Systematic Literature Reviews in Supply chain resilience: A Systematic Literature Review

Dario Simbizi[1], Loubna Benabbou[2], Bruno Urli[2],
Département Sciences de la Gestion, Université du Québec à Rimouski (UQAR) Campus de Lévis, Québec, Canada
Dario.Simbizi@uqar.ca, Loubna_Benabbou@uqar.ca, Bruno_Urli@uqar.ca

Abstract

The COVID-19 pandemic has caused the biggest and most widespread disruption onto global supply chain networks in recent memory. Although hazards and natural disasters occur more frequently, an unparalleled demand for supply chain networks to reconsider their resilience has been observed. Understanding how global companies manage their supply chain disruptions will help other companies adapt their own responses. We carried out a study on 17 systematic literature reviews (SLR) that portrayed the state of the supply chain resilience (SCR) in the last 10 years and present the authors' synthetized definitions, their associated elements and characteristics. The purpose of this paper is to draw an insight on how the definitions of the concept of resilience in the supply chain have evolved over time from a scientific community perspective, through answering our focused research questions, and providing direction for future research.

Keywords
Supply chain, resilien*, systematic literature review

Introduction:

Since the introduction of the concept of supply chain management (SCM), there has been a lot of confusion about what it involves. The supply chain management has been evolving and recognized as the management of key business processes across the network of organizations that comprise the supply chain (Croxton, Garcia-Dastugue, Lambert, & Rogers, 2001).

With globalization, SCM became a main organizational concern targeting a continuous process of increasing SC efficiency where more complex SC structures needed to be optimized for maximum profit under normal circumstances (Ribeiro & Barbosa-Povoa, 2018). However, as pointed out by Knut, Gupta et Trautwein (2020), a multitude of events in recent years have proven that the supply networks that span the globe can deliver with great efficiency, but may as well contain hidden vulnerabilities and risks. Vulnerability is highest when both the likelihood and the impact of disruption are high (Sheffi & Rice, 2005). Risk is defined by Zsidisin and Ritchie (2008) as "the probability of an incident associated with inbound supply from individual supplier failure or the supply market occurring, in which its outcomes result in the inability of the purchasing firm to meet customer demand or cause threats to customer life and safety". Supply chain risk management became a much-needed research topic after Hurricane Katrina in 2005, the Japanese earthquake and tsunami in 2011, and most recently, the horrific fire in a clothing factory in Bangladesh, which caused serious disruptions to the global supply chain (Sáenz, Revilla, & Acero, 2018). Such risks are characterized by a very strong and immediate impact on the SC network design structure since some factories, suppliers and distribution centers, and transportation links become temporarily unavailable (Bevilacqua, Ciarapica, & Marcucci, 2019).

Supply chain resilience as an area of management research, started with an exploratory study of Supply Chain Vulnerability by the Centre for Logistics and Supply Chain Management, undertaken in 2001 on behalf of the UK government's Department for Transport, Department of Trade and Industry (DTi) and The Home Office. The impetus for the study was the widespread economic disruption experienced in the UK by fuel protests in September 2000 and the outbreak of Foot and Mouth Disease in February 2001 (Christopher & Peck, 2004).

Shocks, disruptions, and exposure to industry value chains have grown in frequency and severity in the recent memory and managing supply chains has more than ever become an increasing concern for companies of all sizes and across a wide range of industries. Building awareness and knowledge regarding SC Risk Management and SC Resilience is an important matter since disruptions, even with low probability of happening, can, if occurring, cause severe impacts on companies (Pires Ribeiro & Barbosa-Povoa, 2018). From their research findings, I. Ali et Ismail (2019) finds it reasonable to argue that SCR has firmly established itself as one of the major research domain in contemporary SCM scholarship.

A McKinsey survey conducted in May 2020, reports that 93 percent of the supply chain executives plan to take steps to make their supply chains more resilient (2020). The design and planning of resilient supply chains is a major challenge due to the increasing complexity of these systems that operate in a global market and therefore exposed to disruptions. According to Galbraith (1974), the more complex and turbulent the environment, the greater is the need for information processing. Many definitions of the Supply Chain Resilience exist and most of their authors define it as the ability to react or to withstand a disruption. The fist structured definition of the SCR as "the capacity of a system to return to its original state or move to a new more desirable state after being disturbed" was provided by Christopher et Peck (2004, p. 4). This study presents the recent conceptual trends in the SCR reviews and provides an updated state of knowledge on the SCR elements described in the academic and business communities for the period between January 2010 and July 2020, thru a systematic literature review, in order to guide the formulation of future definitions and future research on SCR.

This study is structured as follows: We first present our research methodology, the defined research questions, then provide a basis for the selection and evaluation for databases, articles, and journals. We next present the results and the findings by providing an analysis of the synthetized definitions of the SCR found in the recent systematic literature reviews and conclude by providing areas of possible future research on the supply chain resilience.

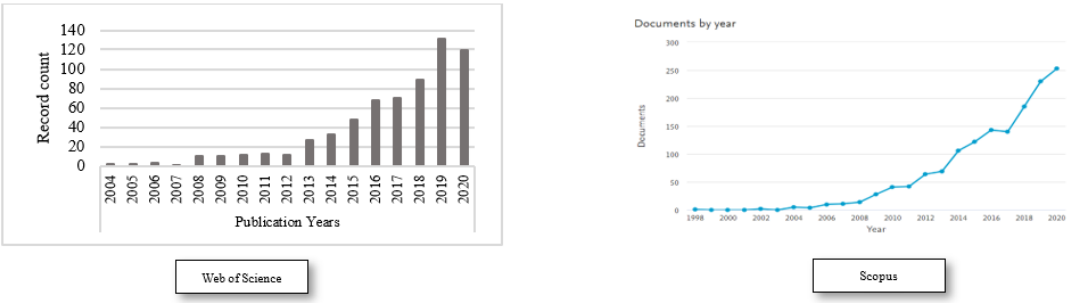
1. Research methodology :

A systematic literature review was used in this study and content analysis to search and classify the body of the literature.

"A rigorous standalone literature review must be systematic in following a methodological approach, explicit in explaining the procedures by which it was conducted, comprehensive in its scope of including all relevant material, and, hence, reproducible by others who would follow the same approach in reviewing the topic" (Okoli, 2015).

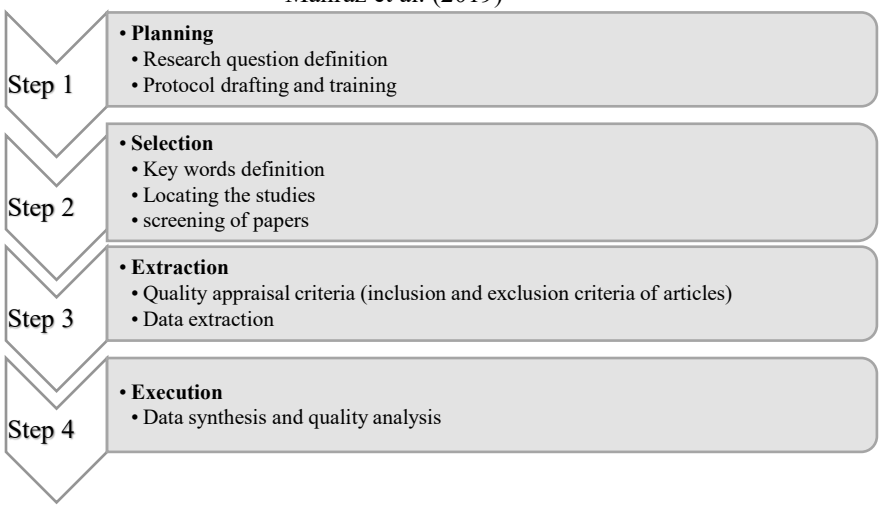
Systematic literature reviews facilitate transparency of the processes utilized for data collection and analyses, so that others can easily replicate the study (Gligor, Bozkurt, Russo, & Omar, 2019). Importantly, they can clearly synthesize existing studies and thus can create new knowledge (J. Light & B. Pillemer, 1986). The literature review on the SCR of Pires Ribeiro et Barbosa-Povoa (2018) highlighted an increase in the numbers of SCR papers particularly since 2010, with 2016 having been the year with the most identified publications. This corresponds to the period and the aftermath of a major earthquake and tsunami in Japan that shut down factories producing electronic components for cars, halting assembly lines worldwide. The disruption by the tsunami was followed a few months later by flooding in Thailand that washed out factories producing roughly a quarter of the world's hard drives, leaving the makers of personal computers scrambling (Knut et al., 2020). As of now, a search on all SCR publications, regardless of the time of publication in the Web of Science and the Scopus databases corroborates and demonstrates that indeed, there is a gradual increase in the SCR publications since the early 2000s which continued to grow even after 2016. Figure 1 portrays this growing trend and discloses that the year 2020 will be no exception. 253 articles can already be found in Scopus (compared to 230 articles that were published for the whole 2019) and 119 in the Web of Science (total 131 articles in 2019). It was against this background that the boundaries to delimit the time interval to our study from January 2010 to July 2020 was seen as adequate and practicable.

Figure 1. SCR publications in Web of Science and Scopus extracted on October 9th, 2020.



The four steps' methodology (planning, selection, extraction and execution) used for our study was adapted from the guideline of executing a multi-step methodology proposed by Okoli (2015) and from the protocol formulated by Mahraz, Benabbou et Berrado (2019) in their paper. This methodology improves the validity and minimize the bias of the findings by considering both qualitative and quantitative approaches : (a) content analysis of the literature (qualitative) and (b) bibliometric review (quantitative) carried out using a "Harzing's Publish or Perish" software program.

Figure 2. Methodology adapted from a systematic guide to literature review development by Okoli (2015) and Mahraz et al. (2019)



1.1 Planning :

- **Defining the problem**

Defining the research question(s) is an initial step in any systematic literature review. These are key for a better understanding of the topic and to guide the research to be done.

RQ1: How has the systematic literature review frequency on the SCR changed over time?
RQ2: What type of papers is it ?
RQ3: Which publication channels are the primary targets for SLR on supply chain resilience?
RQ4: How have the definitions of the supply chain resilience concept been integrated in the past SLR ?

The sections below include steps undertaken in sourcing relevant literature for enhanced transparency and replication.

1.2 Selection :

An initial set of keywords was developed based on the research team's expertise and on past research carried in the same field. Search strings such as *supply chain resilience*, *supply chain resiliency*, *Resilient supply chain* and *systematic literature review* were searched using "supply chain", "resilient", "resilience", resiliency", "resilien*" and "systematic literature review" terms in the title, keywords or in the abstracts of peer-reviewed journal articles and conference proceedings published in English.
The use of multiple databases enabled us to access a wide, comprehensive range of academic publications that were selected, collected, and analyzed using a Boolean search (AND/OR). The Scopus, Web of Science, ScienceDirect and ABI/ProQuest databases were used for sourcing, screening, and analyzing the reviews in their titles, abstracts, and author-defined keywords.

Table 1. Search terms and key words

Supply Chain (SC) context		Resilience context "OR"		Systematic literature review context "OR"
"Supply chain"	AND	Resilien* Resilience Resilient Resilience	AND	Systematic Literature Review

An initial document search was carried out on September 7th, 2020, by search terms in each specific database as shown in Table 2.

Table 2. Results of our initial document selection

Database	Initial findings	Criteria	Filters	
ABI/Proquest	11	Restriction	"supply chain"	Title
			AND resilien*	Abstract
			AND systematic literature review	Abstract
		Document type	Articles and conference proceedings	
		Language	English	
		Years	1st Jan 2010- 31st Jul 2020	
Web of Science	34	Restriction	"supply chain"	Title
			AND Resilien*	Title, abstract, keywords
			AND Systematic literature review	Title, abstract, keywords
		Document type	Articles, Proceedings papers	
		Language	English	
		Years	2010 - 2020	
ScienceDirect	59	Restriction	"supply chain"	Title
			resilience OR resilient OR resiliency	Title, Abstract or Keywords
			Systematic literature review	All fields
		Document type	Research articles, review articles, conference abstracts	
		Language	English	
		Years	2010 - 2020	
SCOPUS	21	Restriction	"supply chain"	Title-ABS-Key
			AND Resilien*	Title-ABS-Key
			Systematic literature review	Title-ABS-Key
		Document type	Articles or conference paper	
		Language	English	
		Years	2010 - 2020	
Total	**125**			

It is important to note however, that at the time we carried out our initial document search, only one database, the ABI/ProQuest, could allow a static period for the selection of articles hence offsetting a fluctuation of the result over time. Publications added in the other 3 databases (Web of Science, ScienceDirect and Scopus) from September 7th, 2020 might thus appear in the results afterwards. One reason why it is crucial to record the search string and procedures is so that they can be periodically repeated on the same databases and sources to see if new materials have shown up since the initial search (Okoli, 2015). As noted by Levy et Ellis (2006), notwithstanding the point at which the reviewers have to go on to the next step, new research is continually published.

1.3 Extraction :

Quality appraisal:

The filtering phase started by defining the inclusion and exclusion criteria across the 4 databases. The field of study was strictly limited to systematic literature reviews, journal articles and conference papers published between January 2010 and July 2020. Applying the search strings in the 4 databases allowed us to generate 125 results. Even with careful design of the search string, potentially relevant articles that do not explicitly use any of the above terms may not be found. Moreover, the ScienceDirect database does not support wildcards '*' in finding word endings or multiple characters and this might have as well hindered the filtering process in this database.

Inclusion criteria:

- They should be related to the supply chain resilience and to the research questions
- They must have a transparent methodology
- They must come from trusted sources and journals
- The publication must be between January 2010 and July 2020
- The publication must have been written in English.

Exclusion criteria:

- The publication must have been peer-reviewed
- Full text was not available

From this process, a total of 26 systematic literature reviews were identified, out of which 4 reviews were found to be appearing in more than 1 database, turning the total of exploitable reviews to 22. Then a manual check was carried out to refine their relevance to the research questions based on their titles, keywords, abstract and conclusions ,where further clarity was needed, a full scan of the text was done. At the end of this exercise, 5 articles were found to be not relevant to the purpose of our study.
In the end, 17 reviews were retained for the data extraction phase.

Table 3. Articles Summary

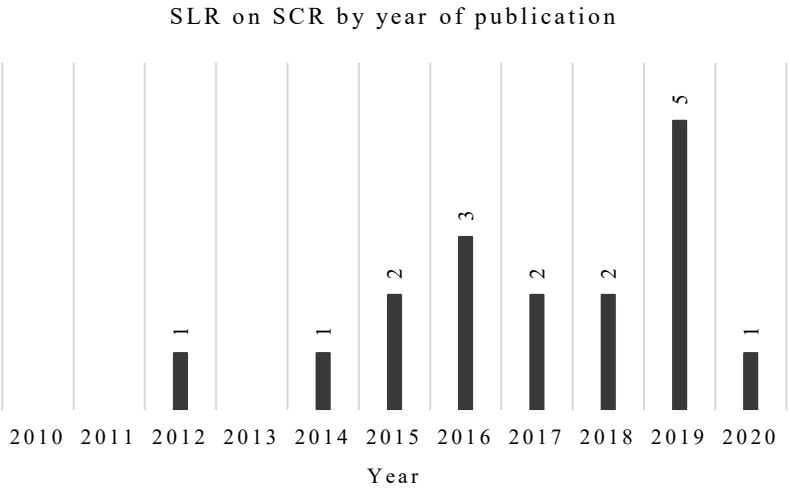
Retained for data extraction	Not relevant for the study	Appearing in more than 1 database
Hohenstein, Feise, Hartmann et Giunipero (2015), Gligor, Gligor, Holcomb et Bozkurt (2019), Roberta Pereira, Christopher et Lago Da Silva (2014), A. Ali, Mahfouz et Arisha (2017), Stavros T. Ponis et Epaminondas Koronis (2012), I. Ali et Ismail (2019), Kochan et Nowicki (2018), Elleuch, Dafaoui, Elmhamedi et Chabchoub (2016), Kamalahmadi et Parast (2016), Hosseini, Ivanov et Dolgui (2019), Pires Ribeiro et Barbosa-Povoa (2018), Costa, Da Silva, Pereira, Pereira et Gómez Paredes (2019), Datta (2017), Shin et Park (2019), Han, Chong et Li (2020), Tukamuhabwa, Stevenson, Busby et Zorzini (2015), Wang et al. (2016)	Durach, Wieland et Jose (2015) Bevilacqua et al. (2019) Rha (2020) Bin Makhashen et al. (2020) Queiroz, Ivanov, Dolgui et Fosso Wamba (2020)	S. T. Ponis et E. Koronis (2012) Hohenstein et al. (2015) Rha (2020) Tukamuhabwa et al. (2015)

Data extraction

a. Occurrence of papers by year of publication

The data collected indicate that systematic literature reviews on SC resilience are on the rise, 2019 having had many identified SLR totaling five. The increase of the systematic literature reviews echoes the corresponding trend in all SCR articles that was discussed in section 1. The total articles found in the Web of Science and Scopus databases were 131 articles (21.23% of 646 articles on SCR in the Web of Science) and 230 articles (15.64% of 1470 articles on SCR in Scopus) published in that same year. The same data indicate that there was no systematic literature review on SCR published in 2013, and by the time of our data collection, only one systematic review appeared in 2020.

Figure 3. Occurrence of systematic literature reviews on SCR by year of publication (n=17)



b. Distribution of papers by country of publication:

Table **4** displays the distribution of papers by authors' locations. The USA is the country with the most identified systematic literature reviews on SCR, followed by Brazil, and China. The remaining publications are equally split between UK, Germany, Portugal, Ireland, South Korea, Greece, Australia, Tunisia, and India having 1 authored publication in each country.

Table 4. Papers by country

USA	4
Brazil	2
China	2
UK	1
Germany	1
Portugal	1
Ireland	1
South Korea	1
Greece	1
Australia	1
Tunisia	1
India	1
Total	17

The results indicate that 100% of the selected papers are all journal articles.

c. Top 5 authors on the field by citation number

We looked at the best authors by citation numbers and present the top 5 in Table 5. Their publications have contributed to set a comprehensive framework of the SCR by the formulation of the SCR definitions and the identification of their formative elements. The authors provide a wide identification of the principles and strategies for reaching or improving resilience alongside their associated metrics.

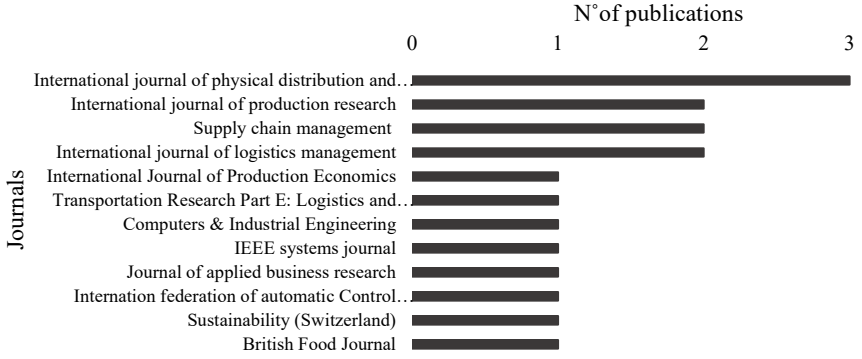
Table 5. Top cited authors

Authors	Publication	Cites
Kamalahmadi et Parast (2016)	International Journal of Production Economics	185
Hohenstein et al. (2015)	International journal of physical distribution and logistics management	156
Tukamuhabwa et al. (2015)	International journal of production research	139
Hosseini et al. (2019)	Transportation Research Part E: Logistics and Transportation Review	92
Pires Ribeiro et Barbosa-Povoa (2018)	Computers & Industrial Engineering	39

d. Distribution of papers by Journal

Publications are spread in different journals. A snip pic of their distribution show that the largest number of the publications are found in the International journal of physical distribution and logistics management. The journal is published by Emerald Group Publishing © ten times per year in the disciplines of supply chain management and logistics.

Figure 4. Distribution of papers by Journal



1.4 Data synthesis and Qualitative analysis :

1.4.1 SCR elements

The SCR principles have been used interchangeably by many authors as phases, dimensions, characteristics, or drivers of SCR, and evolved as authors were attempting to identify newer elements to support their understanding of the SCR dimension. We refer these principles to as elements in our paper, to bring uniformity to the terms consistently with the Christopher et Peck (2004) and A. Ali et al. (2017) analysis. While some group the agility, flexibility, velocity,

redundancy, collaboration and supply chain knowledge as the SCR structural elements (Stavros T. Ponis & Epaminondas Koronis, 2012; Roberta Pereira et al., 2014), Roberta Pereira et al. (2014) in their study consider enabling elements to resilience linked to procurement activities such as collaboration and information sharing (among others). Tukamuhabwa et al. (2015) identified elements such as building social capital and use of information technology. Note that while all the above elements relate to a qualitative classification found in the literature on one hand, Hosseini et al. (2019) explored and presented elements of the SCR from a quantitative perspective on the other. The integration of elements such as supplier segregation, multiple sourcing strategy, inventory positioning, multiple transportation channels, backup supplier, rerouting, communication, and substitution into measuring the internal capability of a supply chain to withstand disruption are discussed in their paper. A. Ali et al. (2017) attempted to provide a holistic model of SCR through a concept mapping approach in an attempt to consolidate and link the features of SCR to improve its conceptual clarity. A more recent research conducted by I. Ali et Ismail (2019) added on the list and identified elements such as Industry 4.0, big data analytics (BDA), blockchain technology, additive manufacturing, disruption mitigation and staff training. This could be a starting point for scholars, to update the constructs by analyzing the newer elements, their relationships, and interactions into reaching best managerial practices and desired levels of SCR.

Table 6 provides an overview of the elements of the SCR found in 16 systematic literature reviews analyzed. The review done by Elleuch et al. (2016) provides only the methods and approaches developed to understand the various issues raised in the domain of vulnerability and resilience in SCM and therefore does not furnish an analysis of the SCR and/or its elements in an independent manner.

Table 6. Elements of the SCR

Elements of the SCR	Stavros T. Ponis et Epaminondas Koronis (2012)	Roberta Pereira et al. (2014)	Hohenstein et al. (2015)	Tukamuhabwa et al. (2015)	Kamalahmadi et Parast (2016)	Wang et al. (2016)	A. Ali et al. (2017)	Datta (2017)	Kochan et Nowicki (2018)	Pires Ribeiro et Barbosa-Povoa (2018)	Costa et al. (2019)	Shin et Park (2019)	I. Ali et Ismail (2019)	Gligor, Gligor, et al. (2019)	Hosseini et al. (2019)	Han et al. (2020)
Absorptive capacity (supplier segregation, multiple sourcing strategy, inventory positioning, multiple transportation channels)															x	
Adaptive capacity (Backup supplier, rerouting, communication, substitution)												x	x		x	
Adaptive framing (Prepare/Respond/Recover and maintain)									x	x		x	x	x		
Agility	x	x	x	x			x	x	x		x	x	x		x	x
Alertness												x				
Alignment		x										x				
Appropriate contractual agreements				x												
Availability	x															
Awareness												x				x
Big data analysis (BDA)													x			
Block chain technology													x			
Building logistics capabilities				x												
Building social capital and relational competences				x			x									
Collaboration	x	x	x	x			x	x	x		x	x	x		x	x
Communication											x					
Complexity								x								
Contingency planning				x			x				x	x				x
Coopetition				x									x			
Coordination and control		x										x				
Demand management				x												
Disruption mitigation													x			
Efficiency									x			x				
Financial strength		x					x		x		x					
Flexibility	x	x	x		x	x	x		x		x	x	x	x	x	x
Focus event (Incident VS disruption)										x						
High security measures						x	x									
Identification of vulnerabilities						x										
Industry 4.0													x			
Information sharing		x			x							x	x		x	
Innovation				x	x						x		x			
Integration		x										x				
Inventory management			x	x							x					
Knowledge management		x		x			x					x		x		x
Leadership					x											x
Market position									x			x				x
Mobilization of resources	x		x										x			
Modeling and solution methodologies															x	

Objectives and decision variables in SCR problems																x	
Operational vulnerability								x									
Performance level										x							
Portfolio diversification				x													
Predefined decision plans			x														
Public-private-partnerships				x									x	x			
Reconfiguration planning					x	x								x			
Redundancy	x	x	x	x	x	x	x		x			x	x	x			x
Restorative capacity									x							x	
Revenue management									x								
Risk management		x		x				x				x	x				
Robustness							x						x	x			
SCR metrics																x	
Security				x		x	x		x				x				x
Social capital and relational competences				x													
Supplier development				x													
Supplier selection				x													
Supply chain agility				x													
Supply chain continuity													x				
Supply chain network structure/design		x		x								x	x	x			
Supply chain structure knowledge/understanding	x							x									
Sustainability compliance				x									x				
Trust		x			x								x				
Uncertainty								x									
Use of information technology				x									x				
Velocity/Speed/acceleration	x	x		x	x				x	x			x	x	x		
Visibility	x	x	x	x	x		x		x			x	x	x		x	x
Vulnerability						x		x									

1.4.2 SCR definitions

From the first SCR definitions attempts in the early 2000's, the academic evidence shows that the necessity to formulate an agreed definition of the SCR was understood by academicians. Generally, most of the reviews acknowledge the previous definitions developed using analytical perspectives that suggest that the SCR is the ability to react to, cope with, adapt to or withstand unexpected events (Carvalho, Azevedo, & Cruz-Machado, 2012; Christopher & Peck, 2004; Ponomarov Serhiy & Holcomb Mary, 2009; Sheffi & Rice, 2005). Over time, the emphasis in defining SCRES shifted from supply chain ability to respond and recover to include elements of resilience-preparation and growth (A. Ali et al., 2017). Almost all the authors concur to the fact that even though there is an indication for similar definitions, a no widely accepted definition exists. They therefore attempted to provide a unique definition of the SCR based on the results of their analysis. Since substantial efforts have been made in previous studies on the concept of SCR, we do not restate the definitions used by the reviewers as basis to their own formulation of the definition of SCR. Instead, a presentation of the synthetized definitions is provided, hence providing an answer to our research question # 4. From our findings, 9 authors attempted to provide integrated definitions of a resilient supply chain as presented in Table 7. The definitions are presented in a chronologic order for the convenience of interpretation.

Table 7. Reviews and authors' synthetized definitions of SCR

#	Author(s)/Year & Article Name	Synthetized definitions of SCR
1	Stavros T. Ponis et Epaminondas Koronis (2012) Supply chain resilience: definition of concept and its formative elements.	*"The ability to proactively plan and design the supply chain network for anticipating unexpected disruptive (negative) events, respond adaptively to disruptions while maintaining control over structure and function and transcending to a post-event robust state of operations if possible, more favorable than the one prior to the event, thus gaining competitive advantage."*
2	Roberta Pereira et al. (2014) Achieving supply chain resilience: the role of Procurement.	*"The capability of supply chains to respond quickly to unexpected events so as to restore operations to the previous performance level or even to a new and better one."*
3	Hohenstein et al. (2015) Research on the phenomenon of supply chain resilience. A systematic review and paths for further investigation	*"Supply chain resilience is the supply chain's ability to be prepared for unexpected risk events, responding and recovering quickly to potential disruptions to return to its original situation or grow by moving to a new, more desirable state in order to increase customer service, market share and financial performance."*

4	Tukamuhabwa et al. (2015) Supply chain resilience: definition, review, and theoretical foundations for further study.	*"The adaptive capability 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 – ideally, a better state than prior to the disruption."*
5	Kamalahmadi et Parast (2016) A review of the literature on the principles of enterprise and supply chain resilience: Major findings and directions for future research.	*"The adaptive capability of a supply chain to reduce the probability of facing sudden disturbances, resist the spread of disturbances by maintaining control over structures and functions, and recover and respond by immediate and effective reactive plans to transcend the disturbance and restore the supply chain to a robust state of operations."*
6	Wang et al. (2016) Toward a Resilient Holistic Supply Chain Network System: Concept, Review and Future Direction.	*"A resilient system is a system with an objective to survive and maintain function even during the course of disruptions, provided with a capability to predict and assess the damage of possible disruptions, and enhanced by the strong awareness of its ever-changing environment and knowledge of the past events, thereby utilizing resilient strategies for defense against the disruptions."*
7	Datta (2017) Supply network resilience: A systematic literature review and future research.	*"Supply chain resilience is a dynamic process of steering the actions so that the organization always stays out of danger zone, and if the disruptive/uncertain event occurs, resilience implies initiating a very rapid and efficient response to minimize the consequences and maintaining or regaining a dynamically stable state, which allows it to adapt operations to the requirements of the changed environment before the competitors and succeed in the long run."*
8	Ribeiro et Barbosa-Povoa (2018) Supply Chain Resilience: Definitions and quantitative modelling approaches – A literature review.	*"A resilient supply chain should be able to prepare, respond and recover from disturbances and afterwards maintain a positive steady state operation in an acceptable cost and time."*
9	Hosseini et al. (2019) Review of quantitative methods for supply chain resilience analysis.	*"SC capability to utilize the absorptive capacity of SC entities to repulse and withstand the impacts of perturbations, to minimize the consequences of disruptions and their propagation by utilizing adaptive capacity and to recover performance level to normal operations in a cost-efficient manner using restorative capacity when absorptive and adaptive capacities are not sufficient."*

From the definitions above, key aspects could be derived and presented in Table 8.

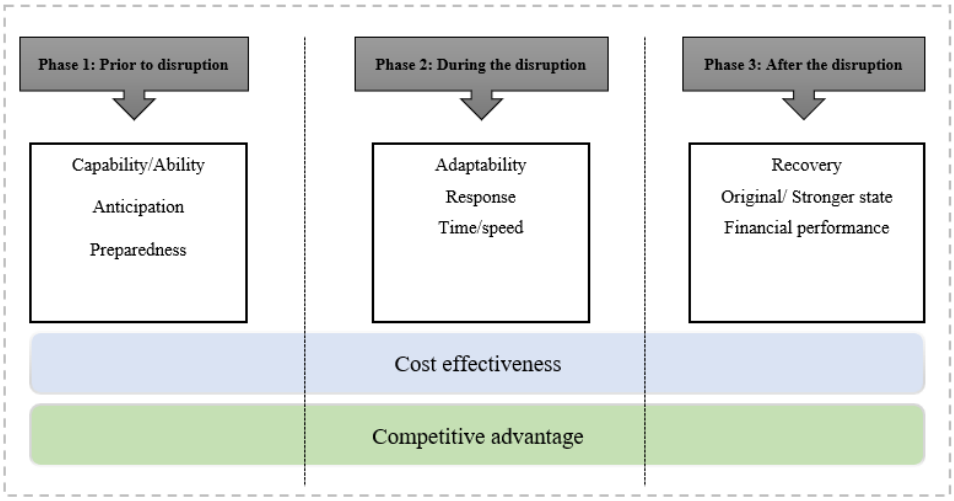
Table 8. Key aspects in the definitions

Authors \ Aspects	Capability/Ability	Anticipation/ Preparedness	Adaptability	Response	Time/speed	Recovery	Original/ Stronger state	Competitive advantage	Financial performance	Cost effectiveness
Stavros T. Ponis et Epaminondas Koronis (2012)	•	•	•	•		•	•	•		
Roberta Pereira et al. (2014)	•			•	•	•	•			
Hohenstein et al. (2015)	•			•	•	•	•	•	•	
Tukamuhabwa et al. (2015)	•	•	•	•	•	•	•			•
Kamalahmadi et Parast (2016)	•		•	•		•	•			
Wang et al. (2016)	•	•	•	•						
Datta (2017)		•	•	•	•		•	•		
Pires Ribeiro et Barbosa-Povoa (2018)		•		•	•	•	•			•
Hosseini et al. (2019)	•	•	•	•		•	•			•

The response of a resilient SC is a recurrent aspect common to all the author's synthetized definition, notwithstanding that different terminology is used: "to repulse and withstand the impacts of perturbations" (Hosseini et al., 2019) and " utilizing resilient strategies for defense against the disruptions" (Wang et al., 2016). The ability/capability, recovery and original/stronger state are common to 89% of them, anticipation/preparedness, and adaptability are found in 67%, the time/speed are for their part found in 56%. Competitive advantage, financial performance, and cost effectiveness are the least picked aspects found in less than 50% of the definitions.

This straightforward analysis highlights the association of the major definition aspects, at a larger or a lesser extent, to five elements of the SCR capabilities that can support business entities in developing a resilient supply chain namely the abilities to anticipate, to adapt, to respond, to recover and to learn (A. Ali et al., 2017). It suggests 3 phases in the making of a resilient supply chain: One phase prior to the happening of the disruption, a second phase during the disruption, and a third in the aftermath of the disruption. Figure 5 illustrates the three phases and the aspects of the definitions of SCR.

Figure 5. Phases in the aspects of the definitions



Although explicitly listed in fewer definitions, it is arguable that the ultimate goal into achieving a resilient SC is to gain competitive advantage. The applications of the SCR capabilities have financial implications that may limit its implementation since those capabilities come with a cost. Tukamuhabwa et al. (2015) were the first ones to formally integrate the cost effectiveness aspect in the SCR definition by arguing that any definition of the resilience of an economic system without regard for cost would have been incomplete.

Conclusion:

This paper has provided a summarized review of 17 systematic literature reviews on SCR identified from the SLR procedure detailed in Section 1.2 and 1.3. We performed a content analysis, presented the categorization of papers by year of publication, by country, by most cited authors and their distribution by journal. We were able to identify 9 systematic reviews that present synthetized definitions of SCR and analyzed the elements the authors used to construct the definitions on. Common aspects of those definitions were also explored, and we were able to confirm that the definitions have remained in order with the themes utilized by the scientific community to describe the capabilities needed to reach a resilient supply chain. We identified and demonstrated the evolution of a large group of elements used in previous studies to build on the knowledge and the SCR definitions. From our analysis, we observed that these reviews, mostly conceptual (qualitative), mutually defined the resilience of the SC by focusing on the planning, the design, and the fast and adapted response attributes of the SC as the main drivers to reach resilience during disruptive events. The recovery and cost-effectiveness attributes were supplemented in the definitions that follow. Enhancing the prediction capacity of the disruptions and staying aware of the environment through learning from the past, came last towards the second half of the decade. We noted that it is at the very end of the decade that one review attempted to analyze the quantitative methods that could be used at different levels of capacity resilience and where the notions of the absorptive, adaptive, and restorative capacities of the SC were first combined in a definition of the SCR.

The methodology used in this literature review has advantages and limitations. A strength of the literature review is the use of systematic methods for searching and synthesizing the current literature to answer the research

questions. However, the literature review is limited by the key terms and keywords used to retrieve the required information. Therefore, the authors acknowledge that there may be sources that might have been skipped for the synthesis.

The results presented in this literature review will serve as a foundation to more selective and extensive investigations by academicians that will grasp better understanding, and integration of the newer but still isolated elements such as SCR metrics, big data analytics (BDA) and Industry 4.0 to prepare and guide future responses in building the SC resilience especially during and in the aftermath of the COVID-19 pandemic. The findings open up directions for the definition of keywords and search strings in future quests to analyzing empirical evidence of the new elements, their metrics and their associated performance indicators found in the literature on the SCR, hence contributing to its better understanding and the edification of the best practice to reach resilient supply chain and competitive advantage sought by business entities.

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Biographies

Dario SIMBIZI holds an MBA in Project Management, from the University of Kigali (UoK). He is completing an MSc in Project Management at Université du Québec à Rimouski (UQAR) - Lévis campus. He is carrying out an end of program research that will focus on the measurement and the selection methods of strategic, operational, and tactical performance indicators of the supply chain.

Dr. Loubna BENABBOU is a Professor of Management Sciences at Université du Québec à Rimouski (UQAR) at Lévis campus. Her research work lies in the application of decision/ management sciences and machine learning techniques to transform data for making better decisions and improving operational processes. Dr. Benabbou has been supervising several undergraduate and graduate students in projects for different Industries related to the areas of Decision Sciences, Machine Learning and Operations Management. Her research related to these fields has been published in international scientific journals and conferences' proceedings. Dr. Benabbou is an industrial engineer from EMI School of Engineering; she earned an MBA and Ph.D. in Management and Decision Sciences from Laval University.

Dr. Bruno URLI for more than thirty years served as a professor of project management at the University of Quebec in Abitibi-Témiscamingue and then at the University of Quebec in Rimouski. He is now a retired professor and associate in the Department of Management Science at the University of Quebec in Rimouski. With a PhD in administration from Laval University and the Empowerment to Lead Management Research at the University of the Littoral (France), his research interests include multi-criteria decision and participation assistance, risk management, project portfolio selection and operational project planning. His work has been supported by leading scientific councils and has given rise to publications in several international journals.