The study proposed a framework integrating sustainability and resilience considerations to optimize production and procurement decisions. Zhu and Krikke (2020) discussed managing a sustainable and resilient perishable food supply chain after an outbreak. Rajesh (2021) examined optimal trade-offs in decision-making for sustainability and resilience in manufacturing supply chains. The study emphasized the need for balancing sustainability objectives, such as reducing carbon emissions and waste, with resilience considerations, such as redundancy and flexibility. This study highlighted the importance of incorporating sustainability and resilience metrics in decision-making to achieve trade-offs that enhance overall supply chain performance. Regarding facility location-related decisions, Sundarakani *et al.* (2021) investigated robust decisions for resilient, sustainable supply chain performance in the face of disruptions. The study emphasized the integration of resilience and sustainability criteria in facility location decisions to enhance supply chain performance under uncertain and disruptive conditions. It highlighted the importance of considering factors such as risk, environmental impact and social responsibility in facility location strategies. More importantly, He *et al.* (2021) developed a novel approach combining both Kano quality function deployment and decision-making trial and evaluation laboratory to optimize risk resilience solutions for sustainable supply chains. The study emphasized the integration of risk management and sustainability considerations in supply chain decision-making. Ivanov (2018) examined the interfaces between supply chain resilience and sustainability using a simulation study. The research demonstrated the interdependencies between resilience and sustainability dimensions, highlighting the need for integrated approaches to enhance both aspects. Similarly, Jabbarzadeh *et al.* (2018) focused on resilient and sustainable supply chain design under disruption risks. The study proposed a mathematical model to optimize supply chain design decisions while considering both sustainability and disruption risks, providing insights into decision-making under uncertain conditions.

2.1 Interplay between resilience and supply chains

Supply chain resilience designates the capability of a supply chain to rapidly recover, adapt and continue to perform effectively when confronted with disruptions or unexpected events, such as natural disasters, geopolitical conflicts, supplier bankruptcies, transportation disruptions or fluctuations in demand Ali *et al.* (2018) Jabbarzadeh *et al.* (2018). Recently, supply chain resilience has received more attention due to the growing recognition of the need for organizations to respond effectively to disruptions and uncertainties. For example, Ali *et al.* (2018) developed a resilience model for cold chain logistics for perishable products. They emphasized the importance of proactive measures, such as contingency planning and risk assessment, in mitigating disruptions and enhancing resilience. In the same line, Kamalahmadi and Parast (2016) examined the principles of enterprise and supply chain resilience. They highlighted the significance of collaboration, redundancy, flexibility and agility as key principles for building resilient supply chains. Lately, Ali and Gölgeci (2019) investigated the trajectory of supply chain resilience research by conducting a co-occurrence analysis. They revealed emerging research themes, including resilience assessment, resilience strategies and the role of technology in enhancing supply chain resilience, and they provided insights into future research directions related to supply chain resilience. Hohenstein *et al.* (2015) examined the phenomenon of supply chain resilience. The authors highlighted the need for empirical research, the integration of resilience with sustainability and the exploration of the role of different actors within the supply chain in enhancing resilience. Furthermore, Scholten and Schilder (2015) explored the role of collaboration in supply chain resilience. They examined the relationship between collaborative practices, such as information sharing and joint decision-making, and the ability to effectively respond to disruptions. The results emphasize the positive impact of collaboration on enhancing supply chain resilience. Roberta Pereira *et al.* (2014) investigated the role of procurement in achieving supply chain resilience. They emphasized the importance of proactive procurement practices, such as supplier evaluation, risk assessment and supplier collaboration, in building resilient supply chains. The authors highlighted the need for organizations to integrate resilience considerations into their procurement strategies.

2.2 Interplay between sustainability and supply chains

Supply chain sustainability refers to integrating sustainable practices and principles into the design, planning, execution and control of supply chain activities (Kaur and Singh, 2019; de Vargas Mores *et al.*, 2018). It involves environmental, social and economic factors throughout the supply chain, from sourcing raw materials to delivering products or services to end customers (Negri *et al.*, 2021). Recently, it has gained significant attention as firms recognize the need to integrate environmental, social and economic considerations into their supply chain practices. For instance, Ansari and Kant (2017) conducted a detailed literature review spanning a 15 years time period, highlighting the evolution of sustainable supply chain management research. The authors emphasized the importance of integrating sustainability principles into supply chain processes and identified key drivers, barriers and practices. Furthermore, Brandenburg *et al.* (2014) focused on the quantitative models. They reviewed the development of mathematical and optimization models to support decision-making in sustainable supply chain design, emphasizing the need for further advancements. From a theoretical perspective, Carter and Rogers (2008) proposed a framework for sustainable supply chain management, aiming to move toward a new theoretical foundation for the field. Their framework emphasized integrating environmental and social concerns into supply chain practices, highlighting the importance of collaboration, measurement and continuous improvement. Furthermore, Souza *et al.* (2019) explored the application of ecosystem network analysis to balance resilience and performance in sustainable supply chain design. The study demonstrated how analyzing the network structure of supply chains can enhance understanding of their resilience and sustainability. Edgeman and Wu (2016) investigated supply chain criticality in sustainable and resilient enterprises. They proposed a framework for assessing the criticality of supply chain nodes and processes, enabling organizations to identify vulnerabilities and develop appropriate mitigation strategies. Likewise, Golini *et al.* (2017) conducted an empirical investigation of sustainability development in the Italian meat supply chain. The study highlighted the importance of collaboration, information sharing and innovation in enhancing sustainability performance across the supply chain. More importantly, He *et al.* (2021) developed a novel approach combining Kano quality function deployment and decision-making trial and evaluation laboratory to optimize risk resilience solutions for sustainable supply chains. The study emphasized the integration of risk management and sustainability considerations in supply chain decision-making. Ivanov (2018) examined the interfaces between supply chain resilience and sustainability using a simulation study. The research demonstrated the interdependencies between resilience and sustainability dimensions, highlighting the need for integrated approaches to enhance both aspects. Similarly, Jabbarzadeh *et al.* (2018) focused on resilient and sustainable supply chain design under disruption risks. The study proposed a mathematical model to optimize supply chain design decisions while considering both sustainability and disruption risks, providing insights into decision-making under uncertain conditions. Recently, Kaur and Singh (2019) investigated sustainable procurement and logistics for disaster-resilient supply chains. The research highlighted the importance of proactive measures, such as risk assessment and mitigation, to enhance the resilience of supply chains in the face of natural disasters. Leppelt *et al.* (2013) explored sustainable supplier relationship management in the chemical industry. The study emphasized the role of collaboration, transparency and long-term partnerships in driving sustainability improvements across the supply chain. Finally, de Vargas Mores *et al.* (2018) focused on the interplay between sustainability and innovation.

3. Business-to-business chemical supply chains

The B2B supply chain plays a critical role in the planning, organization and execution of logistics operations between companies. It is the key to the material flow, information and finances between suppliers, manufacturers, distributors and other stakeholders that govern the production and distribution of goods and services. This is particularly essential in the chemical supply chain due to its dynamic nature, constant changes and inherent risks. For instance, Rashad and Gumzej (2014) delved into the integration of information technology within supply chain management, focusing particularly on B2B contexts. Through a case study of Reda Chemicals with Elemica, they explored how information technology impacts B2B interactions and processes. Similarly, Tay and Chelliah (2011) highlighted the phenomenon of disintermediation within the chemical industry, focusing on the effects of electronic B2B exchanges on traditional intermediary roles. Furthermore, Vlčková and Lošťáková (2017) discussed the diverse spectrum of services available within the B2B sector, especially concerning chemical products. These services, ranging from distribution to logistics to technical support, play a crucial role in customer satisfaction and loyalty within the chemical industry's B2B market. In addition, Samudro *et al.* (2018) conducted a comprehensive literature review exploring factors influencing customer loyalty in the B2B context of the chemical industry. They investigated the roles of perceived value, social bonds and switching costs in shaping customer loyalty among B2B clients. Moreover, Koehn (2018) examined the transformative impact of digital technologies on the engagement between chemical companies and their B2B customers. Through insights into challenges and opportunities arising from digitalization, they offered valuable recommendations for companies navigating this evolving landscape. In the same vein, Moosmayer *et al.* (2012) investigated the role of reference prices in shaping outcomes of price negotiations in the chemical industry's B2B transactions. By presenting empirical research findings, they emphasized that reference prices influence pricing strategies, buyer–seller interactions and overall negotiation outcomes within the chemical supply chain. However, despite the existing range of studies in the literature, concepts like resilience, sustainability and capacity expansion in the B2B context remain largely unexplored. Thus, this study aims to delve deeper into this critical gap to provide clarity and insights into these overlooked dimensions.

4. Methodology

In this section, we outline the chosen methodology. We will discuss the various methodologies that have been used thus far. For instance, Hussain *et al.* (2020) conducted a systematic review, analyzing 192 research articles from databases such as Web of Science, ScienceDirect and Emerald. They focused on articles examining the development of time-dependent relationships from a generalized dynamic perspective, resulting in the selection of 61 articles for final analysis. Similarly, Thomé *et al.* (2012) introduced a literature search framework involving the review and classification of 271 papers. Their five-step process included database selection, keyword identification, criteria for study exclusion, abstract review by at least three authors and full-text examination of selected papers, following specific inclusion criteria. In addition, Datta (2017) performed a systematic literature review to identify 84 conceptual and empirical studies. Their methodology, inspired by Tranfield *et al.* (2003), involved a comprehensive search for relevant studies on a specific topic, followed by appraisal and synthesis according to a predetermined method. Our study adopts a methodology initially proposed by Sauer and Seuring (2023), aiming to analyze contemporary, peer-reviewed articles. It also enables the collection of relevant and reliable information on the topic, using a specific and clearly defined process. The detailed steps of this process are described in the following. This methodology achieves the following objectives:

- research gaps identification and research questions formulation;
- inclusion and exclusion criteria development;
- appropriate sources and databases selection;
- search terms and string development;
- literature selection for detailed analysis and synthesis;
- findings analysis to present a refined conceptual framework; and
- contributions discussion and future research agenda development.

Step 1 is about formulating research questions. This entails recognizing the significance and relevance of the problem and refining the objectives by posing precisely defined, structured and comprehensible questions. The following research questions were formulated:

RQ1. How do chemical processing companies use strategies to integrate sustainability and resilience considerations into their decisions regarding supply chain capacity expansion?

RQ2. What approaches are used to strategically plan for the expansion of a resilient and sustainable supply chain capacity?

RQ3. Which metrics will be used to gauge the effectiveness of incorporating sustainability and resilience into supply chain capacity expansion?

RQ4. What are the primary factors driving and impeding the achievement of sustainable and resilient supply chain capacity expansion?

These questions are addressed by conducting a thorough analysis, facilitating a comprehensive understanding of the challenge of expanding the capacity of chemical supply chains while achieving sustainability and resilience. Step 2 identifies the essential criteria for selecting primary studies for article inclusion.

To this end, we rely on three reputable databases: Scopus, Web of Science and ScienceDirect. These databases are widely acknowledged as comprehensive sources of bibliographic citations and peer-reviewed abstracts, encompassing diverse disciplines and subjects. They are renowned for their extensive coverage and offer sophisticated tools for tracking, analyzing and visualizing research. Step 3 is centered around retrieving a sample of potentially relevant literature, which is considered one of the most crucial stages in ensuring the quality and credibility of the conducted study. The study uses Boolean search based on logical operators such as "AND" and "OR." This method facilitates the construction of a highly comprehensive and precise database by combining various word combinations. The goal is to enhance search precision as we combine different terms. Specifically, the literature search targeted scientific articles published within the past decade. To identify pertinent keywords, we consulted previous articles and documents within the same field or with a similar scope. The obtained keywords are detailed in Table 1 and were searched for within the titles, abstracts and keywords of the publications.

Furthermore, a three-stage process is used to determine the inclusion and exclusion of literature for detailed analysis and synthesis, ensuring a consistent selection of relevant literature in Step 4. Initially, the title, keywords and abstract of each article are evaluated against the inclusion and exclusion criteria. Subsequently, the full text of the remaining articles undergoes the same evaluation. The methodology used in this study is visualized in Figure 1.

Inclusion and exclusion criteria are based on several factors, including the year of publication, which needs to be recent. To guarantee the relevance of the research, opinions, tutorials, workshops, summary reports, posters, unpublished articles, master's theses and books are excluded from the analyses. In addition, works that are not written in English and those that are not directly related to the research questions are also excluded. These criteria are applied to ensure that the selected literature aligns with the specific objectives and focus of the study.

According to Figure 1, article titles and keywords analysis has resulted in the exclusion of 121 contributions based on the specified criteria. From the remaining 265 articles, abstract analysis was conducted, leading to the exclusion of an additional 78 articles. Subsequently, the full-text analysis was performed on the remaining 187 articles, resulting in the exclusion of 26 more articles. Ultimately, 161 articles have met all the criteria of the study and were included in the analyses.

The methodology concludes with Steps 5 and 6, which center around literature synthesis and reporting the findings. Literature synthesis is conducted through a combination of quantitative and qualitative analysis. Simple and practical visualization tools are used to present the results accurately and effectively, ensuring precision and relevance. For comprehensive and credible answers to the aforementioned questions, we start with a preliminary study that is first

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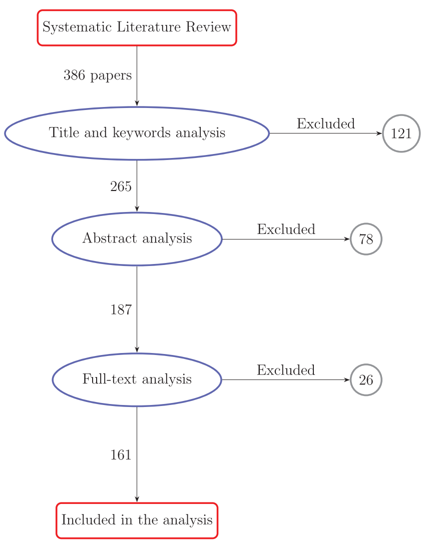
Table 1 Search terms and keywords

Sustainable and resilient supply chains		Strategic capacity expansion
"OR"		"OR"
Sustainable and resilient chemical supply chain design		Capacity expansion
Strategic supply chain optimization for the chemical industry	"And"	Emergency and capacity expansion
Green, eco-friendly, circular economy and supply chain design		Diversification of revenue streams;
Social responsibility and supply chain design		Risk-based capacity expansion;
Supplier resiliency and supply chain design		Technological disruptions and capacity expansion

Source: Authors' own work

Figure 1 Summary of literature review process



Source: Authors' own work

conducted to provide an overview of the publication periods of the covered articles in this study, peer-reviewed journals, their publishers and frequent contributors to the topics under investigation. Then, a quantitative and qualitative analysis is conducted to provide a general overview of the existing literature on supply chain resilience and sustainability, as well as the literature on strategic capacity expansion, to effectively address the relevant questions.

5. Review findings

In this section, various data analysis techniques are explored, including descriptive analysis, topic trend analysis, cluster analysis and keyword dynamics analysis. For this purpose, R-Studio and the Biblioshiny package (Ejaz *et al.*, 2022) are used to extract meaningful insights from the selected data.

5.1 Descriptive analysis

This section examines the density of published work over the past decade to identify the topicality of the problem being addressed. It also evaluates the frequency of the journals and the publishers related to the studied problem.

The analysis reveals that 25% of the analyzed papers were published between 2007 and 2015. However, the majority, almost 75%, were published between 2015 and 2023. To provide more precise information, 50% of the papers fall within the years 2017 and 2020, with a median year of 2018. That can be explained by the impact of the COVID-19 pandemic on research orientation to tackle supply chain disruption during this period. This growing density, in recent years, indicates an increasing interest in the studied problem.

Figure 2 shows the distribution of research papers that addressed related problems. It can be noticed that *Journal of Cleaner Production* had the highest frequency, accounting for 11.8%, followed by *Computers and Chemical Engineering* and *International Journal of Production Research*, both with a frequency of 8.3%. *Supply Chain Management: An International Journal* and *Sustainability* were present with frequencies of 6.9% and 5.6%, respectively. Together, these journals accounted for approximately 41% of all journals addressing these issues. These statistics are valuable for researchers by guiding them to journals that have extensively covered the topics/problems of interest. Researchers can identify key outlets for their scholarly work and contribute to the ongoing development of the problem addressed in this paper. Moreover, the findings underscore the prominence of two major publishers, as illustrated in Figure 3. Elsevier and Emerald. With a frequency of 47%, Elsevier emerges as the most important publisher in terms of publications related to the addressed issues. This suggests that Elsevier has published a significant volume of research in this field. Emerald is second accounting for 15% of the publications analyzed. This demonstrates substantial involvement in publishing works related to studied topics.

The derived information regarding the distribution of journals, combined with the data on prominent editors, provides a comprehensive understanding of the scholarly landscape surrounding the addressed issues. Researchers can consider this information when determining suitable outlets for their work, considering both the adequate journals and the publishers with significant contributions in this field.

5.2 Topic trend analysis

The thematic trend analysis highlights, over time, the important research topics related to SRSC-CapEx. This analysis holds significant importance in discerning research trends with sustained frequency in the long run, as well as in identifying research gaps. Figure 4 illustrates the prevalent topics, indicated by frequently occurring keywords in the data set. As depicted in Figure 4, there has been a recent surge in research interest in a resilient, sustainable supply chain capacity expansion, particularly in the context of the chemical processing industry. This is unsurprising, given the various disruptions the world has witnessed, including disasters,

Figure 2 Journals distribution

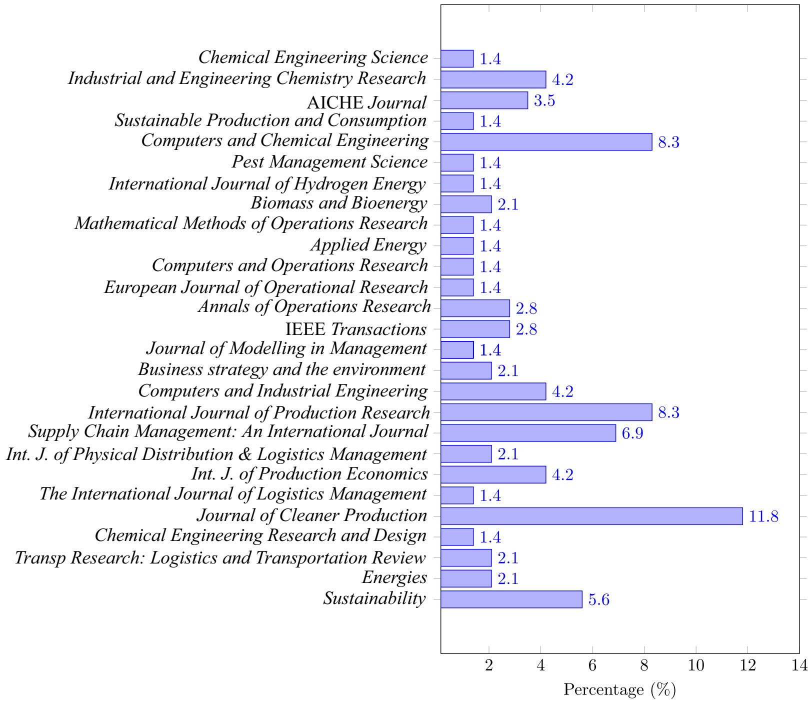


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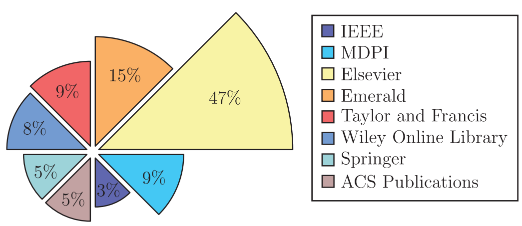
Figure 3 Publishers distribution



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geopolitical conflicts and epidemics. Moreover, during this period, there has been a growing number of warnings about detrimental environmental impacts, particularly about global warming and water wastage. This requires a re-evaluation of our behaviors to protect the environment. Figure 4 substantiates this, as it shows that laws and legislation have been a focal point of interest since the early 21st century, and since 2019, climate change has emerged as a prominent trend. All of this aligns with the observations made.

5.3 Cluster analysis

It is necessary to delve into a cluster analysis to enhance the visualization of the relationship among various topics within the framework of SRSC-CapEx. This visualization encapsulates the clustering of the initial 50 keywords, wherein distinct author keywords are grouped through the application of the Multiple Correspondence Analysis (MCA) method. This process produces a map delimiting the thematic area of the publications examined as part of this study. As a result, by using the R language, the MCA algorithm generates three distinct groups. The primary group of publications (represented by the blue cluster) predominantly concentrates on the imperative of developing a sustainable supply chain in the decision-making process for product design, with a focus on adeptly managing environmental impacts, such as gas emissions within chemical processes. The second group (depicted by the green cluster), though constituting a smaller portion of the publications compared to the first group, centers on the interplay between resilience and the facets encompassing both human and nonhuman elements, along with environmental considerations. Finally, the third group (distinguished by the red cluster) elucidates the associations between resilience, risk assessment and management, while also establishing their application within the chemical processing industry.

5.4 Keywords dynamics analysis

Figure 6 shows keyword dynamics, illustrating the frequency of the top 15 keywords. It also shows a significant increase in these keywords' occurrence, aligning with the remarks observed in Figures 4 and 5. Indeed, it highlights the importance of these research topics, notably the development of sustainable and resilient chemical supply chains to manage the risks encountered and to address environmental challenges.

6. Results, conceptual framework and research agenda

Capacity expansion problems refer to identifying the appropriate increase in capacity, its timing and possibly its location to satisfy the growing or uncertain demands within a specified planning period. The goal is to maximize overall

Figure 4 Trend topics in the SRSC-CapE context

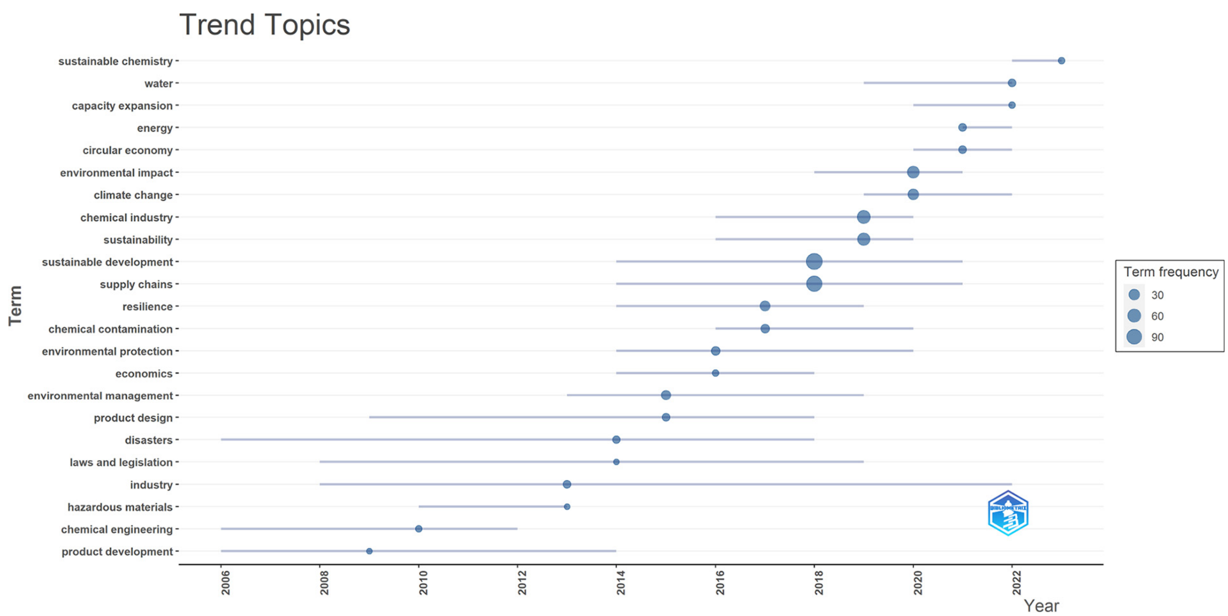

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Figure 5 Conceptual mapping of keywords

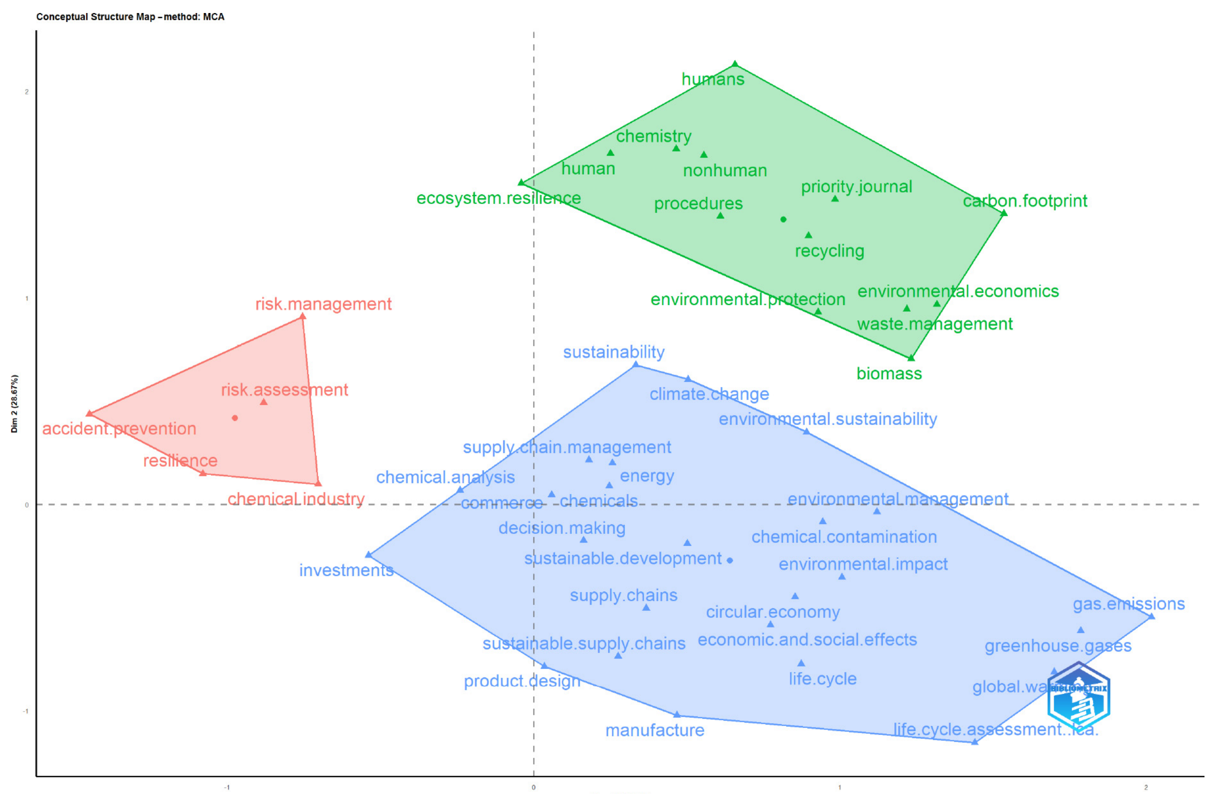

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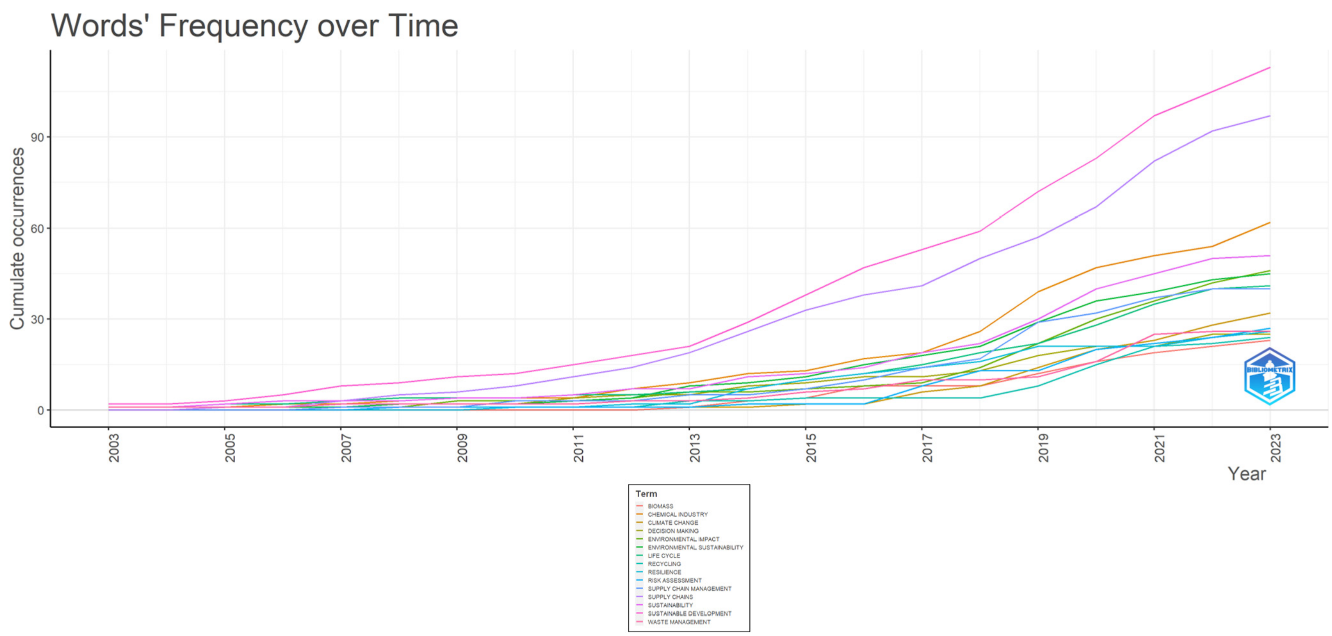
Figure 6 Keywords dynamics



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profits by optimizing the expansion process (Lee and Charles, 2022). Extensive research has been conducted across different domains, using various methodologies and techniques. For instance, Neumann *et al.* (2022) conducted assessments of linear power flow and transmission loss approximations in coordinated capacity expansion problems. Their study focused on power systems and explored the accuracy and effectiveness of these approximations in capacity expansion modeling. In addition, Pineda and Morales (2016) addressed the capacity expansion of stochastic power generation under two-stage electricity markets. They proposed a model to optimize the expansion planning considering uncertainties in power generation. Saif and Almansoori (2016) developed an efficient capacity expansion planning model, but this time for an integrated water desalination and power supply chain problem. Their model aimed to optimize the expansion of water desalination and power generation capacities. For network systems, Brandenberg and Stursberg (2021) focused on refined cut selection for Benders decomposition applied to network capacity expansion problems. They proposed an approach to enhance the efficiency of bender decomposition in solving capacity expansion problems. Park and Baldick (2016) addressed multiyear stochastic generation capacity expansion planning under environmental energy policy. Their study considered environmental policies and uncertainties in future generation capacity planning. Also, Pineda and Morales (2018) proposed a chronological time-period clustering approach for optimal capacity expansion planning with storage. They developed a clustering method to consider temporal patterns in capacity expansion decisions with storage options. For the semiconductor industry, Kuo and Chien (2023) focused on capacity expansion based on forecast evolution and mini-max regret strategy under demand uncertainty. They proposed a strategy to expand semiconductor capacity considering forecast evolution and regret minimization. Tsai (2018) developed a green quality management decision model for capacity expansion in the tire manufacturing industry. The model incorporated carbon tax and activity-based costing to optimize capacity expansion decisions while considering environmental aspects. Mahmud *et al.* (2021) proposed a hybrid agent-based simulation and optimization approach for statewide truck parking capacity expansion. The objective is to optimize truck parking capacity expansion using a combination of agent-based simulation and optimization techniques. Taghavi and Huang (2020) addressed stochastic network capacity expansion with budget constraints using a Lagrangian relaxation approach. Hu *et al.* (2020) explored generating decision rules for flexible capacity expansion problems through gene expression programming. They suggested a method based on gene expression programming to generate decision rules for capacity expansion under flexibility requirements. Zhao (2023) introduced a decision rule-based method to solve the adjustable robust capacity expansion problem. Their study proposed a method that used decision rules to make robust capacity expansion decisions under uncertainties.

These studies make significant contributions to enhancing our comprehension and optimization of capacity expansion problems across diverse domains such as power grids, water supply chains, semiconductor manufacturing, transportation and others. The proposed models, algorithms and approaches offer valuable insights to decision-makers, empowering them to make well-informed decisions regarding capacity expansion. However, there is relatively limited research specifically focused on capacity expansion problems for the chemical processing industry, particularly incorporating sustainability and resilience. In this study, we will delve deeper into this gap and provide further details and analyses by answering our review questions in the methodology section:

RQ1. How do chemical processing companies use strategies to integrate sustainability and resilience considerations into their decisions regarding supply chain capacity expansion?

In recent years, the importance of integrating sustainability and resilience into capacity expansion decisions has been recognized. Consequently, scholars have proposed various strategies to address this challenge. For instance, Mohseni *et al.* (2020) introduced a community resilience-oriented approach for optimal micro-grid capacity expansion planning, demonstrating its effectiveness for sustainable and resilient decision-making. Similarly, Vali-Siar and Roghanian (2022) developed a sustainable, resilient and responsive mixed supply chain network design approach that considers hybrid uncertainty and COVID-19 pandemic disruption, offering decision-makers a tool to design more resilient supply chain networks. In the same line, Mishra and Singh (2020) developed a stochastic disaster-resilient and sustainable reverse logistics model in a big data environment, providing a solution for designing reverse logistics systems resilient to disasters. In addition, Jabbarzadeh *et al.* (2017) developed a green and resilient design of electricity supply chain networks using a multi-objective robust optimization approach, emphasizing the integration of green and resilient aspects. This work investigates the integration of sustainability and resilience in supply chain capacity expansion decisions for the chemical processing industry.

Table 2 summarizes the relevant literature on the integration of sustainability and resilience in capacity expansion decisions for chemical processing companies, reflecting a limited number of works in this area. The table is categorized into several research streams based on a predefined research focus. These streams include:

- Criterion: This stream explores whether the focus is on resilience, sustainability, or both simultaneously, along with other variants.
- Strategies used: This stream delves into approaches and strategies used to enhance supply chain resilience and sustainability.
- Strategy performance measurement: This stream examines methods of measuring supply chain design performance within the contexts of resilience and sustainability.
- Uncertain parameter: This stream is dedicated to comprehending the diverse range of uncertainty that can impact a supply chain.
- Type of risk: This stream centers around identifying, analyzing and evaluating risks within the supply chain.
- Supply chain special case: This stream is dedicated to specifying the types of supply chains involving resilience and sustainability.

Selecting a specific strategy is challenging due to diverse approaches influenced by factors such as supply chain nature, criteria and risks, and uncertainty type. For example, Cardin *et al.* (2015) focused on enhancing on-shore liquefied natural

Table 2 Studies on sustainability and resilience in SRSC-CapEx for chemical processes

Study	Criterion	Strategies used	Strategy performance measurement	Uncertain parameter	Type of risk	Supply chain special case
Cardin *et al.* (2015)	Resilient	Flexible modular strategies	Net present value	Market	–	Gas industry
Heitmann *et al.* (2017)	Sustainable-resilient	Economic expansion strategy	DTA	Market	Investment	Fine chemicals production
Guillén-Gosálbez and Grossmann (2010)	Sustainable	Decomposition strategy	LCA	Environmental damage	–	Chemicals production
Sharifi *et al.* (2020)	Sustainable-resilient	Resilient-sustainable strategies	Weight coefficients	Demand and costs	Operational	Biofuel supply chain
Fernández-Miguel *et al.* (2022)	Sustainable-resilient	Reshoring, nearshoring strategies	LCA	Disruption	Geopolitical	Chemical industry
El-Halwagi *et al.* (2020)	Resilient	Resilient strategies	Flexibility assessment	Process parameters	Disaster	Petrochemical industry
Yune *et al.* (2016)	Green	Industrial ecology strategies	Economic assessment	–	Environment	Chemical industry
Salcedo-Diaz *et al.* (2021)	Sustainable	A cooperative game strategy	Environmental assessment	CO_2 allowances price	–	Chemical industry
Magarey *et al.* (2019)	Sustainable	Eco-efficiency strategy	Risk quotient (RQ)	Eco-efficiency gains	Environment	Chemical production
Dal-Mas *et al.* (2011)	Sustainable	Investment strategies	MILP	Ethanol selling price	Financial	Biomass-based ethanol SC
Hugo *et al.* (2005)	Sustainable	Optimal investment strategies	LCA	–	Financial	Hydrogen SC
Giarola *et al.* (2013)	Sustainable	Optimal investment strategies	Quantitative multicriteria	Market	Decision makers	Ethanol SC

Source: Authors' own work

gas production design through flexible strategies, showcasing benefits like improved performance and adaptability. In contrast, Heitmann *et al.* (2017) presented a decision-making framework for selecting expansion strategies in a small-scale modular multi-product plant based on economic viability and operational flexibility. In 2010, Guillén-Gosálbez and Grossmann (2010) emphasized the environmentally conscious design of chemical supply chains, incorporating uncertainty in the damage assessment model. More recently, Sharifi *et al.* (2020) addressed second-generation biofuel supply chain design, integrating resilience and sustainability with a hybrid stochastic fuzzy robust approach. Similarly, Fernández-Miguel *et al.* (2022) explored reshoring and nearshoring as strategies to enhance resilience and sustainability in resource-intensive supply chains. In addition, El-Halwagi *et al.* (2020) focused on disaster-resilient manufacturing facility design, emphasizing process integration for enhancing that of manufacturing facilities. Salcedo-Diaz *et al.* (2021) proposed a cooperative game strategy to foster collaboration and incentivize sustainable practices within the supply chain under an emissions trading system. Yune *et al.* (2016) applied industrial ecology strategies to promote sustainability and environmental performance within a Chinese chemical industrial park, emphasizing the importance of collaborative efforts among stakeholders. Dal-Mas *et al.* (2011) developed a mathematical model to optimize capacity expansion decisions and investment strategies along the supply chain, highlighting the importance of considering price uncertainty and the dynamic nature of the ethanol market in designing sustainable and economically viable supply chains.

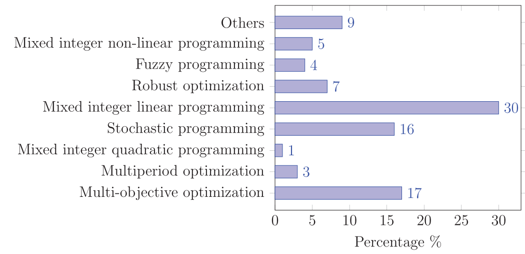
Studying sustainability and resilience together in the context of chemical supply chain capacity expansion problems would be highly interesting. However, in response to our previous question, the utilization of strategies will vary depending on the problem's nature, criteria and risks. Nonetheless, it is important to note that, at present, the application of these strategies cannot be standardized:

RQ2. What approaches are used to strategically plan for the expansion of a resilient and sustainable supply chain capacity?

To plan resilient and sustainable chemical supply chain expansions, it is necessary to develop an appropriate model, similar to solving any other decision problem. Subsequently, a resolution approach must be used, wherein the objective functions to be minimized or maximized are defined. In addition, when constructing such models, it is common to account for certain parameters as the uncertainty while others are considered known. Therefore, it is crucial to consider and address this uncertainty during the initial stages of model design. Thus, in this section, we provide a detailed process analysis.

Figure 7 summarizes mathematical modeling and solution approaches for addressing sustainability and/or resilience in capacity expansion decisions for chemical processing companies. Notably, mixed-integer linear programming (MILP), multi-objective optimization and stochastic programming are the predominant mathematical methods, comprising 30%, 17% and 16%, respectively, in tackling issues related to our decision problem. This prevalence aligns with the expected complexity of decision problems that involve simultaneous optimization of multiple objectives and consideration of parameters with uncertain influences. For example, as detailed in Table 3, Ruiz-Femenia *et al.* (2013) developed a MILP model covering various supply chain aspects, incorporating multiple objectives such as minimizing environmental impact and cost and maximizing supply chain reliability while considering demand uncertainty. Similarly, Jabbarzadeh *et al.* (2018) addressed resilient and sustainable supply chain design under disruption risks, using stochastic multi-objective optimization across production, transportation, inventory management and distribution aspects to identify an optimal supply chain configuration balancing sustainability, resilience and cost trade-offs.

Figure 7 Frequency of the used mathematical approaches for SRSC-CapEx problems



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Furthermore, heuristic and metaheuristic approaches are the most commonly used, accounting for 35.29% of the studies discussed in this paper. For instance, Guillén *et al.* (2006) used a MILP model to optimize supply chain design, deploying a combination of genetic algorithms and mathematical programming tools to identify the optimal configuration minimizing supply chain costs under varying demand scenarios. The ∊-constraint method, Lagrangian relaxation and decomposition algorithms are also used, with both latter methods representing, respectively, 23.53%, 17.65% and 17.65% of the analyzed works. Indeed, You *et al.* (2012) focused on the optimal design of sustainable biofuel supply chains, using a MILP model and applying the ∊-constraint method to balance economic and environmental considerations. Addressing the design of a reliable and efficient petrochemical supply chain network under uncertainty, Yousefi-Babadi *et al.* (2017) introduced a multi-objectives mixed-integer nonlinear programming model. They developed an efficient Lagrangian relaxation based on a subgradient approach to solve the presented model. Similarly, Zhou and Li (2018) defined a MILP model to optimize the supply chain network, using a generalized Bender decomposition and Lagrangian relaxation for problem resolution to identify the optimal configuration minimizing supply chain costs under various demand scenarios.

Table 4 presents the objective criteria used in modeling the problem under study in this research. These optimization criteria can be maximized, minimized or both simultaneously in the case of multi-objective optimization. This is exemplified in the work of Guillén-Gosálbez and Grossmann (2009) where the focus was on maximizing the net present value while minimizing the environmental impact. Indeed, upon examining the table, it becomes apparent that the most commonly used optimization criterion is the minimization of

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Table 3 References according to mathematical approach

Solution approach	Authors
Mixed integer linear programming	64, 127, 111, 88, 99, 112, 162, 55, 28, 166, 86, 82, 6, 98, 3, 89, 87, 79, 37, 81, 52, 158, 138, 2, 32, 31, 38
Multi-objective optimization	127, 88, 9, 99, 3, 158, 105, 128, 138, 76, 25, 71, 107, 32, 31, 101, 38
Stochastic programming	127, 8, 9, 162, 166, 82, 6, 79, 106, 54, 53, 70, 76, 119, 101
Robust optimization	76, 58, 119, 57, 107, 106
Mixed integer nonlinear programming	54, 157, 159, 106
Fuzzy programming	70, 94, 77, 107
Mixed integer quadratic programming	51

Source: Authors' own work

Table 4 Major works categorized according to the objective criterion

Objective criterion	Authors
Maximization	
Net present value	54, 111
Corporate value of the firm	81
Expected profit	52, 2, 71, 101, 127
Sustainability performance	158, 70, 128, 77, 119, 32, 99
Job opportunities	138, 27
Social desirability	2
Resilience performance	76, 58, 77, 25
Environmental benefits	71
Minimization	
Environmental impact	54, 105, 55
	70, 128, 159, 25, 107, 14, 101, 9, 38, 112,
Expected total cost	162, 55, 6, 87
Losses	94
Operational risks	128
Average tardiness to deliver products	159
Transportation cost	9, 159
Water consumption and air pollutants	2
CO_2 emissions	107, 38
Financial risk on investment	28

Source: Authors' own work

expected costs. For instance, Jabbarzadeh *et al.* (2018) emphasized resilience in supply chain design, developing a model that determines outsourcing decisions and resilience strategies to minimize expected total cost while maximizing overall sustainability. In a recent study, Sabouhi *et al.* (2021) presented a framework for designing a sustainable and resilient supply chain, using a MILP model to minimize supply chain costs and identify the optimal configuration. In addition, profit, sustainability and resilience maximization frequently appear as objectives in supply chain design. Moayedi and Sadeghian (2023) focused on designing a green supply chain considering demand uncertainty, using a multi-objective stochastic programming model to minimize supply chain costs and maximize profits.

In addition, Mele *et al.* (2011) formulated as a MILP and includes several decision variables related to the production, transportation and distribution of biofuels to minimize the total cost, the greenhouse gas emissions associated with the production and transportation of biofuels, while maximizing the social benefits of the supply chain. In the same context, Khalili *et al.* (2022) developed a multi-objective MILP model that considers economic, environmental and social sustainability objectives, as well as resilience to disruptions and uncertainty to minimize the total cost and the environmental impact of the supply chain. Therefore, to maximize the social benefits and the resilience of the supply chain to disruptions.

Furthermore, upon analyzing these works, it reveals that uncertainties associated with demand and the environment have been extensively studied with, respectively, 53% and 18% of tackled studies. So, this highlights the significance of incorporating these parameters in the design and evaluation of supply chain networks. However, it is important to acknowledge that other parameters, such as costs, supply, inventory and disruptions, are also subject to uncertainty and should be considered alongside demand since they were all explored in less than 30% of the studies. Exploring the combinations of these parameters presents promising avenues for future research, particularly in the context of addressing both operational and disruption risks:

RQ3. Which metrics will be used to gauge the effectiveness of incorporating sustainability and resilience into supply chain capacity expansion?

The measurement of sustainability and resilience effectiveness has received limited attention in the existing literature. Ruiz-Benitez *et al.* (2017) pointed out the complexity of selecting suitable indicators to effectively measure both sustainable and resilient performance. Consequently, performance measurement of sustainability and resilience of the supply chain has been divided into distinct approaches. One approach involves researchers who aim to jointly measure sustainability and resilience by developing appropriate indicators. Another approach focuses specifically on assessing the risk within green supply chains, primarily emphasizing environmental sustainability. Some researchers concentrated on evaluating the greening aspect in situations of uncertainty, as well as those who assessed risks within sustainable supply chains. Azevedo *et al.* (2016) proposed the LARG index as a comprehensive framework for evaluating and enhancing supply chain performance. This index assesses performance based on four dimensions – performance, responsiveness, resilience and sustainability – providing a benchmark against industry standards. Similarly, Ramezankhani *et al.* (2018) developed a mixed sustainability and resilience approach for measuring supply chain performance, incorporating environmental, social and economic dimensions for sustainability and risk assessment, flexibility and

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robustness for resilience. They emphasized the insufficiency of traditional measures focusing on cost, quality and delivery time. Likewise, Ruiz-Benitez *et al.* (2019) explored the relationship between lean and resilient supply chain management and its impact on supply chain sustainability. They proposed a conceptual framework integrating lean and resilient practices, environmental and social sustainability, supply chain performance, risk management, organizational culture and stakeholder engagement.

The second approach has been endorsed by several works such as Chavan *et al.* (2018), which proposed a relative reliability risk index for green supply chain management. This index is based on a comprehensive set of criteria that includes environmental, social and economic factors. The authors use a fuzzy analytic hierarchy process to evaluate the criteria and calculate the relative reliability risk index for each supply chain partner. The authors argue that supply chain reliability is a critical factor for achieving sustainability and that a reliable supply chain can help reduce waste, improve efficiency and enhance the environmental performance of the supply chain. Furthermore, Mangla *et al.* (2018) highlighted that risk assessment is a critical component of green supply chain management and that a fuzzy approach to failure mode and effect analysis can help evaluate and prioritize risks more comprehensively and accurately. The results show that the proposed approach can effectively evaluate and prioritize risks in a green supply chain context and provide valuable insights for improving supply chain sustainability and resilience. Abdel-Basset and Mohamed (2020) proposed a novel pathogenic TOPSIS-CRITIC model for sustainable supply chain risk management. The model takes into account multiple criteria and their interrelationships and provides a more comprehensive and accurate evaluation of risks.

Regarding resilience and sustainability metrics for chemical processing companies, and specifically, in the context of supply chain capacity expansion or supply chain design, there is limited availability of literature on this topic. However, it has been observed that researchers tend to use the same measures as those commonly found in the existing literature. Otherwise, new measurement approaches are created, depending on the issue at hand. For instance, Chrisandina *et al.* (2022) presented a review of the literature on resilience assessment and identified several metrics that can be used to evaluate the resilience of sustainable chemical supply chains. These metrics include supply chain risk, robustness, flexibility and adaptability, among others. In addition, they discussed sustainability metrics such as carbon footprint, water footprint, energy intensity and resource efficiency. More importantly, Jabbarzadeh *et al.* (2018) emphasized the importance of a comprehensive assessment of both sustainability and resilience metrics in the design of resilient and sustainable supply chains. The authors suggested several metrics that can be used to evaluate the sustainability of supply chain design. These metrics include carbon emissions, water usage, waste generation, social responsibility, economic viability and resilience. They also proposed risk exposure, recovery time and disruption impact such as resilience metrics. They highlighted that the incorporation of these metrics into the supply chain design can enhance the resilience of the supply chain and mitigate the negative impact of disruptions on the sustainability of the supply chain. In the same context, Sabouhi *et al.* (2021) evaluated sustainability and resilience metrics in supply chain design, considering factors like carbon emissions, water usage, waste generation, risk exposure, recovery time, disruption impact and regional considerations such as geographical location, climate and resource availability. They highlighted the critical role of regional factors in enhancing supply chain sustainability and resilience. Similarly, Sharifi *et al.* (2020) and Khalili *et al.* (2022) examined resilience and sustainability metrics in the design of biofuel and gasoline supply chain networks, respectively, considering metrics such as carbon emissions, water usage, waste generation, risk exposure, recovery time and disruption impact. The selection of appropriate metrics, according to these studies, is crucial for identifying sustainability and resilience challenges and devising effective strategies. In the petrochemical supply chain design context, Yousefi-Babadi *et al.* (2017) emphasized reliability as a key criterion related to resilience, while cost-related factors such as transportation and inventory costs were indirectly linked to environmental sustainability. A more comprehensive assessment of resilience and sustainability, considering environmental, social and economic dimensions, was advocated by Khalili *et al.* (2022). Finally, Malek *et al.* (2017) addressed green resilience in supply chain networks, using a hybrid grey relational analysis approach to assess metrics including carbon footprint, water usage, waste generation, social responsibility, economic viability, risk exposure, recovery time and disruption impact. They stressed the importance of considering both environmental and resilience metrics for a comprehensive evaluation.

To address the question regarding the metrics of resilience and sustainability in the case of capacity expansion for chemical processes, it can be affirmed that the selection of metrics can be empirical and problem-dependent (Huizar *et al.*, 2018; Balugani *et al.*, 2020; Ulanowicz *et al.*, 2009). The metrics commonly used in the study mentioned above can serve as a starting point for evaluating resilience and sustainability. However, it is crucial to consider the specific context, objectives and challenges associated with the capacity expansion to identify and tailor the appropriate metrics for a comprehensive assessment:

RQ4. What are the primary factors driving and impeding the achievement of sustainable and resilient supply chain capacity expansion?

The barriers and drivers to designing sustainable and resilient supply chains, particularly in the case of chemical processing companies, have received relatively little attention. In addition, previous research has mostly examined the barriers and drivers of resilient and sustainable supply chains independently. In this study, the focus is on the interplay of resilience and sustainability in capacity expansion decision-making.

Few studies have provided a general understanding of these barriers and drivers. For instance, Fiksel (2003) discussed the importance of designing resilient and sustainable systems and provides a framework for achieving these goals. Therefore, they identified several barriers and drivers to designing resilient and sustainable systems. Some of the barriers include resistance to change, where individuals and organizations may be reluctant to adopt new approaches or technologies that they perceive as risky or unfamiliar; a short-term focus, which means that organizations prioritize immediate goals over long-term sustainability, impeding investments in resilient and sustainable systems; a lack of interdisciplinary collaboration, posing challenges in achieving cooperation across diverse disciplines and stakeholders; uncertainty and complexity, common attributes of sustainability challenges that make it difficult to identify and address underlying problems; and limited resources, as building resilient and sustainable systems often demands substantial investments in technologies, infrastructure and training, surpassing the capabilities of some organizations. On the other hand, drivers of designing resilient and sustainable systems include regulatory and policy incentives, where government measures encourage organizations to adopt more sustainable practices; market demand, as customers and stakeholders increasingly seek sustainable products, creating a market-driven motivation for organizational investment; cost savings, with resilient and sustainable systems often leading to long-term financial benefits; innovation, as investing in these systems fosters creativity and helps organizations remain competitive in a dynamic environment; and collaboration and partnership, as the construction of resilient and sustainable systems necessitate cooperation among various stakeholders, fostering new opportunities for learning and innovation.

In the same way, Beske and Seuring (2014) investigated the challenges and opportunities for integrating sustainability into supply chain management. They highlighted firstly several barriers including a lack of clear definitions and metrics, difficulty in measuring and communicating sustainability performance, difficulty in aligning sustainability with other business objectives, limited availability of sustainable products and services and limited organizational capacity. They emphasized secondly various drivers including increasing stakeholder pressure, the potential for cost savings and efficiency gains and the opportunity to differentiate products and services in the market. More recently, Juettner *et al.* (2020) identified several barriers to implementing supplier management strategies for sustainability risks, including the lack of clear definitions and metrics, the difficulty of managing risks across complex and geographically dispersed supply chains and the resistance to change within organizations and among suppliers. They also highlighted several drivers including stakeholder pressure, regulatory requirements and the potential for cost savings and efficiency gains.

Table 5 provides a summary of the primary barriers and drivers involved in designing a resilient and sustainable supply chain in general. Notably, the barriers predominantly stem from the lack of limitations of specific resources or input parameters, which is a common occurrence. Conversely, the drivers are more closely associated with enhancing supply chain efficiency, competitiveness, cost optimization and risk management. In this study, our focus is on designing a resilient and sustainable supply chain specifically for chemical processes. To accomplish this objective, Table 6 presents the main works that have looked at building resilient and sustainable supply chains in the case of capacity expansion or its design, taking into account various factors such as disruption risks, environmental impact and regional considerations. The table also examines the various obstacles and factors associated with this issue. As a matter of fact, Jabbarzadeh *et al.* (2018) focused on the design of resilient and sustainable supply chains, specifically addressing the sustainability analysis under disruption risks. They propose a multi-objective mathematical model that integrates sustainability and resilience objectives and provides a framework for evaluating supply chain design decisions under uncertain conditions. In the same context, Fahimnia *et al.* (2018) compared the trade-offs between greening and resilience in supply chain design decisions and proposed a conceptual framework for integrating these objectives. They highlight the importance of considering both sustainability and resilience objectives in supply chain design decisions and provide insights on how to achieve a balance between these objectives. More recently, Juettner *et al.* (2020) discussed the implementation of supplier management strategies for mitigating sustainability risks in multinational companies. They provide a framework for assessing sustainability risks and propose strategies for managing them in supplier management. Furthermore, Mousavi *et al.* (2021) presented a green-resilient supply chain network optimization model in the cement industry. They propose a multi-objective optimization model that balances sustainability and resilience objectives and provides insights on how to design a supply chain that is both environmentally friendly and resilient.

Table 5 Key barriers and drivers for building a resilient and sustainable supply chain

Authors	Supply chain type	Barriers	Drivers
Pagell and Shevchenko (2014)	Sustainable SC	Lack of long-term orientation	Potential cost savings Limited top management support, enhanced corporate reputation
Sarkis et al. (2010)	Environmental SC	Lack of stakeholder pressure	Enhanced organizational performance Insufficient training opportunities, competitive advantage
Walker and Preuss (2008)	Sustainable SC	Limited availability of sustainable options	Increased support for small businesses Inconsistent public sector policies, enhanced sustainability performance
Hu and Hsu (2010)	Green SC	Lack of environmental awareness	Competitive advantage High implementation costs, regulatory compliance
Zsidisin and Wagner (2010)	Resilient SC	Lack of supply chain resilience	Increased supply chain performance Insufficient risk management practices, enhanced disruption response capabilities

Source: Authors' own work

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Table 6 Summary for SRSC-CapEx barriers and drivers in chemical processes

Ref	Type of SC	Context	Barriers	Drivers
Jabbarzadeh *et al.* (2018)	Supply chain in various industries, including the chemical processing industry	Resilient and sustainable SC design in the context of disruption risks	• Lack of visibility and transparency • Limited availability of materials and technologies • Resistance to change • Limited awareness and education of stakeholders	• Regulatory requirements and stakeholder pressure • Innovation and technology advancement in sustainable and resilient practices
Fahimnia *et al.* (2018)	Chemical processing industry	Greening (i.e. sustainability) and resilience in SC design	• High costs of implementing sustainable and resilient practices • Trade-offs and conflicting objectives between sustainability and resilience in SC design decisions	• Potential for cost savings and efficiency gains through sustainable and resilient practices • Opportunity for market differentiation and competitive advantage through sustainability and resilience
Juettner *et al.* (2020)	Various industries, including the chemical processing industry	Integrated sustainable-resilient SC design	• Complexity and interdependence of SC systems • Limited awareness and education of sustainability and resilience concepts among stakeholders	• Increased awareness and understanding of sustainability and resilience concepts among stakeholders
Mousavi *et al.* (2021)	Various industries, including the chemical processing industry	Green-resilient SC design	• Limited availability of sustainable and resilient materials and technologies • Resistance to change within the organization and among suppliers • Limited awareness and education of sustainability and resilience concepts among stakeholders	• Regulatory requirements and stakeholder pressure for sustainability and resilience • Potential for cost savings and efficiency gains through sustainable and resilient practices
Sabouhi *et al.* (2021)	Chemical processing industry	Sustainable and resilient SC design	• Limited awareness and education of sustainability and resilience concepts among stakeholders • High costs of implementing sustainable and resilient practices • Complexity and interdependence of SC systems	• Opportunity for market differentiation and competitive advantage through sustainability and resilience • Innovation and technology advancement in sustainable and resilient practices

Source: Authors' own work

Another work is introduced by Sabouhi *et al.* (2021) where the authors proposed an optimization approach for sustainable and resilient supply chain design, taking into account regional considerations such as transportation costs and environmental impact. They provided a framework for integrating sustainability and resilience objectives into supply chain design decisions and highlighted the importance of considering regional factors in supply chain design.

6.1 Conceptual framework and research agenda

Based on the previous analysis, a conceptual framework for SRSC-CapEx is developed (Figure 8). This framework is structured around four essential criteria: capabilities, drivers, impacts and barriers, including risks. Therefore, it encompasses diverse dimensions for the attainment of a sustainable and resilient supply chain. "Capabilities" span across people, processes and technology. "Drivers" and "barriers" are categorized among stakeholders, suppliers, internal factors and customers. Finally, "Impacts" encompass both risks and performance aspects.

Attaining sustainable and resilient supply chain capacity expansion requires a sequential enhancement of the company's capabilities. Regarding the company's people, the imperative lies in fostering collaboration and trust while identifying roles and responsibilities. It also extends to training and certification, concurrently emphasizing the seamless exchange of information. When addressing processes, a strategic fortification is essential through integration, meticulous control, rigorous measurement and consistent audit mechanisms. This multifaceted approach aims at enhancing efficiency, agility and overall quality. In addition, a forward-looking perspective involves the integration of cutting-edge technologies. This encompasses the seamless implementation of information systems, robust data governance, leveraging the potential of the Internet of Things, harnessing the capabilities of cloud computing, and insightful analytics through technological forecasting. By weaving these elements together, companies embarking on the journey to tackle these complex issues establish a robust foundation. This foundational strength enables the smooth applicability of strategies while simultaneously overcoming potential barriers. This comprehensive approach fortifies the drivers underlying the capacity expansion, ultimately culminating in a substantial impact on risk mitigation and performance enhancement.

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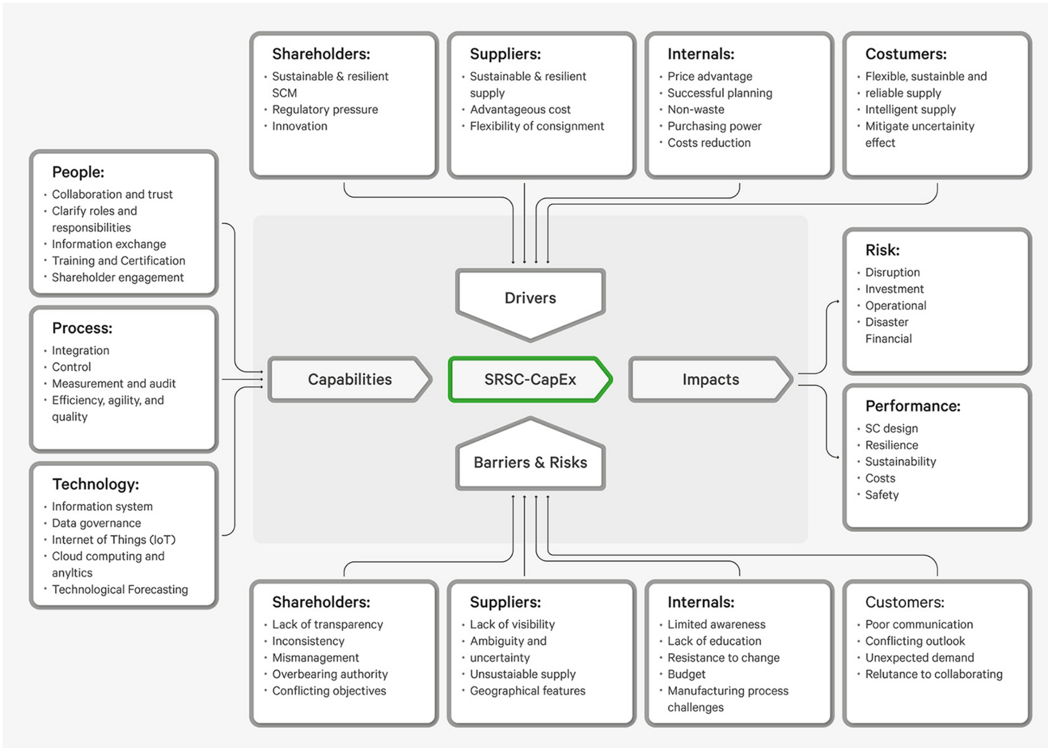
Figure 8 Conceptual framework for SRSC-CapExp



Source: Authors' own work

Figure 8 also clarified a contrasting relationship between barriers and drivers, creating a dynamic interplay. Within the realm of shareholders, the drivers encompass sustainable and resilient supply chain management, regulatory pressure and innovation. Conversely, barriers manifest as lack of transparency, inconsistency, mismanagement, overbearing authority and conflicting objectives. These adversities pose substantial resistance, posing challenges to achieving desired outcomes. Transitioning to suppliers, the drivers emphasize the aspiration for sustainable and resilient supply, cost advantages and flexibility in consignment. However, the barriers materialize as lack of visibility, ambiguity and uncertainty, unsustainable supply practices and geographical constraints. As a result of this overlapping, the fluidity of operations is disrupted. Within the internal sphere, drivers are steered by price advantage, effective planning, nonwaste principles and purchasing power. In contrast, barriers manifest as limited awareness, lack of education, resistance to change, budget constraints and challenges in the manufacturing process. These obstacles hinder seamless progress. Turning to the customer perspective, the drivers encompass a triad of aims: flexibility, sustainability and reliability in supply, intelligent supply management and mitigation of uncertainty's effects. Counter-actively, barriers manifest as poor communication, conflicting outlooks, unexpected demand fluctuations and reluctance to engage in collaborative efforts. This comparative analysis sheds light on the intricate dynamics at play, ultimately offering a clarified understanding of the intricate interplay between drivers and barriers across the SRSC-CapEx context.

The objective is to effectively mitigate diverse risks linked to potential disruptions, investment challenges, operational issues and financial uncertainties. By doing this, chemical companies enhance their supply chain design performance, enhancing resilience, ensuring sustainability and optimizing costs. Particularly, the evolution of chemical supply chain management in the contexts of resilience and sustainability must emphasize B2B interactions, which we focus on extensively. Bag *et al.* (2023) underlined the necessity of identifying essential elements for exceptional performance of B2B firms amid climate change, providing avenues for scholars to contribute to developing strategies that enhance sustainability, resilience and long-term performance in facing climate challenges. The study highlighted the dynamic nature of B2B engagements, emphasizing the critical need for firms to respond to change while maintaining their marketing capabilities adeptly. Shrivastava (2023) offered a detailed overview of recent trends in B2B supply chain management, revealing emerging practices and strategies that strengthen the resilience and sustainability of these networks. Meanwhile, Bag (2023) explored the transition from traditional resources to sustainable practices, providing a practical perspective on implementing a net-zero economy among small to medium-sized B2B firms. The authors highlighted a significant shift toward sustainability and its impact on the operational strategies of B2B enterprises. Furthermore, the need for a continuous and comprehensive review of the literature on SRSC-CapEx, particularly considering B2B aspects, remains imperative. To this end, we formulate a holistic research agenda, structured around the elements already delineated in the proposed framework:

- *People:* What steps can be taken to revamp and enhance inadequate human resources practices, fostering a resilient, sustainable supply chain while also bolstering capacity?
- *Process:* How to adapt existing processes to the context of SRSC-CapEx? how to implement new ones within this context?
- *Technology:* How can we effectively explore the adoption of new technologies and accurately measure their impact on SRSC-CapEx performance?
- *Shareholders:* How can we establish appropriate incentives and cultivate a conducive organizational environment to encourage shareholders to embrace an SRSC-CapEx system?
- *Suppliers:* How can we motivate suppliers to embrace flexible, high-capacity and environmentally friendly sales and shipping practices?
- *Internal:* How can facilitate enhanced collaboration between companies across the supply chain within the context of SRSC-CapEx?
- *Customers:* How can SRSC-CapEx enhance cooperation among diverse customers and establish long-term partnerships with a focus on environmental sustainability?
- *Risk:* How does SRSC-CapEx facilitate the reduction of risks? Can SRSC-CapEx offer flawless risk management?
- *Performance:* How can we train collaborators to ensure the viability and effectiveness of SRSC-CapEx performance? What are the best practices for optimizing performance and maximizing value from SRSC-CapEx? How ensuring the viability and effectiveness of SRSC-CapEx performance, particularly considering B2B aspects?

The findings hold significant implications for the chemical processing industry, encompassing pharmaceuticals, agrochemicals and materials manufacturing. By addressing these research questions on sustainable-resilient supply chain capacity expansion, we provide practical insights tailored for top managers, policymakers, stakeholders and other involved parties. Furthermore, we present practitioners and researchers with a conceptual framework that can guide managers in developing appropriate supply chain strategies and building the right people capability. This can also empower stakeholders to design supply chains that not only embody sustainability, resilience and efficiency but also align with the unique characteristics of the chemical processing industry. In addition, our work enhances theoretical comprehension by synthesizing existing knowledge, aiding practitioners in positioning themselves, identifying research gaps, critically evaluating prevailing models and fostering the development of novel approaches or models, while also allowing for the formulation of new research hypotheses. The outcomes of this research will equip B2B supply chain managers to engage with the market demand with robust supply chain capacities and enhanced flexibility, translating into significant gains and profitability.

7. Conclusions, limitations and perspectives

This work examined the integration of sustainability and resilience in B2B chemical supply chains, with a focus on capacity expansion. To this end, an extensive systematic literature review is conducted of which 75% was recently published from 2015 to 2023. The sustainability-resilience interplay was found to be complex to govern due to the potentially serious consequences of disruptions and risks associated with supply chains, necessitating the need for resilient planning. Moreover, the growing concerns about the environmental, social and economic impacts of supply chains call for incorporating sustainability into various aspects of supply chain performance.

The conducted systematic literature review showed a growing interest in developing sustainability-resilience integration frameworks within supply chains and in formulating and solving supply chain optimization problems for capacity expansion decisions. While several studies have addressed this problem through separate models, there is limited research on the joint study of these two concepts concerning supply chain capacity expansion. The research was noticeably limited within the context of chemical processes. Furthermore, this work is one of the initial attempts to analyze the relationship between sustainability, resilience and capacity expansion. It also helps to clarify these concepts and bridges a gap in existing research. It also represents a significant step forward and provides a foundation for further research in this field.

The research on supply chain resilience was categorized into six research streams; risk management, disruptions and recovery, strategies and frameworks, technology and digitization, design and optimization, and humanitarian supply chains. This comprehensive view highlighted the integral role of resilient practices across supply chains. Studies under each category were analyzed, and results were used to characterize the resilience aspect of supply chain capacity expansion with reflections on chemical processes. Similarly, seven research streams were categorized for the sustainability aspect; frameworks, metrics, practices and strategies, risk management, partnership, technology and innovation, and policy and governance.

To facilitate a comprehensive understanding of the challenge of expanding the capacity of chemical supply chains while achieving sustainability and resilience, four fundamental review or research questions were explored through a deep review of relevant literature. First, the study explored strategies used to integrate sustainability and resilience considerations into decisions regarding supply chain capacity expansion. Such integration in the context of chemical supply chain capacity expansion decisions was found to be attractive and essential. However, the utilization of such strategies will vary depending on the problem's nature, criteria and risks. Second, the study presented the mathematical approaches used to develop a resilient and sustainable supply chain for capacity expansion. It also highlighted the role of heuristic and metaheuristic algorithms in solving this problem. Third, the study outlined the metrics used to jointly measure the effectiveness of sustainable-resilient supply chains. The analysis recommended considering the specific context, objectives and challenges associated with the capacity expansion to identify and tailor the appropriate metrics for a comprehensive assessment. Finally, the study identified the main drivers and barriers to achieving sustainable and resilient capacity expansion.

Finally, to guide researchers and practitioners, a conceptual framework is structured around four essential criteria: capabilities, drivers, impacts and barriers, including risks. "Capabilities" span across people, processes and technology.

"Drivers" and "barriers" are categorized among stakeholders, suppliers, internal factors and customers. Finally, "impacts" encompass both risks and performance aspects. Its practical implications are noteworthy, as it facilitates the implementation of sustainable and resilient supply chains, particularly in a sensitive sector like the chemical industry, by considering capacity expansion as a crucial factor.

Nevertheless, there remain some prospects for additional research tracks as one can acknowledge certain limitations of this study. First, the focus was primarily on scientific journals, but expanding the scope to include other sources could be beneficial. In addition, more specific research topics should be explored to enhance the overall understanding of the subject. Also, this work played a pivotal role in constructing the proposed framework, highlighting distinct drivers and barriers within the chemical processing industry. Nevertheless, it is crucial to recognize that concentrating purely on this aspect might prove insufficient; other facets within this domain also merit consideration, such as the integration of technological advancements.

Finally, the findings underscore the potential for enhanced investigations encompassing novel technological solutions, emerging phenomena such as epidemics, and geopolitical considerations. Incorporating these dimensions into the SRSC-CapExp framework promises to augment its comprehensive efficacy and relevance. As such, this study lays the groundwork for a compelling research agenda, as stated previously, that extends the boundaries of the studied topic.

References

Abdel-Basset, M. and Mohamed, R. (2020), "A novel plithogenic topsis-critic model for sustainable supply chain risk management", *Journal of Cleaner Production*, Vol. 247, p. 119586.

Ali, I. and Gölgeci, I. (2019), "Where is supply chain resilience research heading? A systematic and co-occurrence analysis", *International Journal of Physical Distribution & Logistics Management*, Vol. 49 No. 8.

Ali, I., Nagalingam, S. and Gurd, B. (2018), "A resilience model for cold chain logistics of perishable products", *The International Journal of Logistics Management*, Vol. 29 No. 3.

Ansari, Z.N. and Kant, R. (2017), "A state-of-art literature review reflecting 15 years of focus on sustainable supply chain management", *Journal of Cleaner Production*, Vol. 142, pp. 2524-2543.

Azevedo, S.G., Carvalho, H. and Cruz-Machado, V. (2016), "LARG index: a benchmarking tool for improving the leanness, agility, resilience and greenness of the automotive supply chain", *Benchmarking: An International Journal*, Vol. 23 No. 6.

Bag, S. (2023), "From resources to sustainability: a practice-based view of net zero economy implementation in small and medium business-to-business firms", *Benchmarking: An International Journal*, Vol. 31 No. 6.

Bag, S., Srivastava, G., Gupta, S., Zhang, J.Z. and Kamble, S. (2023), "Change adaptation capability, business-to-business marketing capability and firm performance: integrating institutional theory and dynamic capability view", *Industrial Marketing Management*, Vol. 115, pp. 470-483.

Balugani, E., Butturi, M.A., Chevers, D., Parker, D. and Rimini, B. (2020), "Empirical evaluation of the impact of resilience and sustainability on firms' performance", *Sustainability*, Vol. 12 No. 5, p. 1742.

Beske, P. and Seuring, S. (2014), "Putting sustainability into supply chain management", *Supply Chain Management: An International Journal*, Vol. 19 No. 3.

Brandenberg, R. and Stursberg, P. (2021), "Refined cut selection for benders decomposition: applied to network capacity expansion problems", *Mathematical Methods of Operations Research*, Vol. 94 No. 3, pp. 383-412.

Brandenburg, M., Govindan, K., Sarkis, J. and Seuring, S. (2014), "Quantitative models for sustainable supply chain management: developments and directions", *European Journal of Operational Research*, Vol. 233 No. 2, pp. 299-312.

Broeren, M., Saygin, D. and Patel, M. (2014), "Forecasting global developments in the basic chemical industry for environmental policy analysis", *Energy Policy*, Vol. 64, pp. 273-287.

Brown, L., LaFond, A., …. and Macintyre, K.E. (2001), *Measuring Capacity Building*, Carolina Population Center, University of NC at Chapel Hill

Cardin, M.-A., Ranjbar-Bourani, M. and De Neufville, R. (2015), "Improving the lifecycle performance of engineering projects with flexible strategies: example of on-shore LNG production design", *Systems Engineering*, Vol. 18 No. 3, pp. 253-268.

Carter, C.R. and Rogers, D.S. (2008), "A framework of sustainable supply chain management: moving toward new theory", *International Journal of Physical Distribution & Logistics Management*, Vol. 38 No. 5.

Chavan, R., Patil, R., Chavan, S., Kulkarni, N. and Chavan, S.S. (2018), "Relative reliability risk index for green supply chain management", *International Journal of Mechanical Engineering and Technology*, Vol. 9 No. 13, pp. 1264-1273.

Childerhouse, P., Al Aqqad, M., Zhou, Q. and Bezuidenhout, C. (2020), "Network resilience modelling: a New Zealand forestry supply chain case", *The International Journal of Logistics Management*, Vol. 31 No. 2, pp. 291-311.

Chrisandina, N., Vedant, S., Iakovou, E., Pistikopoulos, E. and El-Halwagi, M. (2022), "Multi-scale integration for enhanced resilience of sustainable energy supply chains: perspectives and challenges", *Computers & Chemical Engineering*, Vol. 164, p. 107891.

Colicchia, C. and Strozzi, F. (2012), "Supply chain risk management: a new methodology for a systematic literature review", *Supply Chain Management: An International Journal*, Vol. 17 No. 4, pp. 403-418.

Dal-Mas, M., Giarola, S., Zamboni, A. and Bezzo, F. (2011), "Strategic design and investment capacity planning of the ethanol supply chain under price uncertainty", *Biomass and Bioenergy*, Vol. 35 No. 5, pp. 2059-2071.

Datta, P. (2017), "Supply network resilience: a systematic literature review and future research", *The International Journal of Logistics Management*, Vol. 28 No. 4, pp. 1387-1424.

de Vargas Mores, G., Finocchio, C.P.S., Barichello, R. and Pedrozo, E.A. (2018), "Sustainability and innovation in the

Brazilian supply chain of green plastic", *Journal of Cleaner Production*, Vol. 177, pp. 12-18.

Edgeman, R. and Wu, Z. (2016), "Supply chain criticality in sustainable and resilient enterprises", *Journal of Modelling in Management*, Vol. 11 No. 4, pp. 869-888.

Ejaz, H., Zeeshan, H.M., Ahmad, F., Bukhari, S.N.A., Anwar, N., Alanazi, A., Sadiq, A., Junaid, K., Atif, M., Abosalif, K. O.A., *et al.* (2022), "Bibliometric analysis of publications on the omicron variant from 2020 to 2022 in the Scopus database using R and VOSviewer", *International Journal of Environmental Research and Public Health*, Vol. 19 No. 19, p. 12407.

El-Halwagi, M.M., Sengupta, D., Pistikopoulos, E.N., Sammons, J., Eljack, F. and Kazi, M.-K. (2020), "Disaster-resilient design of manufacturing facilities through process integration: principal strategies, perspectives, and research challenges", *Frontiers in Sustainability*, Vol. 1, p. 595961.

Eltantawy, R. (2016), "Towards sustainable supply management: requisite governance and resilience capabilities", *Journal of Strategic Marketing*, Vol. 24 No. 2, pp. 118-130.

Fahimnia, B. and Jabbarzadeh, A. (2016), "Marrying supply chain sustainability and resilience: a match made in heaven", *Transportation Research Part E: Logistics and Transportation Review*, Vol. 91, pp. 306-324.

Fahimnia, B., Jabbarzadeh, A. and Sarkis, J. (2018), "Greening versus resilience: a supply chain design perspective", *Transportation Research Part E: Logistics and Transportation Review*, Vol. 119, pp. 129-148.

Fahimnia, B., Sarkis, J. and Talluri, S. (2019), "Design and management of sustainable and resilient supply chains", *IEEE Transactions on Engineering Management*, Vol. 66 No. 1, pp. 2-7.

Farashah, V.H., Sazvar, Z. and Hosseini, S.H. (2021), "A dynamic model to formulate effective capacity expansion policies in iranian petrochemical industry to complete the value chain", *Energy Policy*, Vol. 148, p. 111992.

Fernández-Miguel, A., Riccardi, M.P., Veglio, V., García-Muiña, F.E., Fernández del Hoyo, A.P. and Settembre-Blundo, D. (2022), "Disruption in resource-intensive supply chains: reshoring and nearshoring as strategies to enable them to become more resilient and sustainable", *Sustainability*, Vol. 14 No. 17, p. 10909.

Fiksel, J. (2003), "Designing resilient, sustainable systems", *Environmental Science & Technology*, Vol. 37 No. 23, pp. 5330-5339.

Fiksel, J. (2006), "Sustainability and resilience: toward a systems approach", *Sustainability: Science, Practice and Policy*, Vol. 2 No. 2, pp. 14-21.

Giarola, S., Bezzo, F. and Shah, N. (2013), "A risk management approach to the economic and environmental strategic design of ethanol supply chains", *Biomass and Bioenergy*, Vol. 58, pp. 31-51.

Gligor, D., Bozkurt, S., Gölgeci, I. and Maloni, M.J. (2020), "Does supply chain agility create customer value and satisfaction for loyal B2B business and B2C end-customers?", *International Journal of Physical Distribution & Logistics Management*, Vol. 50 Nos 7/8, pp. 721-743.

Gligor, D., Gligor, N., Holcomb, M. and Bozkurt, S. (2019), "Distinguishing between the concepts of supply chain agility and resilience: a multidisciplinary literature review", *The International Journal of Logistics Management*, Vol. 30 No. 2, pp. 467-487.

Golini, R., Moretto, A., Caniato, F., Caridi, M. and Kalchschmidt, M. (2017), "Developing sustainability in the Italian meat supply chain: an empirical investigation", *International Journal of Production Research*, Vol. 55 No. 4, pp. 1183-1209.

Grzybowska, K. and Stachowiak, A. (2022), "Global changes and disruptions in supply chains—preliminary research to sustainable resilience of supply chains", *Energies*, Vol. 15 No. 13, p. 4579.

Guillén, G., Mele, F.D., Espuna, A. and Puigjaner, L. (2006), "Addressing the design of chemical supply chains under demand uncertainty", *Industrial & Engineering Chemistry Research*, Vol. 45 No. 22, pp. 7566-7581.

Guillén-Gosálbez, G. and Grossmann, I.E. (2009), "Optimal design and planning of sustainable chemical supply chains under uncertainty", *AICHE Journal*, Vol. 55 No. 1, pp. 99-121.

Guillén-Gosálbez, G. and Grossmann, I. (2010), "A global optimization strategy for the environmentally conscious design of chemical supply chains under uncertainty in the damage assessment model", *Computers & Chemical Engineering*, Vol. 34 No. 1, pp. 42-58.

Guillot, R., Dubey, R. and Kumari, S. (2024), "B2B supply chain risk measurement systems: a SCOR perspective", *Journal of Business & Industrial Marketing*, Vol. 39 No. 3, pp. 553-567.

He, L., Wu, Z., Xiang, W., Goh, M., Xu, Z., Song, W., Ming, X. and Wu, X. (2021), "A novel Kano-QFD-dematel approach to optimise the risk resilience solution for sustainable supply chain", *International Journal of Production Research*, Vol. 59 No. 6, pp. 1714-1735.

Heitmann, M., Huhn, T., Sievers, S., Schembecker, G. and Bramsiepe, C. (2017), "Framework to decide for an expansion strategy of a small scale continuously operated modular multi-product plant", *Chemical Engineering and Processing: Process Intensification*, Vol. 113, pp. 74-85.

Hohenstein, N.-O., Feisel, E., Hartmann, E. and Giunipero, L. (2015), "Research on the phenomenon of supply chain resilience: a systematic review and paths for further investigation", *International Journal of Physical Distribution & Logistics Management*, Vol. 45 Nos 1/2, pp. 90-117.

Hu, A.H. and Hsu, C.-W. (2010), "Critical factors for implementing green supply chain management practice: an empirical study of electrical and electronics industries in Taiwan", *Management Research Review*, Vol. 33 No. 6, pp. 586-608.

Hu, J., Guo, P. and Poh, K.-L. (2020), "Generating decision rules for flexible capacity expansion problem through gene expression programming", *Computers & Operations Research*, Vol. 122, p. 105003.

Huizar, L.H., Lansey, K.E. and Arnold, R.G. (2018), "Sustainability, robustness, and resilience metrics for water and other infrastructure systems", *Sustainable and Resilient Infrastructure*, Vol. 3 No. 1, pp. 16-35.

Hussain, K., Jing, F., Junaid, M., Shi, H. and Baig, U. (2020), "The buyer–seller relationship: a literature synthesis on dynamic perspectives", *Journal of Business & Industrial Marketing*, Vol. 35 No. 4, pp. 669-684.

Ivanov, D. (2018), "Revealing interfaces of supply chain resilience and sustainability: a simulation study", *International Journal of Production Research*, Vol. 56 No. 10, pp. 3507-3523.

Jabbarzadeh, A., Fahimnia, B. and Rastegar, S. (2017), "Green and resilient design of electricity supply chain networks: a multiobjective robust optimization approach", *IEEE Transactions on Engineering Management*, Vol. 66 No. 1, pp. 52-72.

Jabbarzadeh, A., Fahimnia, B. and Sabouhi, F. (2018), "Resilient and sustainable supply chain design: sustainability analysis under disruption risks", *International Journal of Production Research*, Vol. 56 No. 17, pp. 5945-5968.

Juettner, U., Windler, K., Podleisek, A., Gander, M. and Meldau, S. (2020), "Implementing supplier management strategies for supply chain sustainability risks in multinational companies", *The TQM Journal*, Vol. 32 No. 5, pp. 923-938.

Kamalahmadi, M. and Parast, M.M. (2016), "A review of the literature on the principles of enterprise and supply chain resilience: major findings and directions for future research", *International Journal of Production Economics*, Vol. 171, pp. 116-133.

Kaur, H. and Singh, S.P. (2019), "Sustainable procurement and logistics for disaster resilient supply chain", *Annals of Operations Research*, Vol. 283 Nos 1/2, pp. 309-354.

Kaur, H., Singh, S.P., Garza-Reyes, J.A. and Mishra, N. (2020), "Sustainable stochastic production and procurement problem for resilient supply chain", *Computers & Industrial Engineering*, Vol. 139, p. 105560.

Khalili, S.M., Pooya, A., Kazemi, M. and Fakoor Saghih, A.M. (2022), "Designing a sustainable and resilient gasoline supply chain network under uncertainty (case study: gasoline supply chain network of Khorasan Razavi province)", *Industrial Management Journal*, Vol. 14 No. 1, pp. 27-79.

Koehn, R. (2018), "The digitalization of marketing and sales in the chemical B2B sector", *Journal of Business Chemistry*, Vol. 15 No. 2, pp. 63-70.

Kuo, H.-A. and Chien, C.-F. (2023), "Semiconductor capacity expansion based on forecast evolution and mini-max regret strategy for smart production under demand uncertainty", *Computers & Industrial Engineering*, Vol. 177, p. 109077.

Larrea-Gallegos, G., Benetto, E., Marvuglia, A. and Gutiérrez, T.N. (2022), "Sustainability, resilience and complexity in supply networks: a literature review and a proposal for an integrated agent-based approach", *Sustainable Production and Consumption*, Vol. 30, pp. 946-961.

Lee, C.-Y. and Charles, V. (2022), "A robust capacity expansion integrating the perspectives of marginal productivity and capacity regret", *European Journal of Operational Research*, Vol. 296 No. 2, pp. 557-569.

Leppelt, T., Foerstl, K., Reuter, C. and Hartmann, E. (2013), "Sustainability management beyond organizational boundaries–sustainable supplier relationship management in the chemical industry", *Journal of Cleaner Production*, Vol. 56, pp. 94-102.

Luss, H. (1982), "Operations research and capacity expansion problems: a survey", *Operations Research*, Vol. 30 No. 5, pp. 907-947.

M. Tachizawa, E. and Yew Wong, C. (2014), "Towards a theory of multi-tier sustainable supply chains: a systematic literature review", *Supply Chain Management: An International Journal*, Vol. 19 Nos 5/6, pp. 643-663.

Magarey, R.D., Klammer, S.S., Chappell, T.M., Trexler, C. M., Pallipparambil, G.R. and Hain, E.F. (2019), "Eco-efficiency as a strategy for optimizing the sustainability of pest management", *Pest Management Science*, Vol. 75 No. 12, pp. 3129-3134.

Mahmud, S., Asadi, A., LaCrue, A.R., Akter, T., Hernandez, S. and Pinkley, S.N. (2021), "A hybrid agent-based simulation and optimization approach for statewide truck parking capacity expansion", *Procedia Computer Science*, Vol. 184, pp. 33-41.

Malek, A., Ebrahimnejad, S. and Tavakkoli-Moghaddam, R. (2017), "An improved hybrid grey relational analysis approach for green resilient supply chain network assessment", *Sustainability*, Vol. 9 No. 8, p. 1433.

Mangla, S.K., Luthra, S. and Jakhar, S. (2018), "Benchmarking the risk assessment in green supply chain using fuzzy approach to fmea: insights from an indian case study", *Benchmarking: An International Journal*, Vol. 25 No. 8, pp. 2660-2687.

Marchese, D., Reynolds, E., Bates, M.E., Morgan, H., Clark, S. S. and Linkov, I. (2018), "Resilience and sustainability: similarities and differences in environmental management applications", *Science of The Total Environment*, Vols. 613/614, pp. 1275-1283.

Martinelli, E.M. and Tunisini, A. (2019), "Customer integration into supply chains: literature review and research propositions", *Journal of Business & Industrial Marketing*, Vol. 34 No. 1, pp. 24-38.

Mele, F.D., Kostin, A.M., Guillen-Gosalbez, G. and Jiménez, L. (2011), "Multiobjective model for more sustainable fuel supply chains. a case study of the sugar cane industry in Argentina", *Industrial & Engineering Chemistry Research*, Vol. 50 No. 9, pp. 4939-4958.

Mishra, S. and Singh, S.P. (2020), "A stochastic disaster-resilient and sustainable reverse logistics model in big data environment", *Annals of Operations Research*, Vol. 319 No. 1, pp. 1-32.

Moayedi, M. and Sadeghian, R. (2023), "A multi-objective stochastic programming approach with untrusted suppliers for green supply chain design by uncertain demand, shortage, and transportation costs", *Journal of Cleaner Production*, Vol. 408, p. 137007.

Mohseni, S., Brent, A.C. and Burmester, D. (2020), "Community resilience-oriented optimal micro-grid capacity expansion planning: the case of totarabank eco-village, New Zealand", *Energies*, Vol. 13 No. 15, p. 3970.

Moosmayer, D.C., Schuppar, B. and Siems, F.U. (2012), "Reference prices as determinants of business-to-business price negotiation outcomes: an empirical perspective from the chemical industry", *Journal of Supply Chain Management*, Vol. 48 No. 1, pp. 92-106.

Moreno-Camacho, C.A., Montoya-Torres, J.R., Jaegler, A. and Gondran, N. (2019), "Sustainability metrics for real case applications of the supply chain network design problem: a systematic literature review", *Journal of Cleaner Production*, Vol. 231, pp. 600-618.

Mousavi, M., Jamali, G. and Ghorbanpour, A. (2021), "A green-resilient supply chain network optimization model in

cement industries", *Industrial Management Journal*, Vol. 13 No. 2, pp. 222-245.
Negri, M., Cagno, E., Colicchia, C. and Sarkis, J. (2021), "Integrating sustainability and resilience in the supply chain: a systematic literature review and a research agenda", *Business Strategy and the Environment*, Vol. 30 No. 7, pp. 2858-2886.
Neumann, F., Hagenmeyer, V. and Brown, T. (2022), "Assessments of linear power flow and transmission loss approximations in coordinated capacity expansion problems", *Applied Energy*, Vol. 314, p. 118859.
Nurhayati, K., Tavasszy, L. and Rezaei, J. (2023), "Joint B2B supply chain decision-making: drivers, facilitators and barriers", *International Journal of Production Economics*, Vol. 256, p. 108721.
Pagell, M. and Shevchenko, A. (2014), "Why research in sustainable supply chain management should have no future", *Journal of Supply Chain Management*, Vol. 50 No. 1, pp. 44-55.
Park, H. and Baldick, R. (2016), "Multi-year stochastic generation capacity expansion planning under environmental energy policy", *Applied Energy*, Vol. 183, pp. 737-745.
Paul, S.K., Moktadir, M.A. and Ahsan, K. (2023), "Key supply chain strategies for the post-covid-19 era: implications for resilience and sustainability", *The International Journal of Logistics Management*, Vol. 34 No. 4, pp. 1165-1187.
Perrings, C. (2006), "Resilience and sustainable development", *Environment and Development Economics*, Vol. 11 No. 4, pp. 417-427.
Pineda, S. and Morales, J.M. (2016), "Capacity expansion of stochastic power generation under two-stage electricity markets", *Computers & Operations Research*, Vol. 70, pp. 101-114.
Pineda, S. and Morales, J.M. (2018), "Chronological time-period clustering for optimal capacity expansion planning with storage", *IEEE Transactions on Power Systems*, Vol. 33 No. 6, pp. 7162-7170.
Radatz, H., Kühne, K., Bramsiepe, C. and Schembecker, G. (2019), "Comparison of capacity expansion strategies for chemical production plants", *Chemical Engineering Research and Design*, Vol. 143, pp. 56-78.
Rajesh, R. (2021), "Optimal trade-offs in decision-making for sustainability and resilience in manufacturing supply chains", *Journal of Cleaner Production*, Vol. 313, p. 127596.
Ramezankhani, M.J., Torabi, S.A. and Vahidi, F. (2018), "Supply chain performance measurement and evaluation: a mixed sustainability and resilience approach", *Computers & Industrial Engineering*, Vol. 126, pp. 531-548.
Rashad, W. and Gumzej, R. (2014), "The information technology in supply chain integration: case study of reda chemicals with elemica", *Int. J. Supply Chain Manag*, Vol. 3, pp. 62-69.
Roberta Pereira, C., Christopher, M. and Lago Da Silva, A. (2014), "Achieving supply chain resilience: the role of procurement", *Supply Chain Management: An International Journal*, Vol. 19 Nos 5/6, pp. 626-642.
Ruiz-Benitez, R., López, C. and Real, J.C. (2017), "Environmental benefits of lean, green and resilient supply chain management: the case of the aerospace sector", *Journal of Cleaner Production*, Vol. 167, pp. 850-862.
Ruiz-Benitez, R., López, C. and Real, J.C. (2019), "Achieving sustainability through the lean and resilient management of the supply chain", *International Journal of Physical Distribution & Logistics Management*, Vol. 49 No. 2, pp. 122-155.
Ruiz-Femenia, R., Guillén-Gosálbez, G., Jiménez, L. and Caballero, J.A. (2013), "Multi-objective optimization of environmentally conscious chemical supply chains under demand uncertainty", *Chemical Engineering Science*, Vol. 95, pp. 1-11.
Sabouhi, F., Jabalameli, M.S. and Jabbarzadeh, A. (2021), "An optimization approach for sustainable and resilient supply chain design with regional considerations", *Computers & Industrial Engineering*, Vol. 159, p. 107510.
Sadeghi Asl, R., Bagherzadeh Khajeh, M., Pasban, M. and Rostamzadeh, R. (2023), "A systematic literature review on supply chain approaches", *Journal of Modelling in Management*, Vol. 18 No. 2, pp. 372-415.
Saif, Y. and Almansoori, A. (2016), "A capacity expansion planning model for integrated water desalination and power supply chain problem", *Energy Conversion and Management*, Vol. 122, pp. 462-476.
Salam, M.A. and Bajaba, S. (2023), "The role of supply chain resilience and absorptive capacity in the relationship between marketing–supply chain management alignment and firm performance: a moderated-mediation analysis", *Journal of Business & Industrial Marketing*, Vol. 38 No. 7, pp. 1545-1561.
Salcedo-Diaz, R., Ruiz-Femenia, J.R., Amat-Bernabeu, A. and Caballero, J.A. (2021), "A cooperative game strategy for designing sustainable supply chains under the emissions trading system", *Journal of Cleaner Production*, Vol. 285, p. 124845.
Samir, K. and Lutz, W. (2017), "The human core of the shared socioeconomic pathways: population scenarios by age, sex and level of education for all countries to 2100", *Global Environmental Change*, Vol. 42 No. 2100, pp. 181-192.
Samudro, A., Sumarwan, U., Yusuf, E.Z. and Simanjuntak, M. (2018), "Perceived value, social bond, and switching cost as antecedents and predictors of customer loyalty in the B2B chemical industry context: a literature review", *International Journal of Marketing Studies*, Vol. 10 No. 4, pp. 124-138.
Sarkis, J., Gonzalez-Torre, P. and Adenso-Diaz, B. (2010), "Stakeholder pressure and the adoption of environmental practices: the mediating effect of training", *Journal of Operations Management*, Vol. 28 No. 2, pp. 163-176.
Sauer, P.C. and Seuring, S. (2023), "How to conduct systematic literature reviews in management research: a guide in 6 steps and 14 decisions", *Review of Managerial Science*, Vol. 17 No. 5, pp. 1-35.
Scholten, K. and Schilder, S. (2015), "The role of collaboration in supply chain resilience", *Supply Chain Management: An International Journal*, Vol. 20 No. 4, pp. 471-484.
Sharifi, M., Hosseini-Motlagh, S.-M., Samani, M.R.G. and Kalhor, T. (2020), "Novel resilient-sustainable strategies for second-generation biofuel network design considering neem and Eruca Sativa under hybrid stochastic fuzzy robust approach", *Computers & Chemical Engineering*, Vol. 143, p. 107073.
Shrivastava, S. (2023), "Recent trends in supply chain management of business-to-business firms: a review and

future research directions", *Journal of Business & Industrial Marketing*, Vol. 38 No. 12, pp. 2673-2693.

Singh, C.S., Soni, G. and Badhotiya, G.K. (2019), "Performance indicators for supply chain resilience: review and conceptual framework", *Journal of Industrial Engineering International*, Vol. 15 No. S1, pp. 105-117.

Singh, J., Hamid, A.B.A. and Garza-Reyes, J.A. (2023), "Supply chain resilience strategies and their impact on sustainability: an investigation from the automobile sector", *Supply Chain Management: An International Journal*, Vol. 28 No. 4, pp. 787-802.

Sirisomboonsuk, P. and Burns, J. (2023), "Sustainability in supply chains through rapid capacity increases and minimized disruptions", *Sustainability*, Vol. 15 No. 7, p. 5629.

Souza, V.D., Bloemhof-Ruwaard, J. and Borsato, M. (2019), "Exploring ecosystem network analysis to balance resilience and performance in sustainable supply chain design", *International Journal of Advanced Operations Management*, Vol. 11 Nos 1/2, pp. 26-45.

Sundarakani, B., Pereira, V. and Ishizaka, A. (2021), "Robust facility location decisions for resilient sustainable supply chain performance in the face of disruptions", *The International Journal of Logistics Management*, Vol. 32 No. 2, pp. 357-385.

Sutcliffe, C., Knox, J. and Hess, T. (2021), "Managing irrigation under pressure: how supply chain demands and environmental objectives drive imbalance in agricultural resilience to water shortages", *Agricultural Water Management*, Vol. 243, p. 106484.

Taghavi, M. and Huang, K. (2020), "A Lagrangian relaxation approach for stochastic network capacity expansion with budget constraints", *Annals of Operations Research*, Vol. 284 No. 2, pp. 605-621.

Tay, K.B. and Chelliah, J. (2011), "Disintermediation of traditional chemical intermediary roles in the electronic business-to-business (e-B2B) exchange world", *The Journal of Strategic Information Systems*, Vol. 20 No. 3, pp. 217-231.

Thomé, A.M.T., Scavarda, L.F., Fernandez, N.S. and Scavarda, A.J. (2012), "Sales and operations planning: a research synthesis", *International Journal of Production Economics*, Vol. 138 No. 1, pp. 1-13.

Tranfield, D., Denyer, D. and Smart, P. (2003), "Towards a methodology for developing evidence-informed management knowledge by means of systematic review", *British Journal of Management*, Vol. 14 No. 3, pp. 207-222.

Tsai, W.-H. (2018), "A green quality management decision model with carbon tax and capacity expansion under activity-based costing (abc)—a case study in the tire manufacturing industry", *Energies*, Vol. 11 No. 7, p. 1858.

Ulanowicz, R.E., Goerner, S.J., Lietaer, B. and Gomez, R. (2009), "Quantifying sustainability: resilience, efficiency and the return of information theory", *Ecological Complexity*, Vol. 6 No. 1, pp. 27-36.

Vali-Siar, M.M. and Roghanian, E. (2022), "Sustainable, resilient and responsive mixed supply chain network design under hybrid uncertainty with considering covid-19 pandemic disruption", *Sustainable Production and Consumption*, Vol. 30, pp. 278-300.

Vanharanta, M. and Wong, P. (2022), "Critical realist multilevel research in business marketing: a laminated conceptualization of resilience", *Journal of Business & Industrial Marketing*, Vol. 37 No. 10, pp. 2010-2021.

Villa, V., Paltrinieri, N., Khan, F. and Cozzani, V. (2016), "Towards dynamic risk analysis: a review of the risk assessment approach and its limitations in the chemical process industry", *Safety Science*, Vol. 89, pp. 77-93.

Vlčková, V. and Lošťáková, H. (2017), "The range of services in the B2B market with products of the chemical industry", *'Proceedings of the 5th International Conference on Chemical Technology', Česká společnost prmyslové chemie*.

Walker, H. and Preuss, L. (2008), "Fostering sustainability through sourcing from small businesses: public sector perspectives", *Journal of Cleaner Production*, Vol. 16 No. 15, pp. 1600-1609.

You, F., Tao, L., Graziano, D.J. and Snyder, S.W. (2012), "Optimal design of sustainable cellulosic biofuel supply chains: multiobjective optimization coupled with life cycle assessment and input–output analysis", *AIChE Journal*, Vol. 58 No. 4, pp. 1157-1180.

Yousefi-Babadi, A., Tavakkoli-Moghaddam, R., Bozorgi-Amiri, A. and Seifi, S. (2017), "Designing a reliable multi-objective queuing model of a petrochemical supply chain network under uncertainty: a case study", *Computers & Chemical Engineering*, Vol. 100, pp. 177-197.

Yune, J.H., Tian, J., Liu, W., Chen, L. and Descamps-Large, C. (2016), "Greening Chinese chemical industrial park by implementing industrial ecology strategies: a case study", *Resources, Conservation and Recycling*, Vol. 112, pp. 54-64.

Zavala-Alcívar, A., Verdecho, M.-J. and Alfaro-Saiz, J.-J. (2020), "A conceptual framework to manage resilience and increase sustainability in the supply chain", *Sustainability*, Vol. 12 No. 16, p. 6300.

Zhang, X. and Yousaf, H.A.U. (2020), "Green supply chain coordination considering government intervention, green investment, and customer green preferences in the petroleum industry", *Journal of Cleaner Production*, Vol. 246, p. 118984.

Zhao, S. (2023), "Decision rule-based method in solving adjustable robust capacity expansion problem", *Mathematical Methods of Operations Research*, Vol. 97 No. 2, pp. 259-286.

Zheng, X. and Guo, C. (2022), "Strengthening systematic research on aging: reflections from an omics perspective", *China CDC Weekly*, Vol. 4 No. 39, p. 875.

Zhou, R.-J. and Li, L.-J. (2018), "Joint capacity planning and distribution network optimization of coal supply chains under uncertainty", *AIChE Journal*, Vol. 64 No. 4, pp. 1246-1261.

Zhu, Q. and Krikke, H. (2020), "Managing a sustainable and resilient perishable food supply chain (PFSC) after an outbreak", *Sustainability*, Vol. 12 No. 12, p. 5004.

Zsidisin, G.A. and Wagner, S.M. (2010), "Do perceptions become reality? The moderating role of supply chain resiliency on disruption occurrence", *Journal of Business Logistics*, Vol. 31 No. 2, pp. 1-20.

Further reading

Akbari-Kasgari, M., Khademi-Zare, H., Fakhrzad, M.B., Hajiaghaei-Keshteli, M. and Honarvar, M. (2022), "Designing a resilient and sustainable closed-loop supply chain network in copper industry", *Clean Technologies and Environmental Policy*, Vol. 24 No. 5, pp. 1553-1580.

Akgul, O., Shah, N. and Papageorgiou, L.G. (2012), "An optimisation framework for a hybrid first/second generation bioethanol supply chain", *Computers & Chemical Engineering*, Vol. 42, pp. 101-114.

Almansoori, A. and Shah, N. (2012), "Design and operation of a stochastic hydrogen supply chain network under demand uncertainty", *International Journal of Hydrogen Energy*, Vol. 37 No. 5, pp. 3965-3977.

Applequist, G., Pekny, J. and Reklaitis, G. (2000), "Risk and uncertainty in managing chemical manufacturing supply chains", *Computers & Chemical Engineering*, Vol. 24 Nos 9/10, pp. 2211-2222.

Azaron, A., Brown, K., Tarim, S.A. and Modarres, M. (2008), "A multi-objective stochastic programming approach for supply chain design considering risk", *International Journal of Production Economics*, Vol. 116 No. 1, pp. 129-138.

Becker, T., Bruns, B., Lier, S. and Werners, B. (2021), "Decentralized modular production to increase supply chain efficiency in chemical markets: an example of polymer production", *Journal of Business Economics*, Vol. 91 No. 6, pp. 867-895.

Clavijo-Buritica, N., Triana-Sanchez, L. and Escobar, J.W. (2023), "A hybrid modeling approach for resilient Agri-supply network design in emerging countries: Colombian coffee supply chain", *Socio-Economic Planning Sciences*, Vol. 85, p. 101431.

Contreras-Zarazua, G., Martin, M., Ponce-Ortega, J.M. and Segovia-Hernández, J.G. (2021), "Sustainable design of an optimal supply chain for furfural production from agricultural wastes", *Industrial & Engineering Chemistry Research*, Vol. 60 No. 40, pp. 14495-14510.

Doliente, S.S. and Samsatli, S. (2020), "Integrated production of fuels, energy and chemicals from Jatropha Curcas: multi-objective optimisation of sustainable value chains", *CET Journal-Chemical Engineering Transactions*, Vol. 80.

Doliente, S.S. and Samsatli, S. (2021), "Integrated production of food, energy, fuels and chemicals from rice crops: multi-objective optimisation for efficient and sustainable value chains", *Journal of Cleaner Production*, Vol. 285, p. 124900.

Emenike, S.N., Ioannou, A. and Falcone, G. (2022), "An integrated mixed integer linear programming model for resilient and sustainable natural gas supply chain", *Energy Sources, Part B: Economics, Planning, and Policy*, Vol. 17 No. 1, p. 2118901.

Eskandarpour, M., Dejax, P. and Péton, O. (2021), "Multi-directional local search for sustainable supply chain network design", *International Journal of Production Research*, Vol. 59 No. 2, pp. 412-428.

Guerra, O.J., Calderón, A.J., Papageorgiou, L.G., Siirola, J.J. and Reklaitis, G.V. (2016), "An optimization framework for the integration of water management and shale gas supply chain design", *Computers & Chemical Engineering*, Vol. 92, pp. 230-255.

Guillén-Gosálbez, G., Mele, F.D. and Grossmann, I.E. (2010), "A bi-criterion optimization approach for the design and planning of hydrogen supply chains for vehicle use", *AIChE Journal*, Vol. 56 No. 3, pp. 650-667.

Habib, M.S., Omair, M., Ramzan, M.B., Chaudhary, T.N., Farooq, M. and Sarkar, B. (2022), "A robust possibilistic flexible programming approach toward a resilient and cost-efficient biodiesel supply chain network", *Journal of Cleaner Production*, Vol. 366, p. 132752.

Hamidieh, A. and Arshadikhamseh, A. (2021), "The flexible possibilistic-robust mathematical programming approach for the resilient supply chain network: an operational plan", *Journal of Advanced Manufacturing Systems*, Vol. 20 No. 3, pp. 473-498.

Hugo, A. and Pistikopoulos, E.N. (2005), "Environmentally conscious long-range planning and design of supply chain networks", *Journal of Cleaner Production*, Vol. 13 No. 15, pp. 1471-1491.

Hugo, A., Rutter, P., Pistikopoulos, S., Amorelli, A. and Zoia, G. (2005), "Hydrogen infrastructure strategic planning using multi-objective optimization", *International Journal of Hydrogen Energy*, Vol. 30 No. 15, pp. 1523-1534.

Jiang, Y., Li, K., Chen, S., Fu, X., Feng, S. and Zhuang, Z. (2022), "A sustainable agricultural supply chain considering substituting organic manure for chemical fertilizer", *Sustainable Production and Consumption*, Vol. 29, pp. 432-446.

Khezeli, M., Najafi, E., Molana, M.H. and Seidi, M. (2023), "A sustainable and resilient supply chain (rs-scm) by using synchronisation and load-sharing approach: application in the oil and gas refinery", *International Journal of Systems Science: Operations & Logistics*, Vol. 10 No. 1, p. 2198055.

Kostin, A.M., Guillén-Gosálbez, G., Mele, F.D., Bagajewicz, M.J. and Jiménez, L. (2012), "Design and planning of infrastructures for bioethanol and sugar production under demand uncertainty", *Chemical Engineering Research and Design*, Vol. 90 No. 3, pp. 359-376.

Laínez, J.M., Guillén-Gosálbez, G., Badell, M., Espuña, A. and Puigjaner, L. (2007), "Enhancing corporate value in the optimal design of chemical supply chains", *Industrial & Engineering Chemistry Research*, Vol. 46 No. 23, pp. 7739-7757.

Laínez, J.M., Puigjaner, L. and Reklaitis, G.V. (2009), "Financial and financial engineering considerations in supply chain and product development pipeline management", *Computers & Chemical Engineering*, Vol. 33 No. 12, pp. 1999-2011.

Lin, M.-H., Tsai, J.-F., Wang, P.-C. and Ho, Y.-T. (2019), "A coordinated production planning model with capacity expansion for supply chain networks", *European Journal of Industrial Engineering*, Vol. 13 No. 4, pp. 435-460.

Lindahl, S.B., Babi, D.K., Gernaey, K.V. and Sin, G. (2023), "Integrated capacity and production planning in the pharmaceutical supply chain: framework and models", *Computers & Chemical Engineering*, Vol. 171, p. 108163.

Liu, S. and Papageorgiou, L.G. (2013), "Multiobjective optimisation of production, distribution and capacity planning of global supply chains in the process industry", *Omega*, Vol. 41 No. 2, pp. 369-382.

Longinidis, P. and Georgiadis, M.C. (2011), "Integration of financial statement analysis in the optimal design of supply chain networks under demand uncertainty", *International Journal of Production Economics*, Vol. 129 No. 2, pp. 262-276.

Marvin, W.A., Schmidt, L.D. and Daoutidis, P. (2013), "Biorefinery location and technology selection through supply chain optimization", *Industrial & Engineering Chemistry Research*, Vol. 52 No. 9, pp. 3192-3208.

Mozafari, M. and Zabihi, A. (2020), "Robust water supply chain network design under uncertainty in capacity", *Water Resources Management*, Vol. 34 No. 13, pp. 4093-4112.

Nayeri, S., Paydar, M.M., Asadi-Gangraj, E. and Emami, S. (2020), "Multi-objective fuzzy robust optimization approach to sustainable closed-loop supply chain network design", *Computers & Industrial Engineering*, Vol. 148, p. 106716.

Oh, H.-C. and Karimi, I. (2004), "Regulatory factors and capacity-expansion planning in global chemical supply chains", *Industrial & Engineering Chemistry Research*, Vol. 43 No. 13, pp. 3364-3380.

Oliveira, F., Gupta, V., Hamacher, S. and Grossmann, I.E. (2013), "A Lagrangean decomposition approach for oil supply chain investment planning under uncertainty with risk considerations", *Computers & Chemical Engineering*, Vol. 50, pp. 184-195.

Rabbani, M., Molana, S.M.H., Sajadi, S.M. and Davoodi, M.H. (2022), "Sustainable fertilizer supply chain network design using evolutionary-based resilient robust stochastic programming", *Computers & Industrial Engineering*, Vol. 174, p. 108770.

You, F. and Grossmann, I.E. (2010), "Integrated multi-echelon supply chain design with inventories under uncertainty: MINLP models, computational strategies", *AIChE Journal*, Vol. 56 No. 2, pp. 419-440.

Zeballos, L.J., Méndez, C.A., Barbosa-Povoa, A.P. and Novais, A.Q. (2014), "Multi-period design and planning of closed-loop supply chains with uncertain supply and demand", *Computers & Chemical Engineering*, Vol. 66, pp. 151-164.

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