

The role of collaborative interorganizational relationships in supply chain risks: a systematic review using a social capital perspective

Anis Daghar, Leila Alinaghian and Neil Turner

Cranfield School of Management, Cranfield University, Bedford, UK

Abstract

Purpose – The purpose of this paper is to systematically review, synthesize and critically evaluate the current research status on the role of collaborative interorganizational relationships (CIRs) in supply chain risks (SCRs) from a social capital perspective and provide an organizing lens for future scholarship in this area.

Design/methodology/approach – This study adopts a systematic literature review approach to investigate 126 articles from 27 peer-reviewed journals between 1995 and 2020.

Findings – This paper investigates supply chain CIRs using a social capital perspective to explain the role of structural, relational and cognitive capital that resides in these relationships in various SCRs (i.e. environmental, supply, manufacturing, demand, information, financial and transportation). The review reveals that the three social capital dimensions uniquely and both positively and negatively affect different SCRs. The findings further suggest that the perceived SCRs can influence the structural and relational capital.

Practical implications – This study calls for practitioners to consider the cognitive alignment with their supply network partners, their relational investments, as well as the interorganizational processes and systems in managing and alleviating SCRs.

Originality/value – This review offers a theoretical articulation of how various aspects of CIRs affect SCRs. Specifically, this study extends the existing understanding of the role of social capital in SCRs through offering a synthesis of dominant findings and discourses, and avenues for future research.

Keywords Social capital, Supply chain risk, Interorganizational relationships, Collaboration, Systematic review

Paper type Literature review

1. Introduction

Supply chain risks (SCRs) stem from events causing supply chain irregularities such as interruptions of material or informational flow. These multifold events include devastating environmental and humanitarian catastrophes (Ho *et al.*, 2015) such as the 2004 Indian Ocean tsunami, 2010 Port-au-Prince earthquake, 2017 hurricane Maria and 2019 COVID-19 pandemic, which can result in diminished business performance impacting stock returns, income, costs and share price volatility (Hendricks and Singhal, 2005). Given the increasing number of actors involved in the design, production and delivery of products and services, SCRs go beyond the boundaries of one single firm. Thus, firms increasingly engage and invest in developing and maintaining collaborative interorganizational relationships (CIRs) with upstream and downstream actors to measure and manage their SCRs (Braunscheidel and Suresh, 2009). In particular, extant studies have examined the role of CIRs, such as supplier development (Dahlmann and Roehrich, 2019), joint problem-solving (Scholten and Schilder, 2015), joint planning

(Jain *et al.*, 2017), information sharing (Subramanian *et al.*, 2015), reciprocity (Jüttner and Maklan, 2011) and trust (Laequuddin *et al.*, 2009).

While there is a wealth of studies examining the role of CIRs in SCRs, the literature still suffers from shortcomings. First, comprehensive account acknowledging the multidimensionality of CIRs when investigating SCRs is still lacking. Indeed, CIRs remain fragmented and unconsolidated throughout the literature. Additionally, existing studies have used meta-concepts (e.g. collaboration, integration and bridging), blending different dimensions of CIRs in and preventing the distinction between unique aspects of CIRs. Second, the role of CIRs in SCRs remains divergent and unconnected as CIRs can influence positively and negatively different SCRs. For example, information sharing can decrease supply risks (Lavastre *et al.*, 2012) but also increase informational leakages to rivals (Zhang *et al.*, 2011). SCRs can also influence CIRs. For instance, a buyer's perception of supply risks can negatively influence the level of information shared with a supplier (Dekker *et al.*, 2013).

In a literature where significant findings are still scattered, a theoretical articulation of how various aspects of CIRs affect different SCRs is still absent. Indeed, over the past two decades, several literature reviews have examined the

The current issue and full text archive of this journal is available on Emerald Insight at: <https://www.emerald.com/insight/1359-8546.htm>



Supply Chain Management: An International Journal
26/2 (2021) 279–296
© Emerald Publishing Limited [ISSN 1359-8546]
[DOI 10.1108/SCM-04-2020-0177]

Received 28 April 2020
Revised 12 August 2020
25 October 2020
Accepted 28 October 2020

concept of SCRs. However, SCR research being relatively nascent, most literature reviews to date have only explored conceptual definitions, typologies or frameworks of SCRs (Tang, 2006), SCR management (SCRM) (Colicchia and Strozzi, 2012) and supply chain resilience (Ali *et al.*, 2017a). Early stages of research require definitional and conceptual development, but SCR research has lately matured from within, enabling a shift from conceptual framing of SCR's nature to a more in-depth understanding of risk mitigation levers such as CIRs.

Adopted by strategic management to understand social relationships between groups (Nahapiet and Ghoshal, 1998), the concept of social capital challenges the Porterian thesis explaining supplier-buyer behaviors with profit maximization objectives. Contributing to operations management, where the focus has been more on optimization than social interaction, this work has recently spelled out effectively how supply chain communities behave (Matthews and Marzec, 2012), and provides a pertinent framework to explain supplier-buyer relationships.

As such, this work:

- Adopts a social capital lens grounded in the work of Nahapiet and Ghoshal (1998) to explain the role of CIRs in SCRs in supplier-buyer dyads and when these are deep-seated in supply networks.
- In synthesizing the consolidated findings, Provides a research agenda. this paper follows the evidence-based systematic literature review technique, In synthesizing the consolidated findings, this paper follows the evidence-based systematic literature review (SLR) technique (Briner and Denyer, 2012), to answer the following review question: using a social capital perspective, how can we understand the effect of CIRs on SCRs?

The key contributions of this review are theoretical and practical. Although promising and extensively used in the social and strategy fields, social capital has been occasionally used in supply chain management (Krause *et al.*, 2006; Lawson *et al.*, 2007). Therefore, first, from a theoretical perspective, the present study extends the supply chain and social capital literature by explaining how CIRs interrelate with different SCRs. It also provides future research directions. Second, from a practical perspective, managers can benefit from a better understanding of interrelationships between CIRs and SCRs when making business decisions involving key practices such as partner selection, supplier relationship management, supplier development, contract development and supply network design.

2. Research methodology and descriptive findings

2.1 Locating relevant articles

Relevant articles were found in databases consisting of EBSCO, ABI/inform and Scopus. A set of different keywords around CIRs and SCRs was determined. CIRs included words such as “interorganizational”, “supplier-buyer”, “relation”, “cooperation”, “coordination”, “collaboration” or “integration”. SCR included the word “supply” combined with “risk”, “resilience”, “resilient”, “resiliency”, “robust” or “robustness”. All these words were arranged to build a string (Table 1) using Boolean operators, proximity connectors to narrow results and asterisks to include word alternates.

2.2 Studies selection and assessment process

The scope of the research targeted abstracts, titles and keywords in scholarly articles written in English in the Business and Management field, up to 2020. In total, 2,030 articles were identified, and their abstracts were screened. A high proportion of simulation and modeling papers looked at contract

Table 1 Research string

Criteria	Decision
Databases	EBSCO, ABI/inform and Scopus
Search targets	Titles, abstracts and keywords
Field of search	Business and management domain
Nature of documents	Scholarly articles
Language of studies	English
String for “interorganizational relationship” keywords combined with: – Asterisks – Boolean operator “OR”	Interfirm OR interorganization* OR “firm to firm” OR “business to business” OR relation* OR cooperat* OR coordinat* OR coopetition OR share OR shared OR sharing OR partner* OR alliance* OR collaborat* OR integrat* OR (supplier* OR vendor* OR seller* OR manufacturer*) WITHIN 3 WORDS OF (buyer* OR dealer* OR distributor* OR customer* OR retailer*)
Boolean operator “OR” to add next string:	
String using paired words for “interorganizational relationship” combined with: – Asterisks – Boolean operator “OR” – Proximity operator “WITHIN”	
Boolean operator “AND” to overlap previous strings with next string:	AND
String for “supply chain risk or supply chain resilience” keywords combined with: – Asterisks – Boolean operator “OR” – Proximity operator “WITHIN”	Supply* WITHIN EIGHT WORDS OF (resilien* OR robust* OR risk*)

optimization minimizing risks. These studies were excluded to focus on broader social aspects of CIRs. In total, 456 articles were determined to be congruent. Subsequently, the trusted journal quality rating published by the Chartered Association of Business Schools (CABS) in 2018 was used. Because of the high number of articles, quality consideration and effort to render the search more replicable, all articles with a quality rating of 3, 4 or 4* were selected (i.e. 179 articles). These articles were screened for qualitative, methodological and contribution eligibility (Miles and Huberman, 1994). Finally, 126 articles were kept. The process described is in Figure 1.

2.3 Data extraction and synthesis of the selected studies

2.3.1 Descriptive analysis

In total, 27 unique journals with a CABS rating of three and more were found from the 126 articles collected. Three journals represented about 52% of the sample, with *Supply Chain Management: An International Journal*, *International Journal of Production Research* and *International Journal of Production Economics*, respectively, sharing the first, second and third positions.

The first paper found in our SLR is from 1995. Since then, the number of publications has steadily increased.

The methodologies used in all 126 studies were surveys (34.9%), case studies (25.4%), modeling-focused (15.9%), conceptual (11.1%), literature reviews (8.7%) and public data set-based (4.0%).

Authors affiliated to 31 countries. The top three most represented countries were the USA (21.3%), UK (20.7%) and Australia (6.9%).

The top three industries studied were manufacturing (43.8%), Food (10%) and transportation (6.3%).

2.3.2 Thematic coding process

Social capital literature highlights that the sum of all resources associated with the network of relationships is critical in the management of social affairs. The body of work aims at understanding behaviors of individuals and groups at multidimensional levels (Nahapiet and Ghoshal, 1998) and has been lately used effectively in the supply chain and operations domains to explain supplier-buyer intricate relationships (Matthews and Marzec, 2012). Social capital consists of structural, relational and cognitive dimensions. These dimensions embedded in CIRs play a role in mitigating but also creating SCRs. This review separates and grounds CIRs' elements in the social capital dimensions (Table 2) to clarify how different collaborative behaviors affect SCRs differently.

First, the structural capital consists of systems, routinized practices or regular patterns of interactions structuring interorganizational communication and joint action (Carey et al., 2010; Lawson et al., 2007) by ways of formal and informal methods (Roden and Lawson, 2014). These interorganizational practices cover a broad spectrum of processes such as information sharing, supplier evaluation and supplier development (Krause et al., 2006); or social events, joint workshops, cross-functional team working, team-building exercises and co-location (Carey et al., 2010; Lawson et al., 2007). Hence, the nature of structural capital revolves around routinized practices. Consequently, the review identifies structural capital embedded in CIRs as buyer-led, supplier-led

Figure 1 Studies selection process flowchart

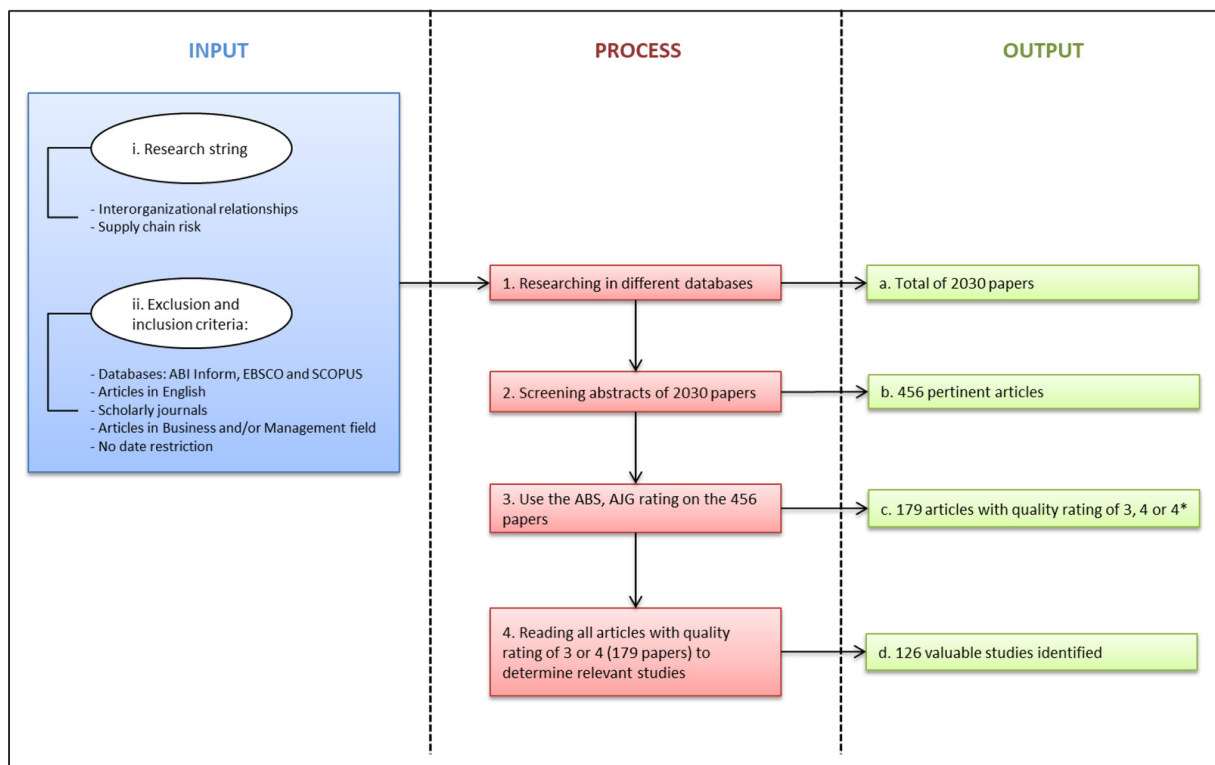


Table 2 Dimensions of CIRs derived from Nahapiet and Ghoshal (1998)

Theoretical lens	Theoretical sub-dimensions	Elements of sub-dimensions extracted from sample			
Social capital: sum of all resources available through the network of relationships (Nahapiet and Ghoshal, 1998)	Structural capital: Network-level configuration and systems, practices or regular patterns of interactions structuring interorganizational communication (Carey <i>et al.</i> , 2010; Krause <i>et al.</i> , 2006; Lawson <i>et al.</i> , 2007) by ways of formal and informal methods (Roden and Lawson, 2014)	<i>Supplier-buyer practices</i>	Buyer-led practices	Supplier management	Supplier performance management Supplier development
				Sourcing practices	Strategic outsourcing Multi-sourcing Sole-sourcing Single-sourcing
			Supplier-led practice	Customer portfolio management	
			Joint practices	Information and knowledge sharing Joint supply chain risk management Joint planning Joint problem-solving Joint decision-making Best practice sharing Co-location Contract	
			Network-level configuration	Supply-base complexity Overall network structure	Supplier differentiation Number of suppliers Supplier interaction levels Scale-free network structure
	Relational capital: close interaction, trust and reciprocity (Carey <i>et al.</i> , 2010)	<i>Relationship closeness</i>	Respect Friendship Interaction level		
			Risk and revenue sharing		
	Cognitive capital: shared representations, interpretations, meaning, values, goals and understanding developed via participative and continuous sense making processes (Krause <i>et al.</i> , 2006)	<i>Reciprocity Trust</i>	Goals and key performance indicators Sector language, standards and tacit understanding Task ownership, standardization and training Past adaptive responses to issues Corporate shared culture, philosophies, values, approach, management styles and capabilities National culture		

and joint practices. Throughout the sample of papers, buyer-led practices comprised supplier management including supplier development and supplier performance management (Fan and Stevenson, 2018; Jüttner and Maklan, 2011) and sourcing practices covering sole-sourcing (Waters-Fuller, 1995), single-sourcing (Tukamuhabwa *et al.*, 2015) and multi-sourcing (Chopra and Sodhi, 2004). Supplier-led practices encompassed customer portfolio management (Hua *et al.*, 2011). Joint practices were associated with scripted processes of SCRM, planning, problem-solving, information and knowledge sharing, decision-making (Stone and Rahimifard, 2018), best practice sharing (Gallear *et al.*, 2015), co-location (Habermann *et al.*, 2015) and contracts (Kleindorfer and Saad, 2005). Structural capital deals with collaborative practices but also the network-level configuration that they shape. Acting as an information transmission platform influencing the range of information accessibility in the network (Nahapiet and Ghoshal, 1998), network-level configuration enables information circulation between organizations. It is connected in the sample to the ideas of

supply-base complexity with supplier differentiation, number of suppliers and supplier interaction levels (Choi and Krause, 2006) and overall network structure or scale-free network configuration (Statsenko *et al.*, 2018).

Second, relational capital describes particular personal relationships that people or communities develop through a history of interactions (Nahapiet and Ghoshal, 1998). Roden and Lawson (2014) operationalized relational capital with interaction closeness, trust, respect, friendship and reciprocity. In this study, the relational dimension refers to trust (Laeequddin *et al.*, 2009), reciprocity (Liu *et al.*, 2018) and conceptually combines interaction closeness, respect and friendship into the idea of relationship closeness (Chowdhury and Quaddus, 2015). Despite information sharing's association with the relational dimension of social capital in strategic management research (Kim *et al.*, 2015a), this study links information sharing with structural capital because of its routinized nature in supply chain research (Krause *et al.*, 2006).

Third, cognitive capital represents resources providing shared representations, interpretations, meanings, values, goals and understanding developed via participative and continuous sense-making processes (Krause *et al.*, 2006; Nahapiet and Ghoshal, 1998). From the sample, the two main components of cognitive capital are shared codes and language and shared narrative (Johnson *et al.*, 2013). Shared codes and languages represent goals, key performance indicators, sector language, task ownership, standardization, training, standards and tacit understanding (Fan and Stevenson, 2018; Johnson *et al.*, 2013). Shared narratives comprise past adaptive responses to issues (Johnson *et al.*, 2013), shared corporate culture (Fan and Stevenson, 2018), company values, philosophies, business approaches and capabilities, management styles (Chowdhury *et al.*, 2019) and national cultures (Gupta and Gupta, 2019; Manhart *et al.*, 2020).

Additionally, throughout this review, SCRs were categorized to highlight the granularity of interactions between CIRs and SCRs. The sample at hand indicates an underpinning split between macro and micro-risks, referred to, respectively, as catastrophic/disruption and operational risks (Tang, 2006). Consequently, this review uses the SCR classification from Ho *et al.* (2015), where macro and micro risks prevail (Figure 2). Macro-risks are rare external natural and human-made events, such as tsunamis, earthquakes, wars or terrorism. Micro-risks are repetitive events emanating from internal activities

or relationships within the supply chain, consisting of demand, manufacturing, supply and infrastructural risks. Manufacturing risks relate to the inherent ability to produce goods and services within firms. Demand and supply risks refer to downstream and upstream uncertainties around a firm. Finally, informational, transportation and financial risks are infrastructural risks.

3. The role of collaborative interorganizational relationships in supply chain risks

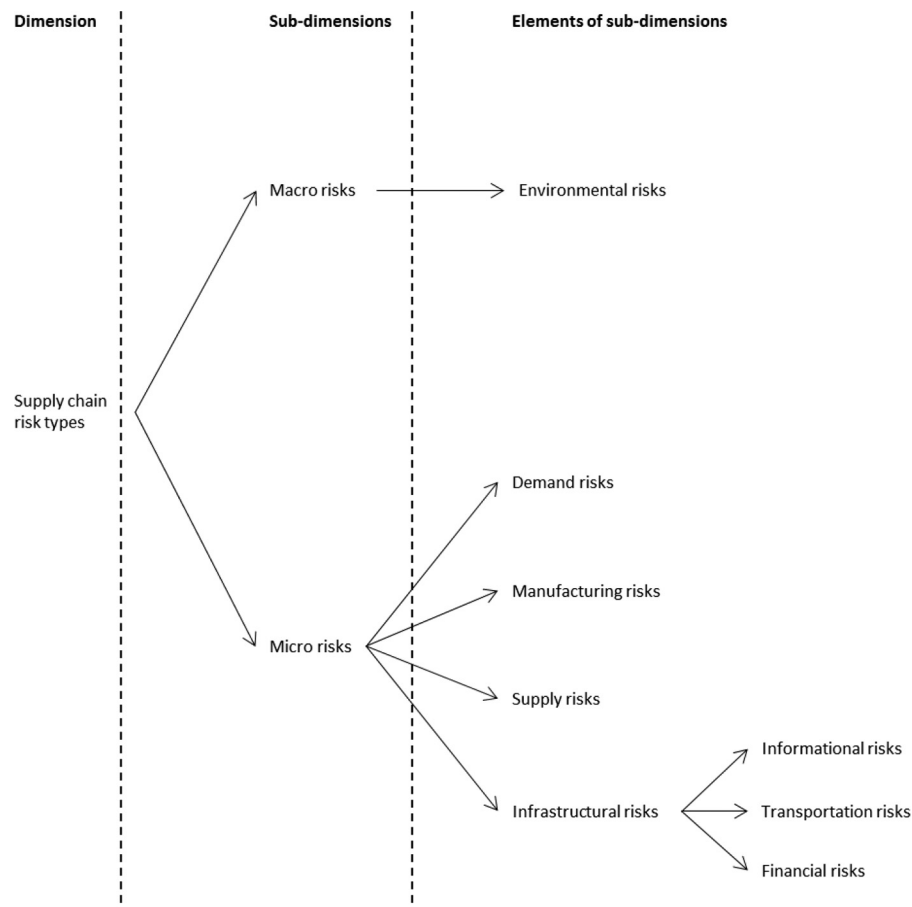
CIRs are examined through the social capital dimensions (Table 2). As to SCRs, the SCR classification from Ho *et al.* (2015) is used (Figure 2).

3.1 The role of collaborative interorganizational relationships' structural capital in supply chain risks

Structural capital refers to supplier-buyer practices and network-level configuration shaped by these practices (Carey *et al.*, 2010). First, supplier-buyer practices consist of:

- buyer-led practices (i.e. supplier development, supplier performance management, strategic outsourcing, multi-sourcing, sole-sourcing, single-sourcing);
- the supplier-led practice of customer portfolio management; and

Figure 2 Supply chain risk typology based on Ho *et al.* (2015)



- joint practices (i.e. information and knowledge sharing, joint SCRM, joint planning, joint problem-solving, best practice sharing, co-location, joint decision-making, contract).

Second, the network-level configuration includes:

- supply-base complexity (i.e. supplier differentiation, number of suppliers and supplier interaction levels); and
- overall network structure or scale-free network structure.

3.1.1 Buyer-led and supplier-led practices interplay with supply chain risks

The buyer-led practices of supplier development and supplier performance management enable risk visibility (Jüttner and Maklan, 2011; Manhart *et al.*, 2020), which helps to contain supply risks' propagation to downstream networks of buyers (Zhang *et al.*, 2018). Supplier development can reduce disaster risks (Dahlmann and Roehrich, 2019; Hu *et al.*, 2019; Sawyerr and Harrison, 2019) and mitigate supply risks (Chowdhury *et al.*, 2019; Fan and Stevenson, 2018; Zhao *et al.*, 2013), as it trains suppliers to be proactively aware of problems such as supply quality risks (Tse *et al.*, 2019) or slave labor (Gold *et al.*, 2015). The more supply, manufacturing and transportation risks increase, the more buyers' SCRs awareness rises, which elevates supplier development (Jajja *et al.*, 2018). Supplier performance management can restrict environmental, supply and demand risks via improved risk detection, contingency intelligence and visibility (Brusset and Teller, 2017). It can also apprehend buyers' manufacturing and supply risks (Cheng and Lu, 2017) such as suppliers' opportunism to produce fraudulent products (Duhadway *et al.*, 2020) or non-quality products (Tse *et al.*, 2019).

Strategic outsourcing is the decision for a buyer to select an external source to process a task. In times of recession, this practice can alleviate disruption risks at the network-level as it builds flexibility, risk-sharing and risk absorption (Jüttner and Maklan, 2011).

Multiple-sourcing creates supply redundancy used by buyers to mitigate supply risks (Aboah *et al.*, 2019; Ali *et al.*, 2017b; Gaur *et al.*, 2019; Tan *et al.*, 2019; Zhao *et al.*, 2019a) or environmental disasters (Sawyer and Harrison, 2019) such as droughts (Sá *et al.*, 2019) or earthquakes (Todo *et al.*, 2015). Chopra and Sodhi (2004) conceptually highlighted the advantage of multiple-sourcing for buyers facing supply risks. Multiple-sourcing dominates for low impact and high-frequency supply disruptions or when the supply risk aversion is high (Namdar *et al.*, 2017). Urciuoli *et al.* (2014) encouraged European oil and gas supply chains to source their energy from different countries to avoid over-dependency on few suppliers resulting in loss of power, disadvantageous contracts and replenishment risks. Nevertheless, multi-sourcing can still create supply risks in networks, notably in the construction industry, where high levels of multiple-sourcing can handicap a buyer's visibility and control of suppliers' opportunism (Rudolf and Spinler, 2018).

Sole-sourcing mingled with just-in-time, and single-sourcing have been determined to be potentially damaging. Sole-sourcing, combined with just-in-time, may increase financial risks for suppliers who could invest in facilities or vehicles, creating dependence on the buyer (Waters-Fuller, 1995).

In the case of single-sourcing, buyer's dependency could drive supply risks up because of the lack of alternate suppliers when needed (Chopra and Sodhi, 2004; Tukamuhabwa *et al.*, 2015).

The supplier-led practice of customer diversification can reduce suppliers' financial and forecast risks. Hua *et al.* (2011) indicate, in an agent-based modeling study, that retailer diversification reduces retailers' non-payment risk, lowering manufacturers' bankruptcy risk. Along these lines, Chopra and Sodhi (2004) associate more customers in a network to less receivable risks for the supplier, minimizing downstream financial risks' propagation upstream. Moreover, customer diversification enables risk pooling, which reduces suppliers' earnings forecast error (Hu *et al.*, 2018).

3.1.2 Joint practices' interrelationships with supply chain risks

Joint SCRM practices encompass multiple shared procedures between partners targeting the control of SCRs (Ritchie and Brindley, 2007) such as environmental, supply discontinuity and manufacturing risks (Kauppi *et al.*, 2016) but also cybersecurity risks (Colicchia *et al.*, 2019a). They are the most effective strategies to manage SCRs (Lavastre *et al.*, 2014) and are highly discussed throughout the literature. Surveys in France (Lavastre *et al.*, 2014), India (Mishra *et al.*, 2016), Austria, Germany and Switzerland (Durach and Machuca, 2018) and 69 other countries (Revilla and Saenz, 2017) evidenced that buyers pursuing joint SCRM strategies with their suppliers obtain lower levels of quality, delivery and supply disruptions than those who do not pursue them. Indeed, joint SCRM practices ameliorate risk information sharing and assessment (Fan *et al.*, 2017), which empowers partners' anticipative capability to detect supply risks (Bevilacqua *et al.*, 2019; Lima *et al.*, 2018; Manhart *et al.*, 2020; Stone and Rahimifard, 2018), and builds strong partnerships reassuring suppliers seeking minimum future contracts uncertainty with their buyers (Ritchie and Brindley, 2007).

Joint planning is a cooperative capability used to plan and cope with environmental risks (Dubey *et al.*, 2020; Jain *et al.*, 2017), such as the weak rule of law (Wiengarten *et al.*, 2016) but also supply risks (Bevilacqua *et al.*, 2019; Chowdhury *et al.*, 2019; Dubey *et al.*, 2019; Hu *et al.*, 2019; Lima *et al.*, 2018; Manhart *et al.*, 2020; Stone and Rahimifard, 2018) including lead time fluctuation, forecast inaccuracy and on-time delivery (Sinha *et al.*, 2004). Joint planning enables stock pooling, which decreases supply and demand risks among partners (Cohen *et al.*, 2000). An example of joint planning used to decrease the bullwhip effect is collaborative planning, forecasting and replenishment (CPFR) systems (Chopra and Sodhi, 2004). In a concern to minimize informational risks, partners have been continuously using this planning technique to allow transparency and risk identification (Kleindorfer and Saad, 2005). CPFR helps suppliers and buyers reduce inventory shortage risks via forecast sharing (Raghunathan, 1999). It can also avoid anticipatory inventory deployment and enable postponement strategies reducing new product launch risks such as demand variability and overstocking (Bowersox, 1999). Other examples of joint planning practices such as vendor-managed inventory or efficient customer response can improve transparency, brainstorming and risk detection, reducing environmental, supply and demand risks (Brusset and Teller, 2017). Joint planning influences SCRs, but SCRs can influence

joint planning as well. Supply, manufacturing and transportation risk levels can increase a firm's joint planning with both customers and suppliers for better coordination (Jajja *et al.*, 2018).

Based on decision, resource and synchronization abilities, joint problem-solving is a synergetic practice highly effective against environmental (Scholten and Schilder, 2015), demand (Chen *et al.*, 2013) and supply risks (Bevilacqua *et al.*, 2019; Chowdhury *et al.*, 2019; Kalaitzi *et al.*, 2019; Lima *et al.*, 2018; Manhart *et al.*, 2020; Stone and Rahimifard, 2018) such as specifications, lead times, quantity requirements and forecasts consistency (Chen *et al.*, 2013). Grötsch *et al.* (2013) found a positive correlation between joint problem-solving philosophy and buyers' proactiveness to detect supplier insolvency risks in the German automotive industry. SCRs can shape joint problem-solving as well. Indeed, supply and environmental risk influence joint problem-solving between organizations. A survey of buyers from Dekker *et al.* (2013) showed that supplier monitoring risks and technological unpredictability reduce joint problem-solving with suppliers. In parallel, environmental variability, lack of competition and supplier risks linked to part complexity increase joint problem-solving. Besides, Hajmohammad and Vachon (2016) suggested that buyers prefer to mitigate a high level of perceived supplier sustainability risk (i.e. ecological or social misconduct) via an open dialogue strategy based on joint planning.

Joint decision-making is a crucial risk mitigation practice in situations of high environmental risks (i.e. natural hazard, terrorism and political instability), supply discontinuity, manufacturing risk (Kauppi *et al.*, 2016; Subramanian *et al.*, 2015) but also demand and financial risks (Subramanian *et al.*, 2015). Used in food waste management, joint decision-making can bridge unconnected parties or structural holes, enabling supply chain circularity and environmental risk reduction (Ciulli *et al.*, 2019). Strategic horizontal and vertical collaboration in decision-making are vital coordination factors that can alleviate SCRs such as Hurricane Katrina (Scholten *et al.*, 2014) but also inflation, political instability, supply disruption and local food demand increase because of the Brexit constitutional changes (Hendry *et al.*, 2019). Joint decision-making optimizes supplier-buyer alignment needed against disaster (Sawyer and Harrison, 2019), customer's demand variability (Zhao *et al.*, 2013) and supply risks (Chowdhury *et al.*, 2019; Dubey *et al.*, 2019; Hu *et al.*, 2019; Kalaitzi *et al.*, 2019; Manhart *et al.*, 2020; Zhao *et al.*, 2013). In a simulation, Levalle and Nof (2015) discuss the practice of resilience by teaming based on joint decision-making where buyers select low-cost suppliers to make them work together to yield a higher combined quality of service. The study found that resilience by teaming boosted the standard and post-disruption quality of service with almost no cost increase. Joint decision-making reduces SCRs, but SCRs can influence joint decision-making too. Indeed, according to a survey from Jajja *et al.* (2018), a firm's perceived supply, manufacturing and transportation risks can increase the firm's level of decision-making with suppliers and customers to control these SCRs.

Information sharing generates transparency (Ali *et al.*, 2017a; Cohen *et al.*, 2000; Colicchia and Strozzi, 2012; Colicchia *et al.*, 2019b). Lack of transparency is an informational risk creating uncertainty between partners. Information sharing appeases this

risk by facilitating communication and visibility (Brandon-Jones *et al.*, 2014; Gunasekaran *et al.*, 2015; Jain *et al.*, 2017), which are used, for instance, against demand volatility, price erosion (Subramanian *et al.*, 2015) or supply risks (Aboah *et al.*, 2019; Bevilacqua *et al.*, 2019; Chowdhury *et al.*, 2019; Colicchia *et al.*, 2019b; Dubey *et al.*, 2019; Hu *et al.*, 2019; Kalaitzi *et al.*, 2019; Lima *et al.*, 2018; Manhart *et al.*, 2020; Stone and Rahimifard, 2018). Knowledge sharing has similar visibility effects, enabling the identification and mitigation of supply-side risks (Chen *et al.*, 2016; Dabhilkar *et al.*, 2016; Scholten and Schilder, 2015; Scholten *et al.*, 2019; Tukamuhabwa *et al.*, 2015) and political risks emanating from strife and economic hardships (Gölgeci and Kuivalainen, 2020). Information sharing enables the containment of environmental, manufacturing and supply risks (Kauppi *et al.*, 2016; Subramanian *et al.*, 2015) but also demand, informational and transportation risks (Liu *et al.*, 2018). In disaster relief operations, for example, information sharing allows feedback loops between hastily formed humanitarian organizations and helps aid groups to assess resource availability and recovery needs (Kumar and Havey, 2013), notably through blockchain technology (Dubey *et al.*, 2020). Information sharing facilitates risk identification and assessment through operational data exchange (Lavastre *et al.*, 2012), decreasing supply and environmental risks (Kleindorfer and Saad, 2005; Liu *et al.*, 2018; Urciuoli *et al.*, 2014). Information sharing can help quickly identify:

- manufacturing and supply quality risks in raw materials in any supply tier (Tse and Tan, 2011);
- supply risk of modern labor slavery;
- demand risk of a bad reputation; and
- information leakage risk (Stevenson and Cole, 2018).

Although information sharing can benefit partners (Du *et al.*, 2003), it can also have nefarious informational risks for partners, such as infrastructure breakdown (Chopra and Sodhi, 2004; Smith *et al.*, 2007), cybersecurity risks (Bhimani and Ncube, 2006; Colicchia *et al.*, 2019a; Finch, 2004), information distortion (Kwak *et al.*, 2018) and leakages to rivals (Zhang *et al.*, 2011) via social media or production systems (Colicchia *et al.*, 2019b). Excessive information transparency can increase financial risks for suppliers. A case study in the British defense industry revealed that supplier-buyer open book relations could cause buyers to push their costs to their suppliers (Johnsen *et al.*, 2009). Nevertheless, in specific cases such as humanitarian crisis or Carbon Dioxide emission control, knowledge and information management capabilities between partners have to be built to coordinate forces and mitigate disaster risks (Dahmann and Roehrich, 2019; Rasouli, 2018; Sawyer and Harrison, 2019; Scholten *et al.*, 2014). Consequently, the pros and cons of information and knowledge sharing on SCRs are typically contextual. The literature also highlights that SCRs can modulate information sharing levels. In a multi-country survey, Arnold *et al.* (2010) discovered that the more the supply chain partner's B2B e-commerce risks increase, the lower the level of information sharing was, due to uncertainty. In another survey, Dekker *et al.* (2013) show that the environmental risk of technological unpredictability and supplier monitoring problem risks negatively influence buyers' information sharing with suppliers. In parallel, other environmental and supply risks such as

environmental variability, lack of competition and part complexity positively affect information sharing levels. An additional survey of Jajja *et al.* (2018) found that manufacturing firms facing supply, manufacturing and transportation risks increase information sharing with their partners to decrease SCRs.

The joint practices of best practice sharing and co-location can mitigate SCRs. Buyers sharing environmental and ethical best practices with their suppliers can better identify relational and supply performance risks (Gallea *et al.*, 2015). Additionally, the practice of co-location, when two partners decide to do business in the same location, helps lower supply lead times and supply disruption duration for buyers (Habermann *et al.*, 2015).

Contracts can help minimize environmental and supply risks. Non-performance penalties built into contracts can be buyers' vehicle against natural disasters, strikes, economic disruptions and terrorism (Kleindorfer and Saad, 2005) or supply risks (Hu *et al.*, 2019; Kalaitzi *et al.*, 2019) such as quality of supply (Tse *et al.*, 2019). Specific risk distribution contracts can mitigate supply and demand risk propagation in networks. Revenue sharing contracts are generally more effective in mitigating customer or supplier propagated bankruptcy risks than price discount and quantity flexibility contracts (Sun *et al.*, 2012). A case study in the food industry in Scotland highlighted that horizontal collaboration between producers and vertical collaboration between processors and retailers via contracts reduced supply, manufacturing and demand risks in the network (Leat and Revoredo-Giha, 2013). Contracts can reduce SCRs, but SCR perception can influence contracts, as well. A survey of American and Brazilian firms found that buyers managing their perceived supplier's financial risk are more likely to re-negotiate payment terms improving supplier working capital and shrinking supply disruption risks (Oliveira and Handfield, 2017). Eckerd and Girth (2017) examined the US Government's risk management choice while designing 240,000 contracts aimed at mitigating supplier risks. The findings concluded that when mission criticality and service complexity are low (low supply risk), suppliers tend to agree to fixed-price contracts, thus bearing all the risks. While in high mission criticality (high supply risk), the US Government tends to agree to incentive contracts. When service complexity is high (high supply risk), cost-reimbursement and incentive contracts were preferred.

3.1.3 Interaction between network-level configuration and supply chain risks

Deep-seated in CIRs, network configuration is structural and includes:

- Supply-base complexity (Choi and Krause, 2006).
- Overall supply network structures.

Supply-base complexity influences supply risks in networks. Using complex adaptive system theory, Choi and Krause (2006) defined supply-base complexity as the focal firm's:

- supplier differentiation in terms of cultures, practices, capabilities and geographical dispersion;
- number of suppliers; and
- supplier interaction levels.

Although conceptual, the paper stipulates that for a focal firm, there is a positive quadratic relationship between its supply-base complexity and supply risk. Indeed, low complexity could

prevent a focal firm from accessing new and varied technologies and create supply disruption risk when single-sourcing is preferred. On the other hand, high complexity could make the focal firm lose control over its suppliers, and increase unreliable deliveries, thus exacerbating supply risks. The number of suppliers is a supply-base complexity dimension connected to the buyer-led practices of single, sole and multi-sourcing previously discussed in Section 3.1.1. A component of supply-base complexity, supplier differentiation, in terms of capability, can reduce environmental risks. In a case study of the South Australian mining industry, Statsenko *et al.* (2018) show, through complex adaptive system theory, that a large number of interconnected multi-sector organizations in the supplier-base helps with complementary partnerships adding to the reconfiguration ability of the mining network during economic downturns. Supplier differentiation, in terms of dispersion, is also an element of supply-base complexity. Lorentz *et al.* (2016) show that supplier dispersion has an inverse U-shaped relationship with supply risk, with buyers increasingly ready for growing internationalized supplier dispersion and associated supply risks. Generally, low supply dispersion means low supply risks for buyers (Lei *et al.*, 2019), who prefer dependable, responsive and geographically close suppliers for quick problem-solving (Ellegaard, 2008). However, high to moderate supply dispersion can help mitigate environmental risks when the risks are not close to the disrupted supply network. Todo *et al.* (2015), in a survey studying a Japanese earthquake, noticed that networks with firms outside of the area impacted saw a quicker recovery for moderately damaged firms. Therefore, contexts drive supplier dispersion's relationship with SCRs. Supplier interaction, another dimension of supply-base complexity, can influence supply risks for buyers. Indeed, in a case study of British food companies, Touboulic *et al.* (2014) highlight that two suppliers can combine forces against a buyer's request to pursue shared sustainability goals.

A specific network configuration, embedding CIRs, can contain supply and environmental risks more efficiently. This configuration is scale-free supply networks, defined by a relatively small number of highly connected hubs and a large number of nodes with few connections (Statsenko *et al.*, 2018). These networks recover better from supply disruptions than random networks because they have lower costs, higher fill-rates and lower inventory needs (Kim *et al.*, 2015b; Ledwoch *et al.*, 2018; Zeng and Yen, 2017). Day (2014) suggests that the assessment of metrics in scale-free networks such as clustering, connectedness, short-path and high-path redundancy can help assess disaster risks. Likewise, Li *et al.* (2019) point to specific centrality indicators going beyond a scale-free characterization and highlighting essential network nodes. These resilience indicators can offer a better understanding of supply disruption propagation and consist of degree (important vertices), betweenness (shortest path) and closeness (node proximity ratio).

3.2 The role of relational capital in supply chain risks

Relational capital refers to mutual respect, friendship, interaction level, trust and reciprocity (Nahapiet and Ghoshal, 1998; Roden and Lawson, 2014). Relationship closeness covers what Nahapiet and Ghoshal (1998) called mutual respect, friendship and interaction level. Trust is a partner's

threshold level of risk-bearing capacity (Laequddin *et al.*, 2009) and reciprocity alludes to shared risks and benefits.

3.2.1 Interactions between relationship closeness and supply chain risks

The interaction between relational closeness and SCRs is complex. Indeed, relationship capital appears to have an inverted U-shaped relationship with supply-side resilience, where the switch into the upward curvilinear relationship occurs when buyers develop relationship closeness with their suppliers (Fan and Stevenson, 2019). Building or improving relationships is one of the most preferred strategies to mitigate all SCRs (Chowdhury and Quaddus, 2015; Daultani *et al.*, 2015; Govindan and Chaudhuri, 2016; Lam and Bai, 2016; Yang and Hsu, 2018). Close relationships establish a mutual understanding between network-partners enabling better collaboration and visibility (Johnson *et al.*, 2013). Healthy relationships make supply network structures more resilient (Day, 2014) to SCRs such as political and economic instability (Gölgeci and Kuivalainen, 2020) or supply risks (Chowdhury *et al.*, 2019) such as suppliers' opportunistic fraud (Duhadway *et al.*, 2020), respect of sustainability obligations (Bird and Soundararajan, 2018), disruption (Dubey *et al.*, 2019; Kalaitzi *et al.*, 2019) and quality issues (Tse *et al.*, 2019). Relationship closeness strengthens supplier-buyer communication and improves supply risk identification (Fan and Stevenson, 2018; Zhao *et al.*, 2013), notably when suppliers are involved early in product development (Khan *et al.*, 2012). Close relationships decrease demand variability when suppliers work with customers (Zhao *et al.*, 2013; Zhao *et al.*, 2019b), diminishes the bullwhip effect (Billington, 2010) through purchase volume and reduced supply-base, and help alleviate supply coordination risks in just-in-sequence activities (Wagner and Silveira-Camargos, 2012). The quality of relationships invested in a given upstream tier can generate better relationships with downstream tiers. Indeed, a buyer investing in better relationships with suppliers can lower supply risk costs linked to opportunism and disruption, and become more competitive, which subsequently makes downstream partners more inclined to establish stronger relationships (Cruz and Liu, 2011). Moreover, buyers building relationships with suppliers can preserve mutual knowledge and build entry barriers against competitors (Bigdeli *et al.*, 2018). Sometimes, because of a close relationship, a supplier becomes financially dependent on the buyer, which can decrease the buyers' financial risks. Kim and Henderson (2015) show that the supplier's dependency can reduce financial risks for the buyer by increasing returns on assets and sales. Nevertheless, co-dependent relationships can create SCRs as entire supply chains can crash if one partner operationally fails (Zeng and Yen, 2017). In a Dutch food case study, Scholten and Schilder (2015) suggested that mutual supplier-buyer dependency indirectly drives financial risk as one or both parties could devote specific investments. Buyer's dependency on suppliers can exacerbate the bullwhip effect for those suppliers (Zhao *et al.*, 2019b), and decrease suppliers' financial risks only to a certain point. Indeed, Kim and Henderson (2015) show that buyer's dependency can reduce financial risks for suppliers by increasing returns on assets and sales. However, the financial benefits from the buyer's dependency decrease as inventory increases. Dependency can

also create a power imbalance between buyers and suppliers, which can materialize through unequal sharing of sustainability investments and financial risks to the advantage of the dominant partner (Touboulic *et al.*, 2014). Relationship closeness influences SCRs, but it can also be affected by SCRs. According to a survey of manufacturers in Hong Kong, perceived supply risks in quantity, quality and lead-time can trigger buyers to develop guanxi with critical suppliers to contain supply risks (Cheng *et al.*, 2012).

3.2.2 Reciprocity's role in supply chain risks

Throughout the literature, reciprocity considered mainly risk sharing, commonly used by partners to mitigate environmental, supply, demand, informational and transportation risks (Liu *et al.*, 2018; Rudolf and Spinler, 2018). Shared risks enable loss dispersion, risk absorption (Jüttner and Maklan, 2011), responsiveness and readiness, which altogether improve resilience in situations of disasters (Chowdhury and Quaddus, 2016; Dubey *et al.*, 2020) and supply risks (Chowdhury *et al.*, 2019; Hu *et al.*, 2019; Manhart *et al.*, 2020). In a supply network simulation, Zeng and Yen (2017) discuss how supply, manufacturing, demand and transportation risks can be shared among partners, leading to increased centrality (center nodes diffuse risks to nodes nearby), ultimately improving network organization and recoverability. Reward sharing is another form of reciprocity, which, when combined with risk-sharing, can coordinate supplier-buyer process alignments and reduces manufacturing quality risks for buyers (Tse *et al.*, 2018). SCRs can also influence reciprocity. In a survey, Jajja *et al.* (2018) show that a firm's elevated supply, manufacturing and transportation risks can trigger the firm to increase risk and revenue sharing among partners for cost-efficiencies.

3.2.3 Interrelations between trust and supply chain risks

Trust enhances supplier-buyer collaboration (Dubey *et al.*, 2020), reducing supply and demand risks from malicious actors (Fan and Stevenson, 2018). Trust helps to mitigate supply risks (Chowdhury *et al.*, 2019; Dabhilkar *et al.*, 2016; Dubey *et al.*, 2019; Jain *et al.*, 2017; Tse *et al.*, 2019) such as falsified drugs (Lima *et al.*, 2018) or disruptions across industries and countries (Chen *et al.*, 2016; Ha *et al.*, 2011; Rajesh *et al.*, 2015; Ritchie and Brindley, 2007; Vlajic *et al.*, 2012) such as manufacturing in China, where trust can also reduce environmental, demand, manufacturing and financial risks (Subramanian *et al.*, 2015). However, excessive trust can trigger opportunism exemplified by buyers negotiating supply prices, and suppliers increasing their selling prices (Laequddin *et al.*, 2009). SCRs can also affect trust. Sambasivan *et al.* (2013) found that suppliers and buyers with a strong perception of opportunistic behavior have a lower level of trust. Similarly, Laequddin *et al.* (2009) highlight that trust exists when there is no significant risk, thereupon suggesting that partners should work on reducing risks to strengthen trust rather than building trust to minimize risks.

3.3 The role of cognitive capital in supply chain risks

Cognitive capital refers to shared codes, languages and narratives (Nahapiet and Ghoshal, 1998). This dimension helps to mitigate SCRs, but in excess can become collectively blinding as group thinking can prevent buyers from developing innovative ideas to identify supply risks (Fan and Stevenson, 2018).

3.3.1 Shared codes and languages in supply chain risks

In a case study of the Grayrigg derailment in the UK, shared codes and languages appear in the form of supplier-buyer goals, key performance indicators, sector language, task ownership, standardization and training. These essential elements drastically improve collaboration and communication and establish explicit and tacit understanding (Johnson *et al.*, 2013), which helps improve supplier-buyer absorptive capacity, shared understanding but also cognitive efforts needed in supply risk identification (Fan and Stevenson, 2018) and mitigation (Chowdhury *et al.*, 2019).

3.3.2 Shared narratives in supply chain risks

Nahapiet and Ghoshal (1998) associate shared narratives with stories, myths and metaphors sustaining meaning in communities. Specifically, in the management of the Grayrigg rail crash in the UK, shared narratives helped to invigorate network collaboration, facilitate the identification and resolution of complex problems by recalling past adaptive responses, and enhance visibility by enticing the curiosity for resource location and status (Johnson *et al.*, 2013). Corporate shared culture is also a shared narrative consisting of company values, philosophies, approaches to business dealings, management styles and business capabilities (Chowdhury *et al.*, 2019). Suppliers and buyers use shared corporate culture to help tacit and explicit understanding and cognitive effort in supply risk identification (Fan and Stevenson, 2018) and mitigation (Chowdhury *et al.*, 2019). National culture is another shared narrative that appears to impact collaboration strategies in supply disruption management (Manhart *et al.*, 2020). Different countries, based on their individualism, collectivism and feminism levels, seem to have differences in their risk-taking and negotiation approaches, but research remains poor in this domain (Gupta and Gupta, 2019).

4. Concluding discussion, future research agenda and Contributions

Summarizing the findings, this section answers the research question: using a social capital perspective, how can we understand the effect of CIRs on SCRs?

4.1 Discussion on current literature

Based on detailed findings from Section 3, Tables 3 and 4 present unique interaction properties between CIRs and SCRs. Four main ideas transpired from the literature. First, the structural capital of CIRs appears to affect positively and negatively SCRs. Indeed, buyer-led practices of supplier development, supplier performance management and strategic outsourcing reduce buyers' SCRs (Jüttner and Maklan, 2011), while sole-sourcing (Waters-Fuller, 1995) and single-sourcing (Tukamuhabwa *et al.*, 2015) can increase them. Multi-sourcing looks to have a positive (Chopra and Sodhi, 2004) but also a negative effect on buyers' SCRs (Rudolf and Spinler, 2018). The supplier-led practice of customer portfolio management reduces SCRs for suppliers (Hua *et al.*, 2011). Joint practices of SCRM, planning, problem-solving, information and knowledge sharing, decision-making (Stone and Rahimifard, 2018), best practice sharing (Gallea *et al.*, 2015), co-location (Habermann *et al.*, 2015) and contracts (Kleindorfer and Saad, 2005) decrease

supplier-buyer SCRs. However, information sharing can raise them (Bhimani and Ncube, 2006). Supply-base complexity seems to have a curvilinear relationship with buyers' SCRs (Choi and Krause, 2006). Scale-free network configurations enable better mitigation of network-level SCRs (Statsenko *et al.*, 2018). Second, the relational capital of CIRs seems to influence positively and negatively SCRs. Relationship closeness (Chowdhury and Quaddus, 2015), trust (Fan and Stevenson, 2018) and reciprocity (Liu *et al.*, 2018) mitigate SCRs, but can also exacerbate them (Fan and Stevenson, 2019). Third, cognitive capital, with shared codes, languages and narratives, appears to help in the mitigation of SCRs (Johnson *et al.*, 2013). However, cognitive capital can also develop collective blinding preventing partners' out-of-the-box thinking (Fan and Stevenson, 2018). Fourth, SCRs can influence the structural capital of supplier development, joint planning, joint decision-making (Jajja *et al.*, 2018), joint problem-solving, information sharing (Dekker *et al.*, 2013) and contracts (Eckerd and Girth, 2017). SCRs can also influence the relational capital of relationship closeness (Cheng *et al.*, 2012), reciprocity (Jajja *et al.*, 2018) and trust (Sambasivan *et al.*, 2013).

Pinpointing the state of current research, Figure 3 counts the number of papers per CIR and SCR. The literature probed some social capital dimensions of CIRs more than others. First, structural capital is at the forefront, specifically with information sharing and joint planning, supplier development, supplier performance management and multi-sourcing and finally, network characteristics with a relatively low number of papers. The examination of strategic outsourcing, sole-sourcing, single-sourcing, customer diversification, best practice sharing and co-location was low. Relational capital came second as the most frequent dimension discussed in the sample, with relationship closeness being the number one element dissected. Other relational elements were less extensively analyzed. Finally, cognitive capital was by far the least scrutinized dimension.

In the sample, supply risk was the most considered risk, followed by environmental, demand, informational and manufacturing risks. The frequency of papers dealing with financial and transportation risk studies was the lowest.

4.2 Suggestions for further research

First, social capital is a valuable perspective enabling the isolation of different dimensions of CIRs in the context of SCRs. Using this lens raises the precision and clarity of research as it avoids mixing different dimensions in various operationalization found in the literature, such as meta-concepts like integration, collaboration and bridging. With rare studies combining all three dimensions, the social capital theoretical lens provides a holistic view of the multidimensionality of CIRs, which can help organizations identify, sustain and develop specific social capital dimensions for valuable partnerships. Making use of social capital concepts in supply chain collaboration could enable the discovery of dimensions compensating others, providing insights into how different social capital dimensions interact and accumulate in the context of SCRs. Throughout the literature, in each study, specific SCRs were investigated. However, in supply chains, some risks can lead to other risks, which highlights a need for a global SCR index while studying CIRs. In developing this index, the endogeneity of actual versus perceived risks should be addressed.

Table 3 CIRs influence SCRs

Dimensions		CIRs		Micro risks				Micro risks				Infrastructural risks		
Structural capital	Elements	Sub-elements	Environmental	Supply	Manufacturing	Demand	Informational	Financial	Transportation					
Structural capital	Buyer-led practices	Supplier development	→	→	→	→								
		Supplier performance management	→	→	→	→								
		Strategic outsourcing	→	→	→	→								
		Multi-sourcing	↕	↕	↕	↕								
		Sole-sourcing	↕	↕	↕	↕								
	Supplier-led practice	Single-sourcing	→	→	→	→	→		↑					
		Customer portfolio management	→	→	→	→	→		→					
		Joint SCRM	→	→	→	→	→	→						
		Joint planning	→	→	→	→	→	→						
		Joint problem-solving	→	→	→	→	→	→						
		Joint decision-making	→	→	→	→	→	↕	→	↕				
		Information/knowledge sharing	→	→	→	→	→	↕	→	↕	→			
		Best practice sharing	→	→	→	→	→							
		Co-location	→	→	→	→	→							
		Contract	→	→	→	→	→							
	Supply-base complexity	Supply-base complexity	→	↕	↕	→	→							
		Supplier capability differentiation	→	→	↕	→	→							
		Supplier dispersion differentiation	→	→	↕	→	→							
Supplier interaction		→	→	→	→	→								
Scale-free structure		→	↕	→	→	→								
Relational capital	Overall network structure		↕	↕	→	↕	→	↕	→	→				
	Relationship closeness		→	↕	→	→	→	↕	→	→				
	Reciprocity		→	↕	→	→	→	↕	→	→				
Cognitive capital	Trust		→	↕	→	↕	→	↕	→	→				
	Shared codes and language		→	↕	→	↕	→	↕	→	→				
	Shared narrative		→	↕	→	↕	→	↕	→	→				
Notes: ↓ Decrease, ↑ Increase														

Table 4 SCRs Influence CIRs

Risk type	Risk element	CIRs								
		Structural capital				Information and knowledge sharing			Relational capital	
		Supplier development	Joint planning	Joint problem-solving	Joint decision-making	Contracts	Relationship closeness	Reciprocity	Trust	
Macro risks	Environmental			↓↑			↓↑			↓
Micro risks	Supply	↑	↑	↓↑	↑		↓↑	X	↑	↓
	Manufacturing	↑	↑		↑		↑		↑	
	Demand									↓
	Informational						↓			
	Transportation	↑	↑		↑		↑		↑	

Notes: ↓ Decrease. ↑ Increase. X Influence

Figure 3 Number of articles in CIRs and SCRs

CIRs			Macro risks	Micro risks						Total per:			
Dimensions	Elements	Sub-elements	Environmental	Supply	Manufacturing	Demand	Informational	Financial	Transportation	Sub-element	Element	Dimension	
Structural capital	Buyer-led practices	Supplier development	2	7	1				1	8	41	203	
		Supplier performance management	1	9	2	1		1	1	15			
		Strategic outsourcing	1							1			
		Multi-sourcing	2	10						12			
		Sole-sourcing					1			1			
		Single-sourcing		1						1			
	Supplier-led practice	Customer portfolio management				1		2		3	3		
	Joint practices	Joint SCRM	1	10	1	1	2				15		150
		Joint planning	5	11	1	6	1		1		25		
		Joint problem solving	2	9		1					12		
		Joint decision making	6	13	3	3		2	1		28		
		Information/knowledge sharing	11	22	3	3	15	2	2		58		
		Best practice sharing		1							1		
		Co-location		1							1		
		Contract	1	7	1	2					11		
Network characteristics	Supply-base complexity	3	2							5	9		
	Scale-free network structure	1	3							4			
Relational capital	Relationship closeness		4	19	3	7	3	4	3	43	91	91	
	Reciprocity		5	8	3	3	2		4	26			
	Trust		3	17	1	1		1					22
Cognitive capital	Shared codes and language		1	2						3	7	7	
	Shared narrative		1	3						4			
Total			50	155	19	29	23	13	13	302			

CAPTION

	No papers
	One paper only
	Two or more papers

Second, ample information on structural and relational dimensions of CIRs was available in the SCR literature. Nevertheless, research on cognitive capital remains limited, despite the dimension's embeddedness and importance in other social capital dimensions (Nahapiet and Ghoshal, 1998). Only five pieces were found in the sample highlighting some elements of cognitive capital (Chowdhury *et al.*, 2019; Fan and Stevenson, 2018; Gupta and Gupta, 2019; Johnson *et al.*, 2013; Manhart *et al.*, 2020) such as shared languages, narratives, codes and cultures. How these elements interrelate, and their roles in SCRs remain superficial in the literature, despite research calls on cultural congruence (e.g. Revilla and Saenz, 2017). Indeed,

Gupta and Gupta (2019) point out how little we know about the influence of national cultures (e.g. individualistic, collectivist and feminist) on risk-taking behaviors such as willingness to report errors, negotiation coalition, opportunism, uncertainty avoidance, lies and governance preferences. Cognitive and structural capitals influence relational capital (Carey *et al.*, 2010; Tsai and Ghoshal, 1998), but counter-intuitively, structural capital does not affect cognitive capital as groups can share values and beliefs without interacting (Tsai and Ghoshal, 1998). Could cognitive capital antecede structural capital, hence setting off both structural and relational capitals? Investigating sub-dimensions of cognitive capital, how they interact but also impact

relational and structural capital in affecting SCRs is yet to be achieved. Qualitative work could help thoroughly operationalize cognitive capital, and understand it contextually and longitudinally in the face of SCRs such as the COVID-19 pandemic. Also, qualitative research focused on shared languages, for instance, could use ethnomethodology or symbolic interactionism to study how language or body language interrelate with CIRs and SCRs. Furthermore, quantitative research could be beneficial, for example, in assessing how cognitive capital embedded in CIRs account for the variation of SCRs or resilience.

Third, the literature revealed a high number of dyadic articles. The embeddedness of dyads in networks shows that dyads and networks affect each other. However, empirical approaches, in network contexts, were scarce in the sample. Making use of network position characteristics and connectedness indicators could be valuable to understand how CIRs affect SCRs such as late delivery or bad reputation. Social network analysis, through relationship intensity valuations in graphs (e.g. trust intensity or power imbalance), would be a helpful tool to study relationships between network-level CIRs, SCRs and associated propagations. The work could consist of complete network mappings of focal firms' suppliers with information collected from both buyers and suppliers instead of only reporting buyers' perspectives, as seen in most dyadic studies, thus far.

4.3 Theoretical and practical contributions

To date, the multiplexity of CIRs and their interactions with SCRs remain scattered and unconsolidated. This review fills this gap by offering a theoretical articulation of how various aspects of CIRs affect SCRs differently.

Theoretically, the contributions of this review are threefold. First, this study extends the supply chain and social capital literature. Indeed, the classification of CIRs through the lens of social capital could be useful for future research to determine the role and complexity of CIRs in SCRs. Second, this review provides an up-to-date synthesis of the interrelationships between CIRs and different SCRs. Third, this paper suggests future research avenues.

Practically, the insights of this review can aid managers in making key decisions for their organizations. Understanding the important role of social capital can allow for more informed choices when considering areas such as joint practices, partner selections, supplier management, contractual terms, sourcing practices, relationship closeness and network configurations.

References

- Aboah, J., Wilson, M.M., Rich, K.M. and Lyne, M.C. (2019), "Operationalising resilience in tropical agricultural value chains", *Supply Chain Management: An International Journal*, Vol. 24 No. 2, pp. 271-300.
- Ali, A., Mahfouz, A. and Arisha, A. (2017a), "Analysing supply chain resilience: integrating the constructs in a concept mapping framework via a systematic literature review", *Supply Chain Management: An International Journal*, Vol. 22 No. 1, pp. 16-39.
- Ali, I., Nagalingam, S. and Gurd, B. (2017b), "Building resilience in SMEs of perishable product supply chains: enablers, barriers and risks", *Production Planning & Control*, Vol. 28 No. 15, pp. 1236-1250.
- Arnold, V., Benford, T., Hampton, C. and Sutton, S.G. (2010), "Competing pressures of risk and absorptive capacity potential on commitment and information sharing in global supply chains", *European Journal of Information Systems*, Vol. 19 No. 2, pp. 134-152.
- Bevilacqua, M., Ciarapica, F.E., Marcucci, G. and Mazzuto, G. (2019), "Fuzzy cognitive maps approach for analysing the domino effect of factors affecting supply chain resilience: a fashion industry case study", *International Journal of Production Research*, pp. 1-29.
- Bhimani, A. and Ncube, M. (2006), "Virtual integration costs and the limits of supply chain scalability", *Journal of Accounting and Public Policy*, Vol. 25 No. 4, pp. 390-408.
- Bigdeli, A.Z., Bustinza, O.F., Vendrell-Herrero, F. and Baines, T. (2018), "Network positioning and risk perception in servitization: evidence from the UK road transport industry", *International Journal of Production Research*, Vol. 56 No. 6, pp. 2169-2183.
- Billington, C. (2010), "Cycles are cycles", *Journal of Supply Chain Management*, Vol. 46 No. 1, pp. 5-6.
- Bird, R.C. and Soundararajan, V. (2018), "The role of precontractual signals in creating sustainable global supply chains", *Journal of Business Ethics*, Vol. 164 No. 1.
- Bowersox, D. (1999), "Lean launch: managing product introduction risk through response-based logistics", *Journal of Product Innovation Management*, Vol. 16 No. 6, pp. 557-568.
- Brandon-Jones, E., Squire, B., Autry, C. and Petersen, K.J. (2014), "A contingent resource-based perspective of supply chain resilience and robustness", *Journal of Supply Chain Management*, Vol. 50 No. 3, pp. 55-73.
- Braunscheidel, M.J. and Suresh, N.C. (2009), "The organizational antecedents of a firm's supply chain agility for risk mitigation and response", *Journal of Operations Management*, Vol. 27 No. 2, pp. 119-140.
- Briner, B.R. and Denyer, D. (2012), "Systematic review and evidence synthesis as a practice and scholarship tool", in Rousseau, M.D. (Ed.), *The Oxford Handbook of Evidence-Based Management*, Oxford University Press, Oxford, pp. 112-129.
- Brusset, X. and Teller, C. (2017), "Supply chain capabilities, risks, and resilience", *International Journal of Production Economics*, Vol. 184, pp. 59-68.
- Carey, S., Lawson, B. and Krause, D.R. (2010), "Social capital configuration, legal bonds and performance in buyer-supplier relationships", *Journal of Operations Management*, Vol. 29 No. 4, pp. 277-288.
- Chen, J., Sohal, A.S. and Prajogo, D.I. (2013), "Supply chain operational risk mitigation: a collaborative approach", *International Journal of Production Research*, Vol. 51 No. 7, pp. 2186-2199.
- Chen, J., Sohal, A.S. and Prajogo, D.I. (2016), "Supply risk mitigation: a multi-theoretical perspective", *Production Planning & Control*, Vol. 27 No. 10, pp. 853-863.
- Cheng, J.H. and Lu, K.L. (2017), "Enhancing effects of supply chain resilience: insights from trajectory and resource-based

- perspectives”, *Supply Chain Management: An International Journal*, Vol. 22 No. 4, pp. 329–340.
- Cheng, T., Yip, F. and Yeung, A. (2012), “Supply risk management via Guanxi in the Chinese business context: the buyers perspective”, *International Journal of Production Economics*, Vol. 139 No. 1, pp. 3–13.
- Choi, T.Y. and Krause, D.R. (2006), “The supply base and its complexity: implications for transaction costs, risks, responsiveness, and innovation”, *Journal of Operations Management*, Vol. 24 No. 5, pp. 637–652.
- Chopra, S. and Sodhi, M.S. (2004), “Managing risk to avoid: supply-chain breakdown”, *Sloan Management Review*, Vol. 46 No. 1, pp. 53–61.
- Chowdhury, M.M.H. and Quaddus, M. (2016), “Supply chain readiness, response and recovery for resilience”, *Supply Chain Management: An International Journal*, Vol. 21 No. 6, pp. 709–731.
- Chowdhury, M.M.H. and Quaddus, M.A. (2015), “A multiple objective optimization based QFD approach for efficient resilient strategies to mitigate supply chain vulnerabilities: the case of garment industry of Bangladesh”, *Omega*, Vol. 57, pp. 5–21.
- Chowdhury, P., Lau, K.H. and Pittayachawan, S. (2019), “Operational supply risk mitigation of SME and its impact on operational performance”, *International Journal of Operations & Production Management*, Vol. 39 No. 4, pp. 478–502.
- Ciulli, F., Kolk, A. and Boe-Lillegraven, S. (2019), “Circularity brokers: digital platform organizations and waste recovery in food supply chains”, *Journal of Business Ethics*, Vol. 167 No. 2.
- Cohen, M.A., Cull, C., Lee, H.L. and Willen, D. (2000), “Saturn’s supply chain innovation: high value in after-sales service”, *Sloan Management Review*, Vol. 41 No. 4, pp. 93–101.
- Colicchia, C., Creazza, A. and Menachof, D.A. (2019a), “Managing cyber and information risks in supply chains: insights from an exploratory analysis”, *Supply Chain Management: An International Journal*, Vol. 24 No. 2, pp. 215–240.
- Colicchia, C., Creazza, A., Noè, C. and Strozzi, F. (2019b), “Information sharing in supply chains: a review of risks and opportunities using the systematic literature network analysis (SLNA)”, *Supply Chain Management: An International Journal*, Vol. 24 No. 1, pp. 5–21.
- 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.
- Cruz, J.M. and Liu, Z. (2011), “Modeling and analysis of the multiperiod effects of social relationship on supply chain networks”, *European Journal of Operational Research*, Vol. 214 No. 1, pp. 39–52.
- Dabhilkar, M., Birkie, S.E. and Kaulio, M. (2016), “Supply-side resilience as practice bundles: a critical incident study”, *International Journal of Operations & Production Management*, Vol. 36 No. 8, pp. 948–970.
- Dahlmann, F. and Roehrich, J.K. (2019), “Sustainable supply chain management and partner engagement to manage climate change information”, *Business Strategy and the Environment*, Vol. 28 No. 8, pp. 1632–1647.
- Daultani, Y., Kumar, S., Vaidya, O.S. and Tiwari, M.K. (2015), “A supply chain network equilibrium model for operational and opportunism risk mitigation”, *International Journal of Production Research*, Vol. 53 No. 18, pp. 5685–5715.
- Day, J.M. (2014), “Fostering emergent resilience: the complex adaptive supply network of disaster relief”, *International Journal of Production Research*, Vol. 52 No. 7, pp. 1970–1988.
- Dekker, H.C., Sakaguchi, J. and Kawai, T. (2013), “Beyond the contract: managing risk in supply chain relations”, *Management Accounting Research*, Vol. 24 No. 2, pp. 122–139.
- Du, T.C.T., Lee, H.M. and Chen, A. (2003), “Constructing federated databases in coordinated supply chains”, *Decision Support Systems*, Vol. 36 No. 1, pp. 49–64.
- Dubey, R., Gunasekaran, A., Bryde, D.J., Dwivedi, Y.K. and Papadopoulos, T. (2020), “Blockchain technology for enhancing swift-trust, collaboration and resilience within a humanitarian supply chain setting”, *International Journal of Production Research*, Vol. 58 No. 11, pp. 1–18.
- Dubey, R., Gunasekaran, A., Childe, S.J., Papadopoulos, T., Blome, C. and Luo, Z. (2019), “Antecedents of resilient supply chains: an empirical study”, *IEEE Transactions on Engineering Management*, Vol. 66 No. 1, pp. 8–19.
- Duhadway, S., Talluri, S., Ho, W. and Buckhoff, T. (2020), “Light in dark places: the hidden world of supply chain fraud”, *IEEE Transactions on Engineering Management*, pp. 1–14.
- Durach, C.F. and Machuca, J.A. (2018), “A matter of perspective – the role of interpersonal relationships in supply chain risk management”, *International Journal of Operations & Production Management*, Vol. 38 No. 10, pp. 1866–1887.
- Eckerd, A. and Girth, A.M. (2017), “Designing the buyer-supplier contract for risk management: assessing complexity and mission criticality”, *Journal of Supply Chain Management*, Vol. 53 No. 3, pp. 60–75.
- Ellegaard, C. (2008), “Supply risk management in a small company perspective”, *Supply Chain Management: An International Journal*, Vol. 13 No. 6, pp. 425–434.
- Fan, Y. and Stevenson, M. (2018), “Reading on and between the lines: risk identification in collaborative and adversarial buyer–supplier relationships”, *Supply Chain Management: An International Journal*, Vol. 23 No. 4, pp. 351–376.
- Fan, Y. and Stevenson, M. (2019), “Non-linear effects of relational capital on supply-side resilience”, *International Journal of Operations & Production Management*, Vol. 39 Nos 9/10, pp. 1053–1075.
- Fan, H., Li, G., Sun, H. and Cheng, T. (2017), “An information processing perspective on supply chain risk management: antecedents, mechanism, and consequences”, *International Journal of Production Economics*, Vol. 185, pp. 63–75.
- Finch, P. (2004), “Supply chain risk management”, *Supply Chain Management: An International Journal*, Vol. 9 No. 2, pp. 183–196.
- Gallea, D., Ghobadian, A. and He, Q. (2015), “The mediating effect of environmental and ethical behaviour on supply chain partnership decisions and management

- appreciation of supplier partnership risks”, *International Journal of Production Research*, Vol. 53 No. 21, pp. 6455–6472.
- Gaur, J., Amini, M. and Rao, A.K. (2019), “The impact of supply chain disruption on the closed-loop supply chain configuration profit: a study of sourcing policies”, *International Journal of Production Research*, Vol. 58 No. 17, pp. 1–21.
- Gold, S., Trautrimis, A. and Trodd, Z. (2015), “Modern slavery challenges to supply chain management”, *Supply Chain Management: An International Journal*, Vol. 20 No. 5, pp. 485–494.
- Gölgeci, I. and Kuivalainen, O. (2020), “Does social capital matter for supply chain resilience? The role of absorptive capacity and marketing-supply chain management alignment”, *Industrial Marketing Management*, Vol. 84, pp. 63–74.
- Govindan, K. and Chaudhuri, A. (2016), “Interrelationships of risks faced by third party logistics service providers: a DEMATEL based approach”, *Transportation Research Part E: Logistics and Transportation Review*, Vol. 90, pp. 177–195.
- Grötsch, V.M., Blome, C. and Schleper, M.C. (2013), “Antecedents of proactive supply chain risk management – a contingency theory perspective”, *International Journal of Production Research*, Vol. 51 No. 10, pp. 2842–2867.
- Gunasekaran, A., Subramanian, N. and Rahman, S. (2015), “Supply chain resilience: role of complexities and strategies”, *International Journal of Production Research*, Vol. 53 No. 22, pp. 6809–6819.
- Gupta, M. and Gupta, S. (2019), “Influence of national cultures on operations management and supply chain management practices – a research agenda”, *Production and Operations Management*, Vol. 28 No. 11, pp. 2681–2698.
- Ha, B.C., Park, Y.K. and Cho, S. (2011), “Suppliers affective trust and trust in competency in buyers”, *International Journal of Operations & Production Management*, Vol. 31 No. 1, pp. 56–77.
- Habermann, M., Blackhurst, J. and Metcalf, A.Y. (2015), “Keep your friends close? Supply chain design and disruption risk”, *Decision Sciences*, Vol. 46 No. 3, pp. 491–526.
- Hajmohammad, S. and Vachon, S. (2016), “Mitigation, avoidance, or acceptance? Managing supplier sustainability risk”, *Journal of Supply Chain Management*, Vol. 52 No. 2, pp. 48–65.
- Hendricks, K.B. and Singhal, V.R. (2005), “An empirical analysis of the effect of supply chain disruptions on long-run stock price performance and equity risk of the firm”, *Production and Operations Management*, Vol. 14 No. 1, pp. 35–52.
- Hendry, L.C., Stevenson, M., Macbryde, J., Ball, P., Sayed, M. and Liu, L. (2019), “Local food supply chain resilience to constitutional change: the brexit effect”, *International Journal of Operations & Production Management*, Vol. 39 No. 3, pp. 429–453.
- Ho, W., Zheng, T., Yildiz, H. and Talluri, S. (2015), “Supply chain risk management: a literature review”, *International Journal of Production Research*, Vol. 53 No. 16, pp. 5031–5069.
- Hu, N., Ke, J.Y.F., Liu, L. and Zhang, Y. (2018), “Risk pooling, supply chain hierarchy, and analysts’ forecasts”, *Production and Operations Management*, Vol. 28 No. 2, pp. 276–291.
- Hu, W., Shou, Y., Kang, M. and Park, Y. (2019), “Risk management of manufacturing multinational corporations: the moderating effects of international asset dispersion and supply chain integration”, *Supply Chain Management: An International Journal*, Vol. 25 No. 1, pp. 61–76.
- Hua, Z., Sun, Y. and Xu, X. (2011), “Operational causes of bankruptcy propagation in supply chain”, *Decision Support Systems*, Vol. 51 No. 3, pp. 671–681.
- Jain, V., Kumar, S., Soni, U. and Chandra, C. (2017), “Supply chain resilience: model development and empirical analysis”, *International Journal of Production Research*, Vol. 55 No. 22, pp. 6779–6800.
- Jajja, M.S.S., Chatha, K.A. and Farooq, S. (2018), “Impact of supply chain risk on agility performance: mediating role of supply chain integration”, *International Journal of Production Economics*, Vol. 205, pp. 118–138.
- Johnsen, T., Howard, M. and Miemczyk, J. (2009), “UK defence change and the impact on supply relationships”, *Supply Chain Management: An International Journal*, Vol. 14 No. 4, pp. 270–279.
- Johnson, N., Elliott, D. and Drake, P. (2013), “Exploring the role of social capital in facilitating supply chain resilience”, *Supply Chain Management: An International Journal*, Vol. 18 No. 3, pp. 324–336.
- Jüttner, U. and Maklan, S. (2011), “Supply chain resilience in the global financial crisis: an empirical study”, *Supply Chain Management: An International Journal*, Vol. 16 No. 4, pp. 246–259.
- Kalaitzi, D., Matopoulos, A., Bourlakis, M. and Tate, W. (2019), “Supply chains under resource pressure”, *International Journal of Operations & Production Management*, Vol. 39 No. 12, pp. 1323–1354.
- Kauppi, K., Longoni, A., Caniato, F. and Kuula, M. (2016), “Managing country disruption risks and improving operational performance: risk management along integrated supply chains”, *International Journal of Production Economics*, Vol. 182, pp. 484–495.
- Khan, O., Christopher, M. and Creazza, A. (2012), “Aligning product design with the supply chain: a case study”, *Supply Chain Management: An International Journal*, Vol. 17 No. 3, pp. 323–336.
- Kim, Y.H. and Henderson, D. (2015), “Financial benefits and risks of dependency in triadic supply chain relationships”, *Journal of Operations Management*, Vol. 36 No. 1, pp. 115–129.
- Kim, Y., Chen, Y.S. and Linderman, K. (2015b), “Supply network disruption and resilience: a network structural perspective”, *Journal of Operations Management*, Vols 33/34 No. 1, pp. 43–59.
- Kim, Y., Choi, T.Y. and Skilton, P.F. (2015a), “Buyer-supplier embeddedness and patterns of innovation”, *International Journal of Operations & Production Management*, Vol. 35 No. 3, pp. 318–345.
- Kleindorfer, P.R. and Saad, G.H. (2005), “Managing disruption risks in supply chains”, *Production and Operations Management*, Vol. 14 No. 1, pp. 53–68.
- Krause, D.R., Handfield, R.B. and Tyler, B.B. (2006), “The relationships between supplier development, commitment, social capital accumulation and performance improvement”, *Journal of Operations Management*, Vol. 25 No. 2, pp. 528–545.

- Kumar, S. and Havey, T. (2013), "Before and after disaster strikes: a relief supply chain decision support framework", *International Journal of Production Economics*, Vol. 145 No. 2, pp. 613–629.
- Kwak, D.W., Rodrigues, V.S., Mason, R., Pettit, S. and Beresford, A. (2018), "Risk interaction identification in international supply chain logistics", *International Journal of Operations & Production Management*, Vol. 38 No. 2, pp. 372–389.
- Laequddin, M., Sardana, G., Sahay, B., Waheed, K.A. and Sahay, V. (2009), "Supply chain partners trust building process through risk evaluation: the perspectives of UAE packaged food industry", *Supply Chain Management: An International Journal*, Vol. 14 No. 4, pp. 280–290.
- Lam, J.S.L. and Bai, X. (2016), "A quality function deployment approach to improve maritime supply chain resilience", *Transportation Research Part E: Logistics and Transportation Review*, Vol. 92, pp. 16–27.
- Lavastre, O., Gunasekaran, A. and Spalanzani, A. (2012), "Supply chain risk management in French companies", *Decision Support Systems*, Vol. 52 No. 4, pp. 828–838.
- Lavastre, O., Gunasekaran, A. and Spalanzani, A. (2014), "Effect of firm characteristics, supplier relationships and techniques used on supply chain risk management (SCRM): an empirical investigation on French industrial firms", *International Journal of Production Research*, Vol. 52 No. 11, pp. 3381–3403.
- Lawson, B., Tyler, B.B. and Cousins, P.D. (2007), "Antecedents and consequences of social capital on buyer performance improvement", *Journal of Operations Management*, Vol. 26 No. 3, pp. 446–460.
- Leat, P. and Revoredo-Giha, C. (2013), "Risk and resilience in Agri-food supply chains: the case of the ASDA PorkLink supply chain in Scotland", *Supply Chain Management: An International Journal*, Vol. 18 No. 2, pp. 219–231.
- Ledwoch, A., Yasarcan, H. and Brintrup, A. (2018), "The moderating impact of supply network topology on the effectiveness of risk management", *International Journal of Production Economics*, Vol. 197, pp. 13–26.
- Lei, Z., Lim, M.K., Cui, L. and Wang, Y. (2019), "Modelling of risk transmission and control strategy in the transnational supply chain", *International Journal of Production Research*, pp. 1–20.
- Levalle, R.R. and Nof, S.Y. (2015), "Resilience by teaming in supply network formation and re-configuration", *International Journal of Production Economics*, Vol. 160, pp. 80–93.
- Li, Y., Zobel, C.W., Seref, O. and Chatfield, D. (2019), "Network characteristics and supply chain resilience under conditions of risk propagation", *International Journal of Production Economics*, p. 107529.
- Lima, F.R.P.D., Silva, A.L.D., Filho, M.G. and Dias, E.M. (2018), "Systematic review: resilience enablers to combat counterfeit medicines", *Supply Chain Management: An International Journal*, Vol. 12 No. 3, pp. 117–135.
- Liu, C.L., Shang, K.C., Lirn, T.C., Lai, K.H. and Lun, Y.V. (2018), "Supply chain resilience, firm performance, and management policies in the liner shipping industry", *Transportation Research Part A: Policy and Practice*, Vol. 110, pp. 202–219.
- Lorentz, H., Töyli, J., Solakivi, T. and Ojala, L. (2016), "The effect of a geographically dispersed supply base on downside risk: developing and testing the N-shaped theory", *International Business Review*, Vol. 25 No. 4, pp. 872–882.
- Manhart, P., Summers, J.K. and Blackhurst, J. (2020), "A meta-analytic review of supply chain risk management: assessing buffering and bridging strategies and firm performance", *Journal of Supply Chain Management*, Vol. 56 No. 3, doi: [10.1111/jscm.12219](https://doi.org/10.1111/jscm.12219).
- Matthews, R.L. and Marzec, P.E. (2012), "Social capital, a theory for operations management: a systematic review of the evidence", *International Journal of Production Research*, Vol. 50 No. 24, pp. 7081–7099.
- Miles, M.B. and Huberman, A.M. (1994), *Qualitative Data Analysis: An Expanded Sourcebook*, Sage.
- Mishra, D., Sharma, R., Kumar, S. and Dubey, R. (2016), "Bridging and buffering: strategies for mitigating supply risk and improving supply chain performance", *International Journal of Production Economics*, Vol. 180, pp. 183–197.
- Nahapiet, J. and Ghoshal, S. (1998), "Social capital, intellectual capital, and the organizational advantage", *Academy of Management Review*, Vol. 23 No. 2, p. 242.
- Namdar, J., Li, X., Sawhney, R. and Pradhan, N. (2017), "Supply chain resilience for single and multiple sourcing in the presence of disruption risks", *International Journal of Production Research*, Vol. 56 No. 6, pp. 2339–2360.
- Oliveira, M.P.V.D. and Handfield, R. (2017), "An enactment theory model of supplier financial disruption risk mitigation", *Supply Chain Management: An International Journal*, Vol. 22 No. 5, pp. 442–457.
- Raghunathan, S. (1999), "Interorganizational collaborative forecasting and replenishment systems and supply chain implications", *Decision Sciences*, Vol. 30 No. 4, pp. 1053–1071.
- Rajesh, R., Ravi, V. and Rao, R.V. (2015), "Selection of risk mitigation strategy in electronic supply chains using grey theory and digraph-matrix approaches", *International Journal of Production Research*, Vol. 53 No. 1, pp. 238–257.
- Rasouli, M.R. (2018), "Intelligent process-aware information systems to support agility in disaster relief operations: a survey of emerging approaches", *International Journal of Production Research*, Vol. 57 No. 6, pp. 1857–1872.
- Revilla, E. and Saenz, M.J. (2017), "The impact of risk management on the frequency of supply chain disruptions", *International Journal of Operations & Production Management*, Vol. 37 No. 5, pp. 557–576.
- Ritchie, B. and Brindley, C. (2007), "Supply chain risk management and performance", *International Journal of Operations & Production Management*, Vol. 27 No. 3, pp. 303–322.
- Roden, S. and Lawson, B. (2014), "Developing social capital in buyer-supplier relationships: the contingent effect of relationship-specific adaptations", *International Journal of Production Economics*, Vol. 151, pp. 89–99.
- Rudolf, C.A. and Spinler, S. (2018), "Key risks in the supply chain of large scale engineering and construction projects", *Supply Chain Management: An International Journal*, Vol. 23 No. 4, pp. 336–350.
- Sá, M.M.D., Miguel, P.L.D.S., Brito, R.P.D. and Pereira, S.C.F. (2019), "Supply chain resilience: the whole is not the sum of the

- parts”, *International Journal of Operations & Production Management*, Vol. 40 No. 1, pp. 92–115.
- Sambasivan, M., Siew-Phaik, L., Mohamed, Z.A. and Leong, Y.C. (2013), “Factors influencing strategic alliance outcomes in a manufacturing supply chain: role of alliance motives, interdependence, asset specificity and relational capital”, *International Journal of Production Economics*, Vol. 141 No. 1, pp. 339–351.
- Sawyer, E. and Harrison, C. (2019), “Developing resilient supply chains: lessons from high-reliability organisations”, *Supply Chain Management: An International Journal*, Vol. 25 No. 1, pp. 77–100.
- 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.
- Scholten, K., Scott, P.S. and Fynes, B. (2014), “Mitigation processes – antecedents for building supply chain resilience”, *Supply Chain Management: An International Journal*, Vol. 19 No. 2, pp. 211–228.
- Scholten, K., Scott, P.S. and Fynes, B. (2019), “Building routines for non-routine events: supply chain resilience learning mechanisms and their antecedents”, *Supply Chain Management: An International Journal*, Vol. 24 No. 3, pp. 430–442.
- Sinha, P.R., Whitman, L.E. and Malzahn, D. (2004), “Methodology to mitigate supplier risk in an aerospace supply chain”, *Supply Chain Management: An International Journal*, Vol. 9 No. 2, pp. 154–168.
- Smith, G.E., Watson, K.J., Baker, W.H. and Ii, J.A.P. (2007), “A critical balance: collaboration and security in the IT-enabled supply chain”, *International Journal of Production Research*, Vol. 45 No. 11, pp. 2595–2613.
- Statsenko, L., Gorod, A. and Ireland, V. (2018), “A complex adaptive systems governance framework for regional supply networks”, *Supply Chain Management: An International Journal*, Vol. 23 No. 4, pp. 293–312.
- Stevenson, M. and Cole, R. (2018), “Modern slavery in supply chains: a secondary data analysis of detection, remediation and disclosure”, *Supply Chain Management: An International Journal*, Vol. 12 No. 3, pp. 81–99.
- Stone, J. and Rahimifard, S. (2018), “Resilience in Agri-food supply chains: a critical analysis of the literature and synthesis of a novel framework”, *Supply Chain Management: An International Journal*, Vol. 23 No. 3, pp. 207–238.
- Subramanian, N., Rahman, S. and Abdulrahman, M.D. (2015), “Sourcing complexity in the Chinese manufacturing sector: an assessment of intangible factors and contractual relationship strategies”, *International Journal of Production Economics*, Vol. 166, pp. 269–284.
- Sun, Y., Xu, X. and Hua, Z. (2012), “Mitigating bankruptcy propagation through contractual incentive schemes”, *Decision Support Systems*, Vol. 53 No. 3, pp. 634–645.
- Tan, W.J., Zhang, A.N. and Cai, W. (2019), “A graph-based model to measure structural redundancy for supply chain resilience”, *International Journal of Production Research*, Vol. 57 No. 20, pp. 6385–6404.
- Tang, C.S. (2006), “Perspectives in supply chain risk management”, *International Journal of Production Economics*, Vol. 103 No. 2, pp. 451–488.
- Todo, Y., Nakajima, K. and Matous, P. (2015), “How do supply chain networks affect the resilience of firms to natural disasters? Evidence from the great east Japan earthquake”, *Journal of Regional Science*, Vol. 55 No. 2, pp. 209–229.
- Touboulic, A., Chicksand, D. and Walker, H. (2014), “Managing imbalanced supply chain relationships for sustainability: a power perspective”, *Decision Sciences*, Vol. 45 No. 4, pp. 577–619.
- Tsai, W. and Ghoshal, S. (1998), “Social capital and value creation: the role of intrafirm networks”, *Academy of Management Journal*, Vol. 41 No. 4, pp. 464–476.
- Tse, Y.K. and Tan, K.H. (2011), “Managing product quality risk in a multi-tier global supply chain”, *International Journal of Production Research*, Vol. 49 No. 1, pp. 139–158.
- Tse, Y.K., Zhang, M. and Jia, F. (2018), “The effects of risk and reward sharing on quality performance”, *International Journal of Operations & Production Management*, Vol. 38 No. 12, pp. 2367–2388.
- Tse, Y.K., Zhang, M., Tan, K.H., Pawar, K. and Fernandes, K. (2019), “Managing quality risk in supply chain to drive firms performance: the roles of control mechanisms”, *Journal of Business Research*, Vol. 97, pp. 291–303.
- Tukamuhabwa, B.R., Stevenson, M., Busby, J. and Zorzini, M. (2015), “Supply chain resilience: definition, review and theoretical foundations for further study”, *International Journal of Production Research*, Vol. 53 No. 18, pp. 5592–5623.
- Urciuoli, L., Mohanty, S., Hints, J. and Boekesteijn, E.G. (2014), “The resilience of energy supply chains: a multiple case study approach on oil and gas supply chains to Europe”, *Supply Chain Management: An International Journal*, Vol. 19 No. 1, pp. 46–63.
- Vlajic, J.V., Vorst, J.G.V.D. and Haijema, R. (2012), “A framework for designing robust food supply chains”, *International Journal of Production Economics*, Vol. 137 No. 1, pp. 176–189.
- Wagner, S.M. and Silveira-Camargos, V. (2012), “Managing risks in just-in-sequence supply networks: exploratory evidence from automakers”, *IEEE Transactions on Engineering Management*, Vol. 59 No. 1, pp. 52–64.
- Waters-Fuller, N. (1995), “Just-in-time purchasing and supply: a review of the literature”, *International Journal of Operations and Production Management*, Vol. 15 No. 9, pp. 220–236.
- Wiengarten, F., Humphreys, P., Gimenez, C. and Mcivor, R. (2016), “Risk, risk management practices, and the success of supply chain integration”, *International Journal of Production Economics*, Vol. 171, pp. 361–370.
- Yang, C.C. and Hsu, W.L. (2018), “Evaluating the impact of security management practices on resilience capability in maritime firms – a relational perspective”, *Transportation Research Part A: Policy and Practice*, Vol. 110, pp. 220–233.
- Zeng, B. and Yen, B.P.C. (2017), “Rethinking the role of partnerships in global supply chains: a risk-based perspective”, *International Journal of Production Economics*, Vol. 185, pp. 52–62.
- Zhang, J., Chen, X. and Fang, C. (2018), “Transmission of a supplier’s disruption risk along the supply chain: a further investigation of the Chinese automotive industry”, *Production Planning & Control*, Vol. 29 No. 9, pp. 773–789.

- Zhang, D.Y., Zeng, Y., Wang, L., Li, H. and Geng, Y. (2011), "Modeling and evaluating information leakage caused by inferences in supply chains", *Computers in Industry*, Vol. 62 No. 3, pp. 351-363.
- Zhao, K., Zuo, Z. and Blackhurst, J.V. (2019), "Modelling supply chain adaptation for disruptions: an empirically grounded complex adaptive systems approach", *Journal of Operations Management*, Vol. 65 No. 2, pp. 190-212.
- Zhao, L., Huo, B., Sun, L. and Zhao, X. (2013), "The impact of supply chain risk on supply chain integration and

- company performance: a global investigation", *Supply Chain Management: An International Journal*, Vol. 18 No. 2, pp. 115-131.
- Zhao, R., Mashruwala, R., Pandit, S. and Balakrishnan, J. (2019), "Supply chain relational capital and the bullwhip effect", *International Journal of Operations & Production Management*, Vol. 39 No. 5, pp. 658-689.

Corresponding author

Anis Daghar can be contacted at: a.daghar@cranfield.ac.uk