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Guest Editorial: A purchasing and supply management view of supply resilience for better crisis response

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1. Introduction

The significance and popularity of the topic of resilience have grown explosively during the past two years (Wieland and Durach, 2021). When the COVID-19 pandemic hit the world in the spring of 2020, the need for resilience in companies and their supply chains reached unprecedented levels and became one of firms’ most critical abilities (Deloitte, 2021). The pandemic triggered sudden shortages of critical raw materials (e.g., microchips in car manufacturing), panic buying (e.g., toilet paper), and extremely high demand for personal protection equipment (Patrucco and Kähkönen, 2021), leading to supply chain disruptions, i.e., unplanned incidents that disrupt the material flow and expose companies and their supply chains to various types of risks (Craighead et al., 2007). Disruptions often originate from supply networks (Kim et al., 2015). Companies in Europe and the US faced disruptions though the original sources of problems were in Asia. China was among the first countries severely affected by the pandemic, affecting, for example, the workforce and causing shutdowns in manufacturing facilities (Shen and Sun, 2021). This led to shortages and disruptions for manufacturing firms worldwide. Pandemic outbreaks represent a particular type of disruption; they are rare and extremely dangerous because they spread quickly and cover various geographical areas, leaving supply chains under several sources of uncertainty (Craighead et al., 2020).

During 2021–2022, supply chains have been recovering, though still struggling. With resurging demand, industrial customers have started hoarding critical components, generating new material shortages, and slowing industries’ recovery (e.g., in the automotive sector; Car Magazine, 2022). Transportation and logistics (especially sea modes) are still constrained, worsening shortages and increasing costs. Nevertheless, since March 2022, transportation prices start to show a decreasing trend due to increased transportation capacity (Rogers et al., 2022). The global container freight rate index remains four times higher than the January 2020 levels (MacroMicro, 2022). In addition to the bottlenecks in materials and transportation, several companies are still dealing with severe labor shortages, which is now considered a long-term issue (CNBC, 2022).

However, only two years after the start of the COVID-19 pandemic, with the effects of the pandemic still being felt, the world faced new shocks when Russia invaded Ukraine in February 2022. Although the

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disruptions caused by this invasion differ from the pandemic effects, the war exacerbated the situation by amplifying previous challenges. In addition to the humanitarian and economic crisis, the Russian invasion has generated a global food crisis that may last for years. In May 2022, the United Nations warned that the conflict had led to the suspension of supplies from Ukraine’s ports (Reuters, 2022). As Ukraine is a leading grain and sunflower oil supplier to world markets, the reduced supply of these products has resulted in a price spike in several food commodities (BBC, 2022; Financial Times, 2022). In addition, energy prices are skyrocketing, slowing down the recovery of energy-intensive industries, such as process manufacturing and utilities.

In summary, the recent events have created new and significant long-term disruptions to supply chains. With the overwhelmingly high global supply chain pressure index (Fig. 1), these issues are likely to be amplified by future economic events (Federal Reserve bank of New York, 2022).

With the expected increase in the frequency and magnitude of disruptions, supply chain problems cannot be fixed with simple ad hoc measures and remedies. To recover (and survive) from such unforeseen events, companies need response abilities to reduce events’ impact and post-disruption recovery abilities (Chowdhury and Quaddus, 2016). The need to mitigate risks and manage vulnerabilities brings supply chain resilience (SCR) capabilities to the fore (Chowdhury and Quaddus, 2017). Ponomarov and Holcomb (2009) define SCR as “the adaptive capability of the supply chain to prepare for unexpected events, respond to disruptions, and recover from them by maintaining continuity of operations at the desired level of connectedness and control over structure and function” (p. 131).

When investing in SCR capabilities, focal companies have tended to concentrate on downstream operations to ensure they can absorb disruptions without compromising their ability to meet customer demand (Manuj and Mentzer, 2008). Experience over the last two years is changing this perspective. With firms’ inability to obtain critical materials, components, and services from suppliers and this preventing them from manufacturing and/or delivering final products and services to the final customers (Van Hoek, 2020), much more attention is being given to supply-side resilience (SR), i.e. upstream aspects of SCR. Pereira et al. (2020) define SR capabilities as “the ability to anticipate and adapt to sudden changes [in upstream disruptions] and consequently respond, recover and gain experience (through knowledge and learning) that might be stored to facilitate later disturbances more effectively” (p. 2).

Although research on SCR has flourished during the last 20 years, studies focusing on SR from a purchasing and supply management (PSM) perspective are limited (Pereira et al., 2020). The supply chain management literature has primarily addressed SR in the broader context of SCR and supply network characteristics. Moreover, little attention has been given to SR and its connection with the PSM organization, capabilities, and decisions. Thus, the current economic scenario calls for action for academics in the supply chain and purchasing management fields.

This Editorial aims to stimulate this discussion by answering the following question: “How should supply resilience be conceptualized in post-pandemic supply chains from a PSM perspective?” Accordingly, we analyzed the trends in the supply chain management literature by reviewing SCR papers specifically contributing to SR. This allowed us to design a conceptual framework of SR “before COVID-19.” Then, we considered and analyzed all the SR-focused papers published in the SCM literature following the COVID-19 pandemic (including those in the 2022 Journal of Purchasing and Supply Management Special Issue “Purchasing and supply management learning from the pandemic” that we managed as Guest Editors). By synthesizing the main theoretical and managerial advancements these papers offer for the conceptualization of SR, we provide a revised conceptual framework for SR “since COVID-19.” This framework provides the basis for identifying the areas of SR that have changed or have been added following the recent disruptive events. Thus, future theoretical and managerial opportunities for scholars and practitioners are highlighted.

2. Review and conceptualization of pre-COVID-19 supply-side resilience with a purchasing and supply management perspective

The topics of supply chain disruptions and SCR have a long history in operations and supply chain management literature (Kochan and Nowicki, 2018). To understand the current state of resilience literature in the context of PSM and create a systematic approach, we ran a literature search in the Scopus database during the period 2000–2019 for SCR (with keywords “resilien*” AND “purchas*” OR “procurem*” OR “supply manag*” OR “sourcing” OR “supply chain” OR “supply network”) and supply chain disruptions (with keywords “disrupt*” AND “purchas*” OR “procurem*” OR “supply manag*” OR “sourcing” OR “supply chain” OR “supply network”). To include journal articles irrespective of the journal, we did not limit the search to any journal title. We excluded conference papers to ensure the quality of the sample by confirming that all articles included were peer-reviewed. As shown in Fig. 2, articles published on these topics show a growing trend, with approximately 63 articles per year focused on SCR and 118 on supply chain disruption.

When including the years 2020 and 2021 (following the COVID-19 pandemic), the research outputs for these topics show a significant increase. In 2020, 418 journal articles were published with a focus on SCR resilience, while 644 articles were focused on supply chain disruption. The numbers increased in 2021 when 763 journal articles were published about SCR, whereas supply chain disruption had 1033 published articles. These numbers are expected to increase further in 2022. By October 2022, 723 journal articles had already been published about SCR and 957 on supply chain disruption.

An examination of these studies shows that the existing literature has

![Fig. 1. Global supply chain pressure index 2019–2022 (source: Federal reserve bank of New York).](image-url)
Main studies contributing to the conceptualization of supply resilience.

| Authors               | Year | Journal                                      | Specific focus on SR? | Specific focus on PSM? | Main contribution(s) to SR conceptualization                                                                 |
|-----------------------|------|----------------------------------------------|-----------------------|------------------------|------------------------------------------------------------------------------------------------------------|
| Zsidisin, G.A. and Ellram, L.M. | 2003 | Journal of Supply Chain Management          | Yes                   | No                     | SR depends on risk mitigation tactics adopted, which can be classified into (1) buffer-oriented strategies and (2) process-oriented strategies. |
| Christopher, M. and Peck, H.    | 2004 | The International Journal of Logistics Management | No                    | No                     | In the SCR framework, SR strategies to achieve increased resilience are grouped under “supply chain re-engineering” and distinguished into (1) sourcing decisions and criteria and (2) supplier development. |
| Manuj, I. and Mentzer J.T.      | 2008a| Journal of Business Logistics                | No                    | No                     | Three supply chain risk management strategies to increase SR are empirically validated: (1) control/share/transfer of risks, (2) supplier integration, and (3) security strategies. |
| Manuj, I. and Mentzer J.T.      | 2008b| International Journal of Physical Distribution & Logistics Management | No                    | No                     | A conceptual framework relating SCR and logistics capabilities is defined; supply management capabilities are theorized as drivers of increased SCR. |
| Ponomarov, S.Y. and Holcomb, M.C. | 2009 | The International Journal of Logistics Management | No                    | No                     | SR has enhancements (i.e., human capital, organizational and interorganizational capital, and physical capital resources) and reducers (i.e., flow activities, flow units, and sources of few units). |
| Blackhurst, J., Dunn, K.S., and Craighead, C.W. | 2011 | Journal of Business Logistics                | Yes                   | No                     | Visibility and collaboration are identified as the main SCR capabilities on the supply side; these capabilities can be increased through SCR management strategies, such as sharing risks and knowledge management with suppliers. |
| Jüttner, U. and Maklan, S.       | 2011 | Supply Chain Management: An International Journal | No                    | No                     | SR is presented as a dynamic capability; SR practices are classified into (1) reactive vs. proactive and (2) internal vs. external. |
| Pereira, C.R., Christopher, M., and Lago da Silva, A. | 2014 | Supply Chain Management: An International Journal | No                    | Yes                    | A framework for SCR principles is elaborated; SR principles are positioned in the “collaboration” area. |
| Hohenstein, N.O., Feisel, E., Hartmann, E., and Gianipero, L. | 2015 | International Journal of Physical Distribution & Logistics Management | No                    | No                     | SR capabilities are conceptualized across three sub-capabilities: absorb, respond, and capitalize. |
| Dabhikar, M., Birkie, S.E., and Kaulio, M. | 2016 | International Journal of Operations and Production Management | Yes                   | No                     | The adoption of buffer- and process-oriented risk mitigation tactics depends on PSM’s perception of supply disruption likelihood and risk propensity. |
| Kamalamhadi, M. and Parast, M.M | 2016 | International Journal of Production Economics | No                    | No                     | SR capabilities are enhanced by supplier risk management behaviors. |
| Yao, Y. and Fabbe-Costes, N.     | 2018 | Supply Chain Forum: An International Journal | Yes                   | No                     | Purchasing organizations play a key role in the implementation of proactive and reactive SR practices. |
| Vanpoucke, E. and Ellis, S.C.    | 2020 | International Journal of Operations and Production Management | Yes                   | Yes                    | |
| Fan, Y., Stevenson, M., and Li, F. | 2020 | International Journal of Production Economics | Yes                   | Yes                    | |

Fig. 2. Number of articles per year for SCR and supply chain disruption.
SR. Table 1 summarizes the characteristics of these papers. In addition to summarizing the main contribution to the conceptualization of SR, we also tracked whether the paper was only focused on SR and/or used the PSM perspective. Table 1 shows that most of the papers that contribute to the conceptualization of SR do so in the context of SCR. Moreover, only a few of them consider the PSM perspective.

Based on the studies presented in Table 1, we can design the conceptual framework for SR as presented in Fig. 3.

Supply chains are exposed to different sources of risks that can be distinguished as supply, operational, demand, security, macro, policy, competitive, and resource risks (Christopher and Peck, 2004; Manuj and Mentzer, 2008a; 2008b; Rice et al., 2003). To cope with these risks and minimize their impact, supply chains need to develop appropriate dynamic capabilities; accordingly, SCR is viewed as the dynamic capability that allows supply chains to recover from disruptions (Ponomarov and Holcomb, 2009; Jüttner and Maklan, 2011; Dabhilkar et al., 2016; Pereira et al., 2020). SCR requires supply chains to deploy appropriate strategies and resources to mitigate the effect of disruptions; such resources and strategies should be defined for all supply chain operations (Manuj and Mentzer, 2008a; 2008b). Several sources of risks originate from supply networks (Kim et al., 2015). SR is a sub-component of SCR that concentrates supply chain capabilities to promptly react to unexpected supply disruptions and restore normal supply network operations (Rice et al., 2003). To obtain SR, organizations must deploy specific resources and strategies to cope with supply risks (Pereira et al., 2014, 2020). According to Yao and Fabbe-Costes (2018), SR can be described through three sub-capabilities:

- Absorbing capability: absorbing a supply disruption and minimizing its impact on the supply network operations
- Responding capability: implementing response measures at the supply network level to recover quickly when a supply disruption cannot be absorbed and operations are disrupted
- Capitalizing capability: learning and gaining knowledge from supply disruptions to prevent future negative consequences

From a PSM perspective, SR, as well as its sub-capabilities, can be enhanced by strengthening supplier relationships through different forms of collaboration (Jüttner and Maklan, 2011; Hohenstein et al., 2015; Kamalahmadi and Paras, 2016; Fan et al., 2020). Buyer–supplier collaborations are the basis of enhanced SR, and their strength increases with trust, visibility, and information sharing (Kamalahmadi and Paras, 2016). To strengthen supplier relationships, companies can implement different supply chain risk management practices that the previous literature has distinguished into 1) reactive, i.e., practices that aim to anticipate supply disruptions and design contingency plans, and 2) proactive, i.e., practices that allow the company to react quickly to supply disruptions (Hohenstein et al., 2015; Dabhilkar et al., 2016). Regardless of how solid and detailed they can be, risk management practices become a powerful tool to mitigate disruptions only if effectively implemented by a solid organization. Thus, the literature has argued for the role of PSM departments as enablers for successfully implementing reactive and proactive practices to increase SR (Pereira et al., 2014, 2020 Vampoucke and Ellis, 2019). The previous literature also allows us to examine these practices and how they potentially impact absorbing, responding, and capitalizing capabilities (Table 2).

Reactive practices include all actions companies implement with suppliers following a disruptive event. These practices can include different forms of operational collaboration with suppliers (e.g., enhanced process integration, capacity allocation, and resource sharing; Christopher and Peck, 2004; Hohenstein et al., 2015; Pereira et al., 2020), ad hoc initiatives to increase information sharing and supply chain visibility (Dabhilkar et al., 2016; Kamalahmadi and Paras, 2016), and flexibility in the process and product structure to ensure continuity in product/service delivery (Pereira et al., 2020). As these practices are implemented after a disruption occurs, they do not contribute to SR absorbing capabilities but increase SR responding capabilities. Furthermore, they represent an opportunity to learn from the response to the disruption to plan for the future accordingly. Thus, they also positively impact SR capitalizing capabilities.

In contrast, proactive practices are more nuanced. They include all external initiatives with suppliers, such as the creation of risk–benefit sharing mechanisms (Manuj and Mentzer, 2008a), the establishment of routine information sharing (Dabhilkar et al., 2016; Kamalahmadi and Paras, 2016; Pereira et al., 2020), and strategic collaboration and integration (Manuj and Mentzer, 2008b; Hohenstein et al., 2015; Pereira et al., 2020) with critical suppliers in the supply network. When critical

Fig. 3. Characteristics of SR based on “before COVID-19” supply chain management studies (authors’ elaboration).
Nevertheless, has the COVID-19 pandemic led to the adoption of multiple or dual sourcing strategies to avoid supply interruption (e.g., use of alternative materials and components) and process flexibility. Suppliers are less mature from a risk management perspective, compared to the SR literature before COVID-19 (relating to the framework presented in Fig. 3). These aspects include factors that positively and negatively impact SR (Lorentz et al., 2021; Sturm et al., 2021; Taghizadeh et al., 2022; Giannoccaro and Iftikhar, 2022; Verghese et al., 2022), innovative supply risk management practices (Choksy et al., 2022; Meyer et al., 2022; Raj et al., 2022), and the role of PSM organizations (Kaur and Singh, 2022). However, two themes were particularly emphasized by the papers presented in the SR literature since COVID-19:

- The idea of SR as a dynamic capability that continuously evolves according to the characteristics and complexity of the supply network (Ivanov and Dolgui, 2020; Azadegan and Dooley, 2021; Feizabadi et al., 2021; Wiedmer et al., 2021; Choksy et al., 2022; Wissuwa et al., 2022)
- The idea that SR is a capability that can be built by selecting the most suitable suppliers and including “supplier resilience” criteria in supplier selection models (Mohammed et al., 2021; Taghizadeh et al., 2021; Shishodia et al., 2022; Wissuwa et al., 2022)

Given the relevance of the supply network issues that companies and public organizations have faced since the start of the pandemic, such a relatively low number of articles addressing SR is unexpected. Research on SCR has increased dramatically during the past two years, with 1904 articles published during 2020–2022 (compared with 1263 articles published during 2000–2019). And yet, only 15 of these 1904 articles specifically focus on the issue of SR and/or resilience in the context of PSM. It is noteworthy that although we scrutinized the SCR literature since COVID-19, we want to emphasize that this does not mean that SCM scholars have neglected SR in their research. Among these 1904 papers, only a few discuss resilience capabilities in organizations and supply chain networks in general, without referring to specific sub-dimensions of such capabilities and SR (recent examples include, but are not limited to, Dittfeld et al., 2022; Fayez and Ghaderi, 2021; Gebhardt et al., 2022; Modgil et al., 2021; Munir et al., 2022; van den Adel et al., 2021). In

### Table 2
SR practices and their impact on SR capabilities based on “before COVID-19” supply chain management studies (authors’ elaboration).

| SR capabilities (Vao and Fabbe Costes, 2018) | Absorbing capabilities | Responding capabilities | Capitalizing capabilities |
|---------------------------------------------|------------------------|------------------------|--------------------------|
| **Reactive practices**                      |                        |                        |                          |
| Implement ad hoc collaborations and coordination with suppliers in response to a disruption. | X                      | X                      |                          |
| Share information and disseminate knowledge with key suppliers on an ad hoc basis. | X                      | X                      |                          |
| Temporarily increase product (e.g., use of alternative materials and components) and process flexibility. | X                      | X                      |                          |
| **Proactive practices**                     |                        |                        |                          |
| Use risk-sharing mechanisms with suppliers. | X                      | X                      | X                        |
| Routinely implement information-sharing practices with suppliers. | X                      | X                      | X                        |
| Design and implement supplier collaboration and integration practices. | X                      | X                      | X                        |
| Introduce buffer and redundancy in the inventory of critical supply items. | X                      | X                      | X                        |
| Use dual or multiple sourcing strategies. | X                      | X                      | X                        |
| Scout supply market continuously. | (X)                    | X                      | (X)                      |
| Conduct supplier auditing and monitoring. | (X)                    | X                      | (X)                      |
| Design supplier selection systems based on risk analysis criteria. | (X)                    | (X)                    | (X)                      |
| Design products with an architecture flexible to alternative components. | (X)                    | (X)                    | (X)                      |

X = primary contribution; (X) = secondary contribution.

In conclusion, the SR literature is rich regarding SCR and the characterization of the SR system, capabilities, and practices. Nevertheless, has the COVID-19 pandemic led to “new” insights into SR and, if so, has the SR literature captured learning?

### 3. Building purchasing and supply management resilience since COVID-19: contributions in the Special Issue “Purchasing and supply management learning from the pandemic”

#### 3.1. Purchasing and supply-side resilience research since COVID-19: a review of the 2020–2022 literature

The general literature search on SCR and disruptions in SCM and PSM presented in section 2 shows that the number of articles on these topics increased significantly since the COVID-19 pandemic. We restricted our search sample to 2020–2022 as we aim to focus on SR following COVID-19 and on what PSM can learn from this. An initial search in Scopus using the keywords “resili*” AND “purchasing” OR “procurem*” OR “supply manag*” OR “sourcing” resulted in 359 journal articles published in English. Compared with the previous search, we dropped the keyword “supply chain” to limit the resulting articles to purchasing, procurement, supply management, and sourcing, thereby excluding articles with a broader supply chain view, or a logistics orientation. A first round of reviewing and filtering was conducted by one of the authors using the agreed inclusion/exclusion criteria. The articles in the sample were selected because (1) they were required to include truly the viewpoint of purchasing, procurement, supply management, or sourcing and (2) explore SR. The selection was based on not only the abstract but also on a careful evaluation of the entire paper. All articles that did not explicitly focus on resilience from the perspective of PSM (or include it in their main results) were removed. Articles published in 2020 were further scrutinized to ensure that they were submitted after the onset of the COVID-19 pandemic. As a result, we obtained 16 articles, of which four are COVID-19-specific, and 12 were published after the onset of the COVID-19 pandemic. As a result, we obtained 16 articles, of which four are COVID-19-specific, and 12 were general. Nevertheless, most of the 12 articles frame the relevance of their research problem in terms of the supply chain environment following COVID-19 events. Appendix A presents the list of these articles and their contribution to the SR concept.

Some of these papers focus on traditional SR aspects addressed in the SCM literature before COVID-19 (relating to the framework presented in Fig. 3). These aspects include factors that positively and negatively impact SR (Lorentz et al., 2021; Sturm et al., 2021; Taghizadeh et al., 2022; Giannoccaro and Iftikhar, 2022; Verghese et al., 2022), innovative supply risk management practices (Choksy et al., 2022; Meyer et al., 2022; Raj et al., 2022), and the role of PSM organizations (Kaur and Singh, 2022). However, two themes were particularly emphasized by the SR literature since COVID-19:

- The idea of SR as a dynamic capability that continuously evolves according to the characteristics and complexity of the supply network (Ivanov and Dolgui, 2020; Azadegan and Dooley, 2021; Feizabadi et al., 2021; Wiedmer et al., 2021; Choksy et al., 2022; Wissuwa et al., 2022)
- The idea that SR is a capability that can be built by selecting the most suitable suppliers and including “supplier resilience” criteria in supplier selection models (Mohammed et al., 2021; Taghizadeh et al., 2021; Shishodia et al., 2022; Wissuwa et al., 2022)
contrast, several other papers mention SR as part of SCR. In certain articles, SR is presented at a general level and/or treated as one of the SCR levels (e.g., Cohen et al., 2022; Phillips et al., 2022; Sawyerr and Harrison, 2022; Shishodia et al., 2021). In other cases, SR is considered (implicitly or explicitly) as one of the features of the supply network to explain other capabilities (e.g., Acar et al., 2022; Narassima et al., 2022; Spieske et al., 2022a; Queiroz et al., 2022). Whilst these papers explicitly recognize SR as part of SCR, they do not provide unique contributions on how SR evolves, specifically to increase SCR. On the contrary, the 15 papers we isolated either set SR as a central variable of their study, providing a substantial contribution to its reconceptualization in their results, or analyze SR relative to risk management strategies and practices from a PSM perspective. In this context, the contribution of the JPSM Special Issue that we introduce with this Editorial is noteworthy as it provides four additional empirical articles specifically focused on SR.

3.2. Contributions of the articles included in the journal of purchasing and supply management Special Issue “PSM learning from the pandemic”

In August 2020, JPSM launched a Special Issue on “PSM learning from the pandemic: transforming for better crisis management” to attract and encourage PSM researchers to focus their research on the exceptionally challenging business environment and its requirements. The call included two types of contributions, namely, “Notes and Debates” (N&D) and “Full-Length Papers” (FLP), to enable researchers to publish short contributions in a timely manner (N&D) and build contributions on large-scale empirical research (FLP). The N&D Special Issue was published in the fall of 2021. It included six papers (Finkenstadt and Handfield, 2021; Glas et al., 2021; Melnyk et al., 2021; Moretto and Caniato, 2021; Nikookar et al., 2021; Van Hoek, 2021) and was introduced by the Editorial “Agility, adaptability, and alignment: new perspectives from the pandemic: transforming for better crisis management.”

We originally received 19 contribution proposals for the second call for papers, from which four full papers were accepted for publication and included in the Special Issue. These papers cover different perspectives on how SR and supply networks in different industries were affected during the COVID-19 pandemic and how companies built SR to recover from the crisis. Table 3 provides an overview of the Special Issue articles and their main contributions to the themes mentioned in section 3.1.

Dube et al. (2022), in their paper “One crisis, different paths to supply resilience: The case of ventilator procurement for the COVID-19 pandemic,” study the mechanisms underpinning different pathways to SR in varying conditions. Using a case study approach, they explored how three governments (the U.K., Germany, and Switzerland), each with different initial conditions during the first wave of COVID-19, successfully secured supply for ventilators despite an unprecedented surge in global demand and disrupted supply. They find that local sourcing was crucial for governments during the COVID-19 crisis. However, suitable strategies are highly dependent on buying organizations’ initial conditions. Their study results revealed five key SR capabilities that are important during crises: flexibility, redundancy, agility, collaboration, and visibility. During such extreme crises, SR depends on buyer and suppliers’ responses, and collaboration and rapid innovations are needed to survive. Their findings promote the role of PSM from a government perspective and thus highlight the importance of PSM.

Küffner et al. (2022), in their article “Getting back into the swing of things: the adaptive path of purchasing and supply management in enhancing supply chain resilience,” study the response measures applied by PSM to enhance SCR. Using expert interview data from original equipment manufacturers and first-tier suppliers in the German automotive industry, they identify three waves of measures: initial measures when the disruption first occurs, temporary measures during the disruption, and post-disruption measures. They show the main supply risk management measures during crises, classify them according to buffering vs. bridging, and further illustrate the adaptive path of PSM in enhancing SCR in the context of the three waves of initial, temporary, and post-disruption measures. They find that the measures are interrelated and that initial and temporary measures indicate the expected result of post-disruption measures. Overall, the authors highlight the importance of PSM in coping with disruptions during the COVID-19 pandemic by identifying critical measures that PSM can apply to enhance SCR.

Silva and Ruel (2022), in their paper “Inclusive purchasing and supply chain resilience capabilities: Lessons for social sustainability,” investigate resilience capabilities and social sustainability connections through a multinational company’s inclusive purchasing program during COVID-19. They focus on whether the pre-existence of social sustainability within the purchasing organization could enhance SCR capabilities to deal with an unprecedented crisis, such as COVID-19. They analyze the purchasing organization through the lens of inclusiveness and conclude that inclusive purchasing can emerge as a mechanism to connect SCR capabilities and sustainability. They find that capabilities such as collaboration, financial strength, adaptability, and visibility were significant for coping with the challenges created by COVID-19. In addition to these capabilities (partially included in previous SCR frameworks), they also introduce a new one, namely, empowerment. In this context, sustainability is presented as a way to strengthen resilience. From a PSM perspective, when preparing for a crisis, inclusive purchasing programs directly contribute to the organization’s SCR.

Spieske et al. (2022b), in their paper “Improving resilience of the healthcare supply chain in a pandemic: Evidence from Europe during the COVID-19 crisis,” study resource dependencies in the healthcare sector during the pandemic and further procurement-related strategies in improving medical supply availability. Using empirical case study data with a multi-tier setting spanning nine European medical supplies manufacturers and hospital groups, they identify the main supply risk management measures during crises and classify them according to buffering vs. bridging. With buffering strategies, organizations aim to

Table 3
Characteristics of the Special Issue articles and their key contributions to SR.

| Authors                  | Methodology and industry focus       | Theoretical perspective                          | SR and supply network complexity | Risk management practices | Role of PSM | SR and supplier selection | Factors impacting SR |
|--------------------------|--------------------------------------|-------------------------------------------------|----------------------------------|---------------------------|-------------|--------------------------|---------------------|
| Dube, Li, Selviaridis, and Jahre | Case study with secondary data; healthcare | Equifinality perspective                        | X                               | X                         | X           | X                        |                     |
| Küffner, Münch, Hähner, and Hartmann | 40 expert interviews in 18 companies; automotive industry | Resource dependence theory, adaptive cycle theory |                                 | X | X                      |               |                       |                     |
| Silva and Ruel           | Case study with 10 interviews; cosmetics industry | Dynamic capabilities view                       |                                 | X | X                      | X            |                       |                     |
| Spieske, Gebhardt, Kopyto, and Birkel | Multiple case studies with 39 interviews; healthcare | Resource dependence theory                  | X                               |                           | X           |                         |                     |
reduce risk exposure and mitigate potential disturbances, for example by using safety stocks and multiple sourcing. In contrast, with bridging strategies, the aim is to reduce uncertainty through boundary-spanning activities, such as collaboration and information sharing. They found that complementing bridging with buffering can lead to superior risk mitigation. Overall, their study promotes the role of PSM in a non-industrial setting, in this case the healthcare supply chain network.

4. Supply resilience for PSM during crises: a revised conceptualization

Together with the literature published since COVID-19 presented in Section 3.2, these four new articles provided the basis for re-conceptualizing SR for PSM during crises. Fig. 4 illustrates this new conceptual model (adapted from Fig. 3).

Among the studies published since COVID-19, Feizabadi et al. (2021), Taghizadeh et al. (2021), Dube et al. (2022), and Silva and Ruel (2022) help identify the key SR capabilities that supply chains should prioritize to face crises and global disruptions appropriately:

- Absorbing capabilities include redundancy, i.e., the ability to establish and maintain dedicated resources (e.g., capacity, inventory, backup suppliers) to be used whenever a disruption occurs.
- Responding capabilities include flexibility (i.e., the ability to quickly redeploy resources in response to a disruption), adaptability (i.e., the ability to modify and restructure the characteristics of the supply network in response to a disruption), and agility (i.e., the ability to quickly adjust purchasing and supplier relationship management in response to a disruption).
- Capitalizing capabilities include collaboration (i.e., the ability of buyers and suppliers to work together to solve problems, minimize impact, and gain mutual benefits following a disruption) and visibility (i.e., the ability of buyers and suppliers to share and access relevant information following a disruption, to, e.g., capitalize from previous experience, better understand issues, and favor the creation of knowledge to find a solution).

Although the pre-COVID-19 literature highlighted the sub-capabilities within each area, SR research since COVID-19 now makes it possible to combine them with the capabilities outlined by Yao and Fabbe-Costes (2018). Thus, companies that aim to build a supply network capable of absorbing the consequences of disruptions with limited negative impact and without changing their current state should invest in creating buffer resources. Companies that aim to build a supply network capable of responding to disruptions by quickly reconfiguring themselves and limiting the duration of the negative impact should invest in creating flexibility, agility, and adaptability. Companies that aim to build a supply network capable of capitalizing on the negative consequences of disruptions by learning and improving should invest in creating collaboration opportunities and improving visibility within the supply network. To be resilient on the supply-side, companies can either decide to excel in a specific capability area or diversify their investments in more than one area.

From an operational perspective, these SR capabilities are built through the risk management practices implemented by suppliers and buyers. Studies published since COVID-19 (i.e., Sturm et al., 2021; Choksy et al., 2022; Dube et al., 2022; Küffner et al., 2022; Meyer et al., 2022; Raj et al., 2022; Spieske et al., 2022b) suggest that SR practices can be classified through the lens of resource dependency theory to face a crisis, rather than compare proactive vs. reactive practices. Such a classification is made according to (1) whether the practices strengthen existing supply chain relationships (i.e., bridging) or establish new relationships (i.e., buffering) and (2) whether they are short-term (i.e., temporary) or long-term (i.e., permanent) orientated. Fig. 5 provides examples of practices in each group.

The possibility of deploying these practices (and developing high and robust SR capabilities to face crises) depends on two factors. First, we have the characteristics of the supply network (Wiedmer et al., 2021; Choksy et al., 2022; Giannoccaro and Itikhar, 2022; Dube et al., 2022; Spieske et al., 2022b). Notably, the more complex the supply network (Azadegan and Dooley, 2021; Taghizadeh et al., 2021; Wiedmer et al., 2021), the more intertwined the relationships between suppliers (Ivanov and Dolgui, 2020; Feizabadi et al., 2021) and the more difficult the access to previous SR capabilities. Governing supply network complexity to impact positively SR capabilities for crisis management should be a priority for buying companies (Wiedmer et al., 2021). Organizations need to pay attention to two aspects:

- To cultivate trustful relationships with strategic suppliers, as trust eases complexity and favors collaboration (Giannoccaro and Itikhar, 2022)
- To ensure alignment with risk management strategies planned and implemented by strategic suppliers, for example by assessing supplier risk management strategies during supplier selection and evaluation (Mohammed et al., 2021; Shishodia et al., 2022; Silva and Ruel, 2022)

Second, compared with previous studies, the literature since COVID-19 has emphasized the importance of PSM organizations (in private and public sectors) as the leader of such practices (Dube et al., 2022; Silva and Ruel, 2022; Küffner et al., 2022). Accordingly, specific models and best practices are suggested to ensure their successful implementation (Kaur and Singh, 2022). Other buyer organization characteristics, such as leadership, financial position, empowerment level, and attention to supply risks, can also directly impact SR capabilities during crises (Lorentz et al., 2021; Silva and Ruel, 2022; Verghese et al., 2022).

![Fig. 4. Characteristics of SR during crises based on supply chain management studies since COVID-19 (authors’ elaboration).](image-url)
5. Concluding remarks: what’s next for supply chain resilience from a PSM perspective?

The review of the SR literature published since COVID-19 and the four empirical contributions in this Special Issue helped us formalize the characteristics of SR and the classification of SR practices during crises (Figs. 4 and 5). This contributes to the idea that SR includes capabilities that should be distinguished from the general concept of SCR, though such capabilities are part of SCR. To ensure SR during crises, organizations individually and jointly across supply chains should invest in building absorbing, responding, and/or capitalizing capabilities that may and should become specific features of the supply network. As such, the dynamic business environment shows that SR must not be overlooked in SCR discussions. SR should become a research area within PSM that specifically deals with providing theoretical and empirical evidence on how supply chains can increase supply network resilience capabilities.

Thus, in this Editorial, we advocate a strong PSM perspective in studying SR. Despite the intense research output over the last two years, several research avenues through which PSM scholars and practitioners can focus on in studying SR capabilities in supply chains remain underexplored. Although the idea of SR as a dynamic capability has continuously evolved in recent studies, further empirical research on the topic is needed because the business environment requires dynamism, and supply networks are increasingly subjected to sudden shocks. Exploring SR as a dynamic capability enables studying it from the viewpoint of capacities of sensing (i.e., scanning, detecting, identifying, interpreting new opportunities), seizing (i.e., capturing the sensed opportunities or neutralizing the threats), and reconfiguring/transforming (i.e., alignment or realignment of assets to renew and ensure that resources are in line with the changes and opportunities sensed) (Teece, 2007, 2012). For example, studying SR using this traditional dynamic capability view would allow a comparison with the categorization of SR sub-capabilities of absorbing, responding, and capitalizing (see Yao and Fabbe-Costes, 2018) traditionally used by the SCM literature.

Furthermore, studies published since COVID-19 suggest that companies should always think “one step ahead” regarding SR capabilities embedded in supply networks (e.g., Dube et al., 2022). Although organizations significantly invest in building “current” SR capabilities to respond and cope with disruptions, this process should not be one-off and limited to one point in time. Understanding the mechanisms companies can establish to initiate a virtuous cycle of “continuous improvement” of SR is another issue that SCM and PSM research should focus on.

Lastly, although the recent literature has emphasized the strategic role of PSM organizations in building SR capabilities to improve crisis management and planning, and the implementation of supply risk management practices during crises, much more evidence is needed. Topics such as the competencies, capacity, and responsibilities of PSM organizations to build SR capabilities and act to deploy these capabilities during crises are overlooked in the current literature (particularly in the public sector). These topics represent promising avenues for building future research.

Declaration of competing interest

There are no conflicts of interest to declare.

Data availability

No data was used for the research described in the article.

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APPENDIX. SCM literature since COVID-19 contributing to supply resilience

| Authors | Year | Journal | Specific focus on SR? | Specific focus PSM? | COVID-specific? | Main contribution(s) to SR conceptualization |
|---------|------|---------|-----------------------|--------------------|-----------------|---------------------------------------------|
| Wissuwa F., Durach C.F., and Choi T.Y. | 2022 | International Journal of Production Economics | Yes | No | No | Supplier and SR depend on supplier complexity level and collaborations with other suppliers. |
| Chokey U.S., Ayaz M., Al-Tabbba O., and Parast M. | 2022 | Journal of Business Research | Yes | No | Yes | Suppliers can be classified into three categories: socio-sustainable, adaptive, and oblivious. Different categories of suppliers implement different risk management strategies, thus affecting SR. |
| Vergheese A.J., Koufteros X., Polysviou M., and Jia X. | 2022 | Transportation Research Part E: Logistics and Transportation Review | Yes | No | No | SR is impacted by the level of the supplier’s trust in the buyer. |
| Raj A., Mukherjee A.A., de Sousa Jabbour A.B.L., and Srivatsa S.K. | 2022 | Journal of Business Research | No | Yes | Yes | The main supply-side disruptions during COVID-19 can be distinguished into inconsistency in supply, scarcity of materials, suboptimal substitute adoption, scarcity of labor, and suboptimal manufacturing. Short- and long-term strategies can be designed and implemented to increase SR capabilities. |
| Meyer M.M., Glas A.H., and Ejig M. | 2022 | International Journal of Integrated Supply Management | Yes | No | No | Additive manufacturing represents an effective strategy to decrease supply disruptions and increase SR. |
| Giannoccaro I. and Iftikhar A. | 2022 | International Journal of Production Research | Yes | No | Yes | The level of trust in supply networks influences supply network resilience; this impact is different according to the network typology. |
| Shishodia A., Verma P., and Jain K. | 2022 | Production Planning and Control | Yes | No | No | To increase SR, buyers should evaluate supplier resilience during the selection stage. |
| Kaur H. and Singh S.P. | 2022 | Production Planning and Control | Yes | Yes | Yes | PSM is key to ensuring SR. Resilient supplier selection represents a proactive strategy to increase SR. |
| Feizabadi J., Gligor D.M., and Choi T.Y. | 2021 | International Journal of Production Research | Yes | No | No | By developing “jury-rigged” adaptive behavior in supply networks, companies can increase SR and viability. Such behavior can be developed by training flexible suppliers who can assimilate architectural knowledge of multiple modules related to the products realized by the buyers. |
| Lorentz, H., Laari, S., Meehan, J., Ejig, M., and Henke, M. | 2021 | International Journal of Operations and Production Management | Yes | No | Yes | SR is positively impacted by two attentional perspectives: the focus on supply risk sources and the focus on supply network recoverability. |
| Taghzadeh E., Venkatachalap S., and Chinnam R.B. | 2021 | International Journal of Production Economics | Yes | No | No | To increase SR, companies must improve their capabilities to assess the resilience of their “deep-tier” supply network. These capabilities depend on the companies’ visibility in supply network activities. |
| Wiedmer R., Rogers Z.S., Polyviou M., Mena C., and Chae S. | 2021 | Journal of Business Logistics | Yes | No | No | Supply network complexity (i.e., supply, logistics, and contract complexity) affects the buyer’s ability to recover from disruptive events. |
| Sturm S., Hohenstein N.-O., Birkel H., Kaiser G., and Hartmann E. | 2021 | Supply Chain Management | Yes | No | No | Supply chain robustness (i.e., the ability of a company to handle unexpected supply-side disruptions to maintain the original state of its supply chain) positively impacts SR. |
| Azadegan A. and Dooley K. | 2021 | Journal of Supply Chain Management | Yes | No | Yes | Supply network resilience can be distinguished into three types: micro (closed), meso (mixed), and macro (open). The selection of suppliers based on their resilience capabilities is not in trade-off with environmental selection criteria. |
| Mohammed A., Harris I., Soroka A., Naim M., Ramjaun T., and Yazdani M. | 2021 | Annals of Operations Research | Yes | No | No | SR should consider the viability of intertwined supply networks. |
| Ivanov D. and Dolgui A. | 2020 | International Journal of Production Research | Yes | No | Yes | Supply chain crisis resilience: conceptualization and scale development using dynamic capability theory. Int. J. Prod. Econ. 188, 185–204. |

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