

1. Dealing with the unpredictable: supply chain resilience

1.1 Introduction

It is estimated that almost three quarters of organisations experience a supply chain disruption each year (BCI, 2018), i.e. an event that impacts the flow of goods, materials and/ or services (Craighead *et al.*, 2007), thereby limiting the ability of an organisation to serve the end consumer (Jüttner, 2005). The disruptions felt by supply chains are wide ranging. For example, while some originate from within the supply chain, such as a production line break down, IT problems, demand fluctuations, sustainability issues or quality problems, others are external and due, amongst other causes, to labour strikes, regulatory changes, weather conditions, financial turbulence, terrorism and counterfeiting. This breadth of threat also reminds us that disruptions can be man-made and somewhat controllable or a result of the natural environment and consequently more unpredictable. Meanwhile, the performance impact of such events is also dependent on the severity and duration of the disruption as well as on the supply chain's competency and experience in dealing with disruptions and threats.

Some organisations are better able to reduce the severity and duration of disruptions to their supply chains than their competitors; and it is argued that this is because they are more resilient (Christopher and Peck, 2004; Sheffi and Rice, 2005). Supply chain resilience (SCRes) can be an important strategic weapon in the current competitive environment and is at the heart of contemporary supply chain management thinking and research (Melnyk *et al.*, 2014; Pettit *et al.*, 2019). SCRes is the capability of supply chains to operate in the face of disturbances and disruptions with or without a limited decrease in their performance (Christopher and Peck, 2004). The review by Tukamuhabwa *et al.* (2015, p. 8) defined SCRes not only in terms of the ability of “a supply chain to prepare for and/or respond to disruptions, to make a timely and cost effective recovery, and therefore progress to a post-disruption state of operations” but also in terms of its ability to re-emerge in “ideally, a better state than prior to the disruption” thereby gaining ground on the competition by bouncing back or taking advantage of new opportunities better than other firms that were affected.

The concept of SCRes has received significant attention in recent years from practitioners. For example, a survey by the World Economic Forum (2013) revealed that more than 80 per cent of companies are concerned about the resilience of their supply chains; and the Business Continuity Institute found that disruptions cost 10 per cent of firms more than €1m per year and as much as €101–250m (BCI, 2018). Consequently, SCRes has become a topic of significant academic attention (e.g. Sheffi, 2005; Brandon-Jones *et al.*, 2014; Ambulkar *et al.*, 2015; Hohenstein *et al.*, 2015; Scholten and Schilder, 2015; Stevenson and Busby, 2015; Kamalahmadi and Parast, 2016; Purvis *et al.*, 2016; Tukamuhabwa *et al.*, 2017; MacDonald *et al.*, 2018; Scholten *et al.*, 2019). Further, resilience as a theme has become important not only in industries such as insurance, food, automotive, and electronics but also as an area for governmental and inter-governmental attention, as reflected in calls for H2020 projects on, for instance, city resilience. Hence, achieving and increasing SCRes is high on the agenda of researchers, organisations, supply chains, industries, governments, and economic institutions.

2. Aims of the special issue

Despite the attention, growth in publications and the research progress made in SCRes to date, it has been highlighted that the empirical base and exploration of SCRes is limited so far (e.g. Tukamuhabwa *et al.*, 2015) and that a considerable part of the available SCRes literature



is conceptual in nature (e.g. Ponomarov and Holcomb, 2009). At the same time, several recent literature reviews on the topic (e.g. Hohenstein *et al.*, 2015; Tukamuhabwa *et al.*, 2015; Kamalahmadi and Parast, 2016; Ali *et al.*, 2017; Kochan and Nowicki, 2018; Stone and Rahimifard, 2018) have shown that SCRes research has established supply chain principles that underpin resilience (Christopher and Peck, 2004; Sheffi, 2005); identified and explored formative elements of resilience (e.g. Jüttner and Maklan, 2011) and their interrelationship (e.g. Brandon-Jones *et al.*, 2014; Scholten and Schilder, 2015; Gligor *et al.*, 2019); studied SCRes in specific contexts, such as disaster relief (e.g. Day, 2014; Scholten *et al.*, 2014) and the agri-food industry (Leat and Revoredo-Giha, 2013); related resilience to sustainability (e.g. Fahimnia and Jabbarzadeh, 2016; Ivanov, 2018); and begun to examine the impact of big data analytics and innovative technologies on resilience (e.g. Papadopoulos *et al.*, 2017; Dubey *et al.*, 2019; Min, 2019).

Notwithstanding the above contributions, there remains much scope for further work. For example, we know relatively little about what constitutes SCRes beyond top-level generic supply chain strategies; how strategies for building SCRes relate to one another; if and how SCRes can be measured before the unexpected happens; how SCRes relates to other supply chain concepts that help to improve performance, including supply chain integration, sustainability, quality management and lean; and there is limited understanding of behavioural aspects of building resilience. Further, most studies to date have focussed on resilience at the organisational level rather than looking more closely at the individuals within firms that make decisions or, importantly, looking truly at the level of the supply chain or beyond. Moreover, the literature has thus far made limited use of existing theory frames to further our understanding of SCRes. The most notable theory frames used to date are the resource based view (e.g. Ponomarov and Holcomb, 2009; Blackhurst *et al.* 2011), systems theory (e.g. Erol *et al.*, 2010; Blackhurst *et al.*, 2011), contingency theory (e.g. Brandon-Jones *et al.*, 2014), dynamic capabilities (e.g. Brusset and Teller, 2017; Chowdhury and Quaddus, 2017), social capital theory (Gölgeci and Kuivalainen, 2019) and complex adaptive systems theory (e.g. Day, 2014). Using other theory frames may provide additional explanatory power and further our understanding of SCRes. Finally, given the very nature of SCRes, it seems natural to import insights from other disciplines into Operations Management to better understand SCRes (Van der Vegt *et al.*, 2015).

In the light of the above, we called for papers seeking contributions that extended the literature and expanded the knowledge base in order to further develop our understanding and strengthen the theoretical underpinning of SCRes. Our ambition was to gain insights into, for example, how SCRes impacts performance; if and how SCRes links to other concepts, such as sustainability or SC integration; how specific or one-off disruptions, such as an economic crises, Brexit or flooding, influence supply chains and what strategies companies and supply chains use to mitigate these disruptions or their inherent risks; SCRes in under-represented contexts, including developing countries and small and medium sized enterprises to improve understanding of SCRes, its antecedents, and impact; and SCRes in the overall supply chain through chain-wide research. Ultimately, this special issue is comprised of four papers that fit the call and satisfied the publication standards required by *IJOPM* – although the initial number of submissions would have been enough to fill a whole volume of *IJOPM* (around 70 formal submissions from 18 different countries). Reflecting upon these papers and their content as well as on a number of interesting recent papers and the subject of some of the rejected papers, we recognise that SCRes as a supply chain construct needs to be considered at different levels of aggregation and analysis, as depicted in Figure 1 – a four-level framework for SCRes. The four levels depicted in Figure 1 are unpacked in the following section, which also introduces and positions the four special issue papers in terms of their contributions to one or more levels of the framework.

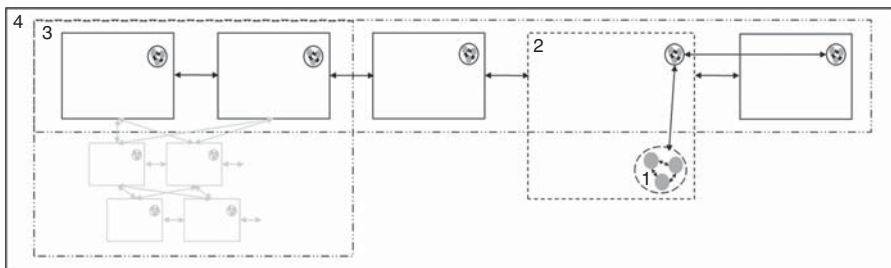
3. Four levels of SCRes and the contributions of the special issue papers

3.1 SCRes level 1: individuals and teams

Supply chain management is human-centric and almost all studied contexts contain and revolve around people. Indeed, the success of tools and techniques, and the accuracy of theories, relies heavily on the individuals and teams making decisions or improving processes (Bendoly *et al.*, 2006; Croson *et al.*, 2013). This also holds true in the specific area of SCRes. The origins of the concept of resilience lie in the field of psychology where the individual and their resistance to adversarial events is a central point of concern and attention (van der Vegt *et al.*, 2015). Yet, while there is some acknowledgement of the role of individuals and teams in the SCRes literature (e.g. Fahimnia *et al.*, 2019), SCRes is mainly seen as a system characteristic rooted in concepts of engineering and ecological science (van der Vegt *et al.*, 2015). In contrast, this special issue includes three papers that begin to contribute novel insights to the individual/ team level of building SCRes.

The paper by Vanpoucke and Ellis (2020) provides a behavioural perspective on the development of supply-side resilience, focussing on the decisions made by managers. It is thus focussed on the individual and his/her influence on decisions relating to the resilience of the supply chain. Primary data are collected from 113 buyers using two experimental scenarios featuring supply-side disruptions of low and high probability. The paper shows that risk propensity affects the type of risk mitigation strategy employed by buyers, providing an insight into how risk propensity influences the risk mitigation decision-making process. The work expands the literature by offering an insight into how buyers actually make decisions to build resilience. In addition, it provides a new methodological approach within the SCRes literature: while experimental approaches are widely used in the risk literature, to date they are scarce in the field of SCRes. The paper may provide a springboard for further experimental research considering other characteristics of supply chain disruptions, other strategies for building resilience and their deployment, and work that goes beyond the supply-side decisions of the buyer towards a more supply chain view.

Moving from the individual to a team-based perspective, the paper by Rubbio *et al.* (2020) in this special issue draws on dynamic capabilities theory to explore how surgery wards in two Italian hospitals employ resilient behaviour to solve operational failures and improve patient safety. As such, it studies the effect of team decisions – a ward’s nurses and physicians – within a larger organisation. Employing an in-depth case study approach, the authors identify five dynamic capabilities related to individual and team behaviour, knowledge, and experience. The findings show that resilience practices are not necessarily linked to an organisational routine or a managerial process, and thus the work emphasises the importance of individual and team level contributions to SCRes. While contributing new



Notes: Level 1: Individuals and teams; Level 2: Organisational; Level 3: Supply chain and Network; Level 4: Sector, national, and supranational

Figure 1.
A four-level framework for supply chain resilience

insights at this lowest SCRes level, the paper also provides a rare insight into how digital technologies can support such behavioural capabilities.

Finally, the paper from Polyviou *et al.* (2020) includes some new insights on this first level of analysis. The authors explore how resources or capabilities enhance SCRes and find that particularly internal social capital, comprised of interpersonal relationships, commitment, respect and employee tenure, matters. As such, it provides an insight into resilience-enhancing resources that are not rooted in a firm's supply chain operations but in its human resources.

3.2 SCRes level 2: organisational

Resilience to supply chain disruptions can be built at an organisational level by, for example, keeping redundancies in the form of spare capacity or additional inventory, or by creating visibility in processes and routines (e.g. Jüttner and Maklan, 2011). To date, much of the SCRes research has focussed on this level of analysis, i.e. on how a focal company can or should deal with disruptions in their supply chain for its own gain, either by developing specific capabilities and/or by restructuring their supply chain, and in terms of how it can deal with suppliers (e.g. Ambulkar *et al.*, 2015). The insights that have been provided to date are largely generic and while these are valuable there has been limited attention to date on specific organisational factors such as the size, culture or nature of an organisation or how these factors affect resilience.

The paper by Polyviou *et al.* (2020) in this special issue provides an organisational level study of SCRes based on four case studies of manufacturing organisations. The paper is novel in its focus on medium sized firms, highlighting the particular challenges they face in applying existing generic SCRes insights. For example, on the one hand, such firms do not have the resources, scale, or influence to develop multiple resilience-enhancing capabilities in the same way as large firms while, on the other hand, they are too large to obtain the support offered to small firms. As described above, the paper draws attention to internal social capital and the role of a firm's human resources (Level 1) for building organisational level SCRes (Level 2). As such, it also provides valuable insights into the interactions between different levels of our framework for building SCRes.

3.3 SCRes level 3: supply chain and network

Similar to the fields of supply chain integration (Frohlich and Westbrook, 2001; Flynn *et al.*, 2010) and sustainability, where a multi-tier approach has been advocated (e.g. Hartmann and Moeller, 2014; Tachizawa and Won, 2014), it is argued that resilience is not something to be pursued at the organisational level only. Ultimately, the resilience of the supply chain as a whole depends on the capability of the individual chain partners and on the broader network, even including competitors (Scholten and Schilder, 2015). To date, most contributions to Level 3 of the SCRes framework have been limited to a dyadic focus, i.e. on a buyer organisation and its immediate tier one suppliers. This is perhaps understandable given that first-tier suppliers are the predominant source of supply chain disruptions (BCI, 2018). Yet, this narrow focus might neglect opportunities and threats beyond the dyadic relationship (see also literature on the bullwhip effect, e.g. Lee *et al.*, 1997). A broader focus could, for example, identify the transformation or migration of a risk from one point in the network to another, as has been shown by Tukamuhabwa *et al.* (2017). As such, supply chains that are disrupted and aim to be resilient could rethink where redundancy can be located in their chain, specifically if it relates to additional inventory. Such a question can be compared to the location of inventories for normal functioning chains where concepts such as vendor managed inventory help to reduce stocks and improve chain performance.

The paper by Martins de Sá *et al.* (2020) in this special issue studies two supply chains over three tiers and how these supply chains were prepared for, responded to and recovered from a supply chain disruption. The authors provide a rare study of how each node contributes to the overall process of building resilience; and they note that investigating SCRes from the

perspective of the focal firm only may omit consequences for the overall supply chain. In the context of supply chains with low interdependence between actors, the authors find that resilience is mainly built at the organisational level (Level 2), where firms implement isolated solutions rather than strategies for building SCRes in the overall chain/network. At the same time, the authors also find that despite no evidence of resilience at the most upstream node, both of the supply chains they studied were resilient. This suggests that SCRes is not dependent on the overall chain but rather on specific nodes. More specifically, the authors conclude that resilience is more dependent on the capacity of downstream actors who are responsible for delivery to the end consumer than on upstream nodes. This may seem somewhat counter-intuitive when considering previous literature suggestions and would not have been identified if a supply chain level approach had not been taken. There is potential to build on the contribution of this paper in future studies and to conduct similar investigations in supply chains with greater levels of interdependence between actors.

3.4 SCRes level 4: sectors, national and supranational

It is important that management practice and research takes account of the wider context; this is also important to research on SCRes (Leat and Revoredo-Giha, 2013), which should consider the broader context in which individuals, firms and supply chains are embedded and how they can contribute to resilience at a higher level of aggregation. Indeed, building SCRes can require organisations and supply chains to contribute to resilience at an industry, national or supranational level. The paper by Rubbio *et al.* (2020) contained in this special issue is a starting point for such research. To the best of our knowledge, it is the first to extend SCRes to the healthcare sector. The authors find that healthcare knowledge in relation to experience, clinical knowledge and organisational dynamics are antecedents of readiness, flexibility and collaboration, which are dynamic capabilities required for exhibiting resilient behaviour. Resilience at the firm level becomes an antecedent for building the resilience of the sector.

There is also a need to consider how organisations and supply chains can be resilient to threats that have consequences for entire industries, countries or more. Here, research has begun to examine the resilience of supply chains to constitutional changes that affect an entire sector or are nationwide, including the effects of Brexit on agri-food supply chains in the UK (Hendry *et al.*, 2019) and how energy supply chains build resilience with implications for the support mechanisms that should be introduced or improved by the European Union (Urciuoli *et al.*, 2014). At the same time, research has called for the impact of transnational phenomena such as the belt and road initiative on SCRes to be examined (Thürer *et al.*, 2019). The paper by Martins de Sá *et al.* (2020) in this special issue adds further insight to agricultural SCRes, as previously explored by Leat and Revoredo-Giha (2013) and synthesised by Stone and Rahimifard (2018), by studying a sugarcane and an orange supply chain.

Other existing literature at this fourth level of analysis takes a more extreme point of view. It focusses on humanitarian logistics and disaster management (Kovács and Spens, 2007; Kunz *et al.*, 2017), often studying a specific disaster and its effect on managing a supply chain that delivers services to affected populations (e.g. Perry, 2007; Holguín-Veras *et al.*, 2014; Dufour *et al.*, 2018). The paper by Martins de Sá *et al.* (2020) also focusses on a particular natural disaster – an extreme drought in 2014/2015 – and how it affected the resilience of two supply chains. As such, it departs from the regular disaster management literature in studying the effect of a slow onset disaster on ongoing commercial supply chains rather than those of humanitarian organisations. The authors' findings highlight the importance of information sharing about Level 4 aspects such as climate across Level 3, i.e. the supply chain, to increase risk awareness and willingness to adapt. At the same time, the broader network (Level 3) is found to be important as associations, cooperatives, and government organisations are relevant to fostering knowledge and training across the supply chain.

4. Supply chain resilience: where to next?

The papers included in this special issue are testament to the novel, interesting and high quality SCRes research being undertaken at different levels of aggregation and analysis. The intersection of these different levels is depicted in the framework contained in Figure 1. We hope that, together with this framework, the contributions of the papers in this special issue spark further ideas and research in the future. There remains much scope for expanding our understanding of SCRes, as also recently identified in a review by Pettit *et al.* (2019), especially in the more underrepresented areas of the framework described in this introductory essay.

We conclude by providing a few examples of areas that would be interesting to study further in the coming years in the context of SCRes:

- Level 1: the role of individual managers, including their risk perceptions and approaches to decision making, and their effect in order to identify personality characteristics and behaviours that help in enhancing resilience; and the composition and effective decision making structure of teams, including both regular management teams for responding to “everyday” disruptions and emergency teams for responding to crises and unpredictable threats.
- Level 2: interactions between teams within an organisation in building resilience; the role of cross-functional teams and their effect on resilience; the nature of an organisation (e.g. for-profit *vs* not-for-profit) and how this affects the threats a firm faces and how it approaches resilience using its resource base; different organisational cultures; and other organisational theories.
- Level 3: the value of relationships between buyers and suppliers not only at an organisational level but also at an interpersonal level (individual/team) in building resilience; the role of the broader network, including competitors, in responding to disruptions that have a broad resonance; supply chain structural components, such as upstream and downstream tiers or the length of a supply chain and their effect on resilience; and different levels of interdependencies between actors across the chain or network.
- Level 4: the study of different contexts and industry regulations and their effect on SCRes using relevant theories, including of institutional theory and embeddedness; and the role of policy in supporting the enhancement of SCRes.

Kirstin Scholten

*Department of Operations, University of Groningen,
Groningen, The Netherlands*

Mark Stevenson

*Department of Management Science, Lancaster University,
Lancaster, UK, and*

Dirk Pieter van Donk

*Department of Operations, University of Groningen,
Groningen, The Netherlands*

Acknowledgements

This special issue would not have been possible without the contribution made by an impressive team of expert reviewers who provided their time and insights to develop the submissions. The authors would like to acknowledge and thank the following reviewers: Ran Bhamra, Kate Blackmon, Constantin Blome, Emma Brandon-Jones, Manda Broekhuis, Raffaella Cagliano, Helena Carvalho, Sander de Leeuw, Thom de Vries, Hendryk Dittfeld,

Christian Durach, Yiyi Fan, Brian Fynes, Christine Harland, Linda Hendry, Matthias Holweg, Marianne Jahre, Uta Juttner, Canan Kocabasoglu-Hillmer, Mike Lewis, Torbjorn Netland, Steve New, Nick Oliver, Damien Power, Sinead Roden, Cristina Sancha, Stefan Seuring, Pamela Sharkey-Scott, Martin Spring, Brian Squire, Mitchel van den Adel, Taco van der Vaart, Wout van Wezel, Andreas Wieland, Miriam Wilhelm and Xuan Zhang. Finally, the authors would like to thank the Editors – Constantin Blome, Cristina Gimenez and Tobias Schoenhoerr – for their support and suggestions on this special issue.

References

- Ali, A., Mahfouz, A. and Arisha, A. (2017), "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.
- Ambulkar, S., Blackhurst, J. and Grawe, S. (2015), "Firm's resilience to supply chain disruptions: scale development and empirical examination", *Journal of Operations Management*, Vols 33-34, pp. 111-122.
- BCI (2018), "Supply chain resilience report 2018", 10th Annual Survey, available at: www.thebci.org/uploads/assets/uploaded/c50072bf-df5c-4c98-a5e1876aafb15bd0.pdf (accessed 24 May 2019).
- Bendoly, E., Donohue, K.L. and Schultz, K.L. (2006), "Behavior in operations management: assessing recent findings and revisiting old assumptions", *Journal of Operations Management*, Vol. 24 No. 6, pp. 737-752.
- Blackhurst, J., Dunn, K.S. and Craighead, C.W. (2011), "An empirically derived framework of global supply resiliency", *Journal of Business Logistics*, Vol. 32 No. 4, pp. 374-391.
- Brandon-Jones, E., Squire, B., Autry, C.W. and Petersen, K.J. (2014), "A contingent resource-based perspective of supply chain resilience and robustness", *Journal of Supply Chain Management*, Vol. 50, pp. 55-73.
- Brusset, X. and Teller, C. (2017), "Supply chain capabilities, risks, and resilience", *International Journal of Production Economics*, Vol. 184, pp. 59-68.
- Chowdhury, M.M.H. and Quaddus, M. (2017), "Supply chain resilience: conceptualization and scale development using dynamic capability theory", *International Journal of Production Economics*, Vol. 188, pp. 185-204.
- Christopher, M. and Peck, H. (2004), "Building the resilient supply chain", *International Journal of Logistics Management*, Vol. 15 No. 2, pp. 1-13.
- Craighead, C.W., Blackhurst, J., Rungtusanatham, M.J. and Handfield, R.B. (2007), "The severity of supply chain disruptions: design characteristics and mitigation capabilities", *Decision Sciences*, Vol. 38 No. 1, pp. 131-156.
- Croson, R., Schultz, K., Siemsen, E. and Yeo, M.L. (2013), "Behavioral operations: the state of the field", *Journal of Operations Management*, Vol. 21 Nos 1-2, pp. 1-5.
- 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.
- Dubey, R., Gunasekaran, A., Childe, S.J., Fosso Wamba, S., Roubaud, D. and Foropon, C. (2019), "Empirical investigation of data analytics capability and organizational flexibility as complements to supply chain resilience", *International Journal of Production Research*, forthcoming.
- Dufour, É., Laporte, G., Paquette, J. and Rancourt, M.É. (2018), "Logistics service network design for humanitarian response in East Africa", *Omega*, Vol. 74, pp. 1-14.
- Erol, O., Sauser, B. and Mansouri, M. (2010), "A framework for investigation into extended enterprise resilience", *Enterprise Information Systems*, Vol. 4 No. 2, pp. 111-136.
- Fahimnia, B. and Jabbarzadeh, A. (2016), "Marrying supply chain sustainability and resilience: a match made in heaven", *Transportation Research Part E: Logistics and Transportation Review*, Vol. 91, pp. 306-324.

- Fahimnia, B., Pournader, M., Siemsen, E., Bendoly, E. and Wang, C. (2019), "Behavioral operations and supply chain management – a review and literature mapping", *Decision Sciences*, forthcoming.
- Flynn, B.B., Huo, B. and Zhao, X. (2010), "The impact of supply chain integration on performance: a contingency and configuration approach", *Journal of Operations Management*, Vol. 28 No. 1, pp. 58-71.
- Frohlich, M.T. and Westbrook, R. (2001), "Arcs of integration: an international study of supply chain strategies", *Journal of Operations Management*, Vol. 19 No. 2, pp. 185-200.
- Gligor, D., Gligor, N., Holcomb, M. and Bozkurt, S. (2019), "Distinguishing between the concepts of supply chain agility and resilience: a multidisciplinary literature review", *The International Journal of Logistics Management*, Vol. 30 No. 2, pp. 467-487.
- Gölgeci, I. and Kuivalainen, O. (2019), "Does social capital matter for supply chain resilience? The role of absorptive capacity and marketing-supply chain management alignment", *Industrial Marketing Management*, forthcoming.
- Hartmann, J. and Moeller, S. (2014), "Chain liability in multitier supply chains? Responsibility attributions for unsustainable supplier behaviour", *Journal of Operations Management*, Vol. 32 No. 5, pp. 281-294.
- 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.
- Hohenstein, N.-O., Feisel, E., Hartmann, E. and Giunipero, L. (2015), "Research on the phenomenon of supply chain resilience: a systematic review and paths for further investigation", *International Journal of Physical Distribution & Logistics Management*, Vol. 45 Nos 1/2, pp. 90-117.
- Holguín-Veras, J., Taniguchi, E., Jaller, M., Aros-Vera, F., Ferreira, F. and Thompson, R.G. (2014), "The Tohoku disasters: chief lessons concerning the post disaster humanitarian logistics response and policy implications", *Transportation Research part A: Policy and Practice*, Vol. 69, pp. 86-104.
- Ivanov, D. (2018), "Revealing interfaces of supply chain resilience and sustainability: a simulation study", *International Journal of Production Research*, Vol. 56 No. 10, pp. 3507-3523.
- Jüttner, U. (2005), "Supply chain risk management: understanding the business requirements from a practitioner perspective", *The International Journal of Logistics Management*, Vol. 16 No. 1, pp. 120-141.
- 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.
- Kamalahmadi, M. and Parast, M.M. (2016), "A review of the literature on the principles of enterprise and supply chain resilience: major findings and directions for future research", *International Journal of Production Economics*, Vol. 171 No. 1, pp. 116-133.
- Kochan, C.G. and Nowicki, D.R. (2018), "Supply chain resilience: a systematic literature review and typological framework", *International Journal of Physical Distribution & Logistics Management*, Vol. 48 No. 8, pp. 842-865.
- Kovács, G. and Spens, K.M. (2007), "Humanitarian logistics in disaster relief operations", *International Journal of Physical Distribution & Logistics Management*, Vol. 37 No. 2, pp. 99-114.
- Kunz, N., Van Wassenhove, L.N., Besiou, M., Hambye, C. and Kovács, G. (2017), "Relevance of humanitarian logistics research: best practices and way forward", *International Journal of Operations & Production Management*, Vol. 37 No. 11, pp. 1585-1599.
- 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.
- Lee, H.L., Padmanabhan, V. and Whang, S. (1997), "Information distortion in a supply chain: the bullwhip effect", *Management Science*, Vol. 43 No. 4, pp. 546-558.

- MacDonald, J.R., Zobel, C.W., Melnyk, S.A. and Griffis, S.E. (2018), "Supply chain risk and resilience: theory building through structured experiments and simulation", *International Journal of Production Research*, Vol. 56 No. 12, pp. 4337-4355.
- Martins de Sá, M., Laczynski de Souza Miguel, P., Peregrino de Brito, R. and Farias Pereira, S.C. (2020), "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.
- Melnyk, S.A., Closs, D.J., Griffis, S.E., Zobel, C.W. and MacDonald, J.R. (2014), "Understanding supply chain resilience", *Supply Chain Management Review*, Vol. 18 No. 1, pp. 34-41.
- Min, H. (2019), "Blockchain technology for enhancing supply chain resilience", *Business Horizons*, Vol. 62 No. 1, pp. 35-45.
- Papadopoulos, T., Gunasekaran, A., Dubey, R., Altay, N., Childe, S.J. and Fosso-Wamba, S. (2017), "The role of Big Data in explaining disaster resilience in supply chains for sustainability", *Journal of Cleaner Production*, Vol. 142, pp. 1108-1118.
- Perry, M. (2007), "Natural disaster management planning: a study of logistics managers responding to the tsunami", *International Journal of Physical Distribution & Logistics Management*, Vol. 37 No. 5, pp. 409-433.
- Pettit, T.J., Croxton, K.L. and Fiksel, J. (2019), "The evolution of resilience in supply chain management: a retrospective on ensuring supply chain resilience", *Journal of Business Logistics*, Vol. 40 No. 1, pp. 56-65.
- Polyviou, M., Croxton, K.L. and Knemeyer, A.M. (2020), "Resilience of medium-sized firms to supply chain disruptions: the role of internal social capital", *International Journal of Operations & Production Management*, Vol. 40 No. 1, pp. 68-91.
- Ponomarov, S.Y. and Holcomb, M.C. (2009), "Understanding the concept of supply chain resilience", *The International Journal of Logistics Management*, Vol. 20 No. 1, pp. 124-143.
- Purvis, L., Spall, S., Naim, M. and Spiegler, V. (2016), "Developing a resilient supply chain strategy during 'boom' and 'bust'", *Production Planning & Control*, Vol. 27 Nos 7-8, pp. 579-590.
- Rubbio, I., Bruccoleri, M., Pietrosi, A. and Ragonese, B. (2020), "Digital health technology enhances resilient behaviour: evidence from the ward", *International Journal of Operations & Production Management*, Vol. 40 No. 1, pp. 34-67.
- 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., Sharkey-Scott, P. 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., Sharkey Scott, P. 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.
- Sheffi, Y. (2005), *The Resilient Enterprise: Overcoming Vulnerability for Competitive Advantage*, MIT Press, Cambridge, MA.
- Sheffi, Y. and Rice, J.B. Jr (2005), "A supply chain view of the resilient enterprise", *MIT Sloan Management Review*, Vol. 47 No. 1, pp. 41-48.
- Stevenson, M. and Busby, J. (2015), "An exploratory analysis of counterfeiting strategies: towards counterfeit-resilient supply chains", *International Journal of Operations & Production Management*, Vol. 35 No. 1, pp. 110-144.
- 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.
- Tachizawa, M. and Won, C.Y. (2014), "Towards a theory of multi-tier supply chains: a systematic literature review", *Supply Chain Management: An International Journal*, Vol. 19 Nos 5-6, pp. 643-663.

- Thürer, M., Tomašević, I., Stevenson, M., Blome, C., Melnyk, S., Chan, H.K. and Huang, G.Q. (2019), "A systematic review of China's belt and road initiative: implications for global supply chain management", *International Journal of Production Research*, forthcoming.
- Tukamuhabwa, B., Stevenson, M. and Busby, J. (2017), "Supply chain resilience in a developing country context: a case study on the interconnectedness of threats, strategies and outcomes", *Supply Chain Management: An International Journal*, Vol. 22 No. 6, pp. 486-505.
- Tukamuhabwa, R.B., 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., Hintsä, 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.
- Van der Vegt, G., Essens, P., Wahlstrom, M. and George, G. (2015), "Managing risk and resilience: from the editors", *Academy of Management Journal*, Vol. 58 No. 4, pp. 971-980.
- Vanpoucke, E. and Ellis, S.C. (2020), "Building supply-side resilience – a behavioural view", *International Journal of Operations & Production Management*, Vol. 40 No. 1, pp. 11-33.
- World Economic Forum (2013), "Building resilience in supply chains", available at: www3.weforum.org/docs/WEF_RRN_MO_BuildingResilienceSupplyChains_Report_2013.pdf (accessed 27 July 2016).