



Resilience in the management and business research field: a bibliometric analysis

Resiliencia en el área de gestión y negocios: un análisis bibliométrico

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ARTICLE INFO

Received 5 July 2021,

Accepted 11 February 2022

Available online 11 May 2022

DOI: 10.5295/cdg.211581js

JEL: M10, M19, O30.

ABSTRACT

The purpose of this study is to map the recent scientific literature on resilience and analyses the most substantial contributions to the advancement of studies in the business and management research field. A bibliometric analysis from the Web of Science / *Social Sciences Citation Index* database – covering the period 2014 until May 2021 – was carried out. Bibliometric techniques and tools were applied, such as co-citation counts and historiography generated by HistCite™, and bibliographic coupling and cartography from VOSviewer (visualization of similarities). As result, 637 articles were identified, which were published in 114 journals and written by 1607 authors affiliated to 821 institutions from 63 countries. This study provides new information not previously reviewed, for example, most influential journals and articles in recent years. The analysis allowed elaborating a map that provides clues for future studies on resilience in the business and management research field.

Keywords: Resilience, Review, Bibliometrics, HistCite, VOSviewer, Thematic Network.

RESUMEN

El objetivo de este estudio es analizar la producción científica reciente sobre resiliencia y las principales contribuciones al avance de la investigación del tema en el área de gestión y negocios. Fue realizado un análisis bibliométrico en la base *Web of Science / Social Sciences Citation Index* —desde el inicio de 2014 hasta mayo de 2021— mediante recuentos de citas e historiografía de HistCite; y acoplamiento bibliográfico y cartografía de *VOSviewer* (visualización de similitudes). Se identificó un conjunto de 637 artículos publicados en 114 revistas y escritos por 1607 autores afiliados a 821 instituciones de 63 países. Los resultados aportan también nuevas informaciones sobre las revistas y los artículos más influyentes de los últimos años. El análisis permitió generar un mapa de la literatura emergente, señalar temas asociados y caminos para futuras investigaciones sobre resiliencia en el área de gestión y negocios.

Palabras clave: Resiliencia, Revisión, Bibliometría, HistCite, VOSviewer, Red Temática.

1. INTRODUCTION

In unstable environments, organizations need to have the ability to face unforeseen events in order to survive over time (Duchek, 2020). Studies in management and business have pointed out that the ability of organizations, societies, and industries to react to external threats, unforeseen events, crises and disruptive situations – such as the COVID-19 pandemic – is closely linked and related to resilience (Bailey & Breslin, 2021; Van Hoek, 2020). But what makes some organizations more successful in dealing with and responding to the unknown? (Linnenluecke, 2017). According to Vogus and Sutcliffe (2007), resilience allows us to describe the characteristics of some organizations that are able to monitor the environment in which they find themselves in order to respond more quickly to adverse changes.

The field of resilience research is full of other conceptualizations and the topic has been studied in different ways, either in theoretical studies (e.g., Datta, 2017; Gligor *et al.*, 2019; Pereira *et al.*, 2014) or in empirical studies (e.g., Azevedo & Shane, 2019; Chowdhury & Quaddus, 2016). Literature review papers make resilience clear from different perspectives: resilience in flood risk management (Mcclymont *et al.*, 2020); resilience and sustainability (Roostaie *et al.*, 2019); and resilience and health (Ellis *et al.*, 2019; Pecillo, 2016). Both the interdisciplinary nature of this topic and its academic and managerial importance can be observed in these studies. Although resilience has been investigated in different areas of knowledge and for different purposes, there are still unanswered questions and little understanding of the characteristics of recent publications in the management and business research field.

Linnenluecke (2017) identified in his literature systematic review some gaps in scientific research on resilience in the area of management and business. In the study he reviewed 339 articles and book chapters published between 1977 and 2014 (as of August 31, 2014). The results revealed that resilience was conceptualized differently in the studies analyzed and was operationalized in different ways with little progress in the empirical studies. Although the study did not present a characterization of the bibliographic production on the topic, it has left important clues for future papers and literature reviews on resilience beyond 2014.

Given the current context and the uncertainties caused by the COVID-19 pandemic, the continuation of Linnenluecke's (2017) study demands even more relevance. With the present bibliometric analysis, useful information is generated for academics and their future research on resilience and for management interested in learning about the topic and gaining insights relevant to their organizations and business contexts. This study presents an overview of the main publications and lines of research covering the period from 2014 to May 2021. It also offers themes and avenues for future research with implications for practice.

For this reason, the present paper updates Linnenluecke's (2017) review and provides a visualization of the study field on resilience, through the bibliometric analysis of recent publications in the Web of Science - Social Sciences Citation Index (WoS - SSCI), using the HistCite™ and VOSviewer tools. Bibliometric analysis is widely used to highlight the most representative results of a set of bibliographic documents (Martinez-Lopez

et al., 2018). The main objective of this paper is to analyze the most recent scientific production on resilience in the area of management and business. It can be said that this study, on the one hand, identifies, organizes, and integrates knowledge developed and disseminated during the last eight years of representative publications on resilience. On the other hand, it provides considerations and insights for its appropriation and development in future research in the area of management and business.

2. THEORETICAL BACKGROUND

According to Hosseini *et al.* (2016), the word resilience has its origin in the Latin word “resiliere”, which means “to recover”. In frequent use it involves the ability of the system to return to its normal condition after the occurrence of an event that disrupts its normal state. In this sense, different definitions for resilience are presented in the literature. Allenby and Fink (2005, p. 1034) defined it as “the capacity of a system to maintain its functions and structure in the face of internal and external changes and to degrade normally when necessary”. For Haimes (2009, p. 498), resilience is the “ability of the system to withstand a major disruption within acceptable degradation parameters and recover with adequate time and reasonable costs and risks.” Lee *et al.* (2013, p. 29) define resilience as “a multidimensional socio-technical phenomena that portrays how people, individuals, or groups manage uncertainty.” Woods (2015) emphasizes that resilience can be conceptualized as recovery from trauma and return to balance, as a synonym for robustness, as the opposite of fragility, or even as network architectures that can sustain the ability to adapt to future surprises.

Over the last decade, the concept of “resilience” has been used in different fields of knowledge (e.g., management, psychology, sociology, political science, engineering, ecosystem science and safety) and its popularity has given rise to different interpretations and perceptions (Nemeth & Herrera, 2015). Thus, Hosseini *et al.* (2016) also emphasize their approach from different perspectives and identify four domains of resilience: social, economic, engineering, and organizational. The social domain is related to the analysis of resilience capacities of individuals, groups, communities, and the environment. As for economic resilience, it highlights the ability to reconfigure and adapt to a given structure (e.g., an industry). In the field of engineering, the concept is relatively new compared to others and refers to technical systems designed by engineers interacting with humans and technology. Finally, in the organizational field, the concept was born to meet the need for companies to respond to rapidly changing environments.

In the management and business field, resilience is also defined in different ways. According to Nemeth and Herrera (2015), management literature refers to resilience as related to individuals, groups and organizations, highlighting a company's ability to withstand difficult economic conditions. Vogus and Sutcliffe (2007) define resilience as the organization's capability to absorb tensions, recover and preserve its functioning in the face of adversity and undesirable events. In the same line, Burnard and Bhamra (2011) highlight resilience as responses of individuals and organizations to turbulence and discontinuities.

Recognizing these definitions, Gilly *et al.* (2014) emphasize that an organization is resilient when, in the face of continuous or discontinuous environmental pressures, it has the capacity to absorb, anticipate and resist, generating solutions and, at the same time, developing a new growth dynamic.

The COVID-19 pandemic further reinforced the importance of resilience in business and management. The pandemic has prompted companies around the world to operate nimbly in newer and more resilient ways (Verma & Gustafsson, 2020). In the same sense, Bailey and Breslin (2021) highlight that the COVID-19 crisis caused organizations to face new business challenges related to adaptations to new ways of working and profound changes in interpersonal interactions and relationships.

In a study of article reviews recently published by the International Journal of Management Reviews (IJMR), Bailey and Breslin (2021) draw attention to three resilience factors. First, organizations need to develop adaptive business models that enable rapid innovation. In times of pandemic, this adaptability can be seen when, for example, distilleries started producing hand sanitizers or “organizations implementing online/remote/contactless options as they adjust to the ‘new normal’” (p.4). Second, the authors highlight the weakness of supply chains and that they need to become more resilient. Third, organizational resilience depends also on the employees, such as those in frontline health-care and the food supply chain.

In fact, the concept of resilience is very broad and is addressed in different ways in various areas and fields of knowledge. In the area of management and business, despite being a topic that has been widely explored in academic research, there is still little consensus on its conceptualization and operationalization (Linnenluecke, 2017). Likewise, the COVID-19 pandemic made even more evident the need for organizations to be more resilient in order to recover and adapt quickly to unexpected events. Considering the relevance of the topic, this paper provides continuity to the studies developed by Linnenluecke (2017), as detailed in the next section of this article.

3. METHOD

In this work, bibliometric techniques, indicators, and tools are used to analyze the scientific production on the topic of resilience in the area of management and business. The bibliometric analysis provides an overview of scientific research in a field of knowledge or journal, identifying its main bibliographic characteristics and research trends, citations, authors, institutions, and keywords (Martínez-Lopez *et al.*, 2018; Merigó & Yang, 2017). Thus, a bibliometric study brings data and indicators to draw the development trajectory of scientific production, allowing to identify the most influential articles and their impact on a field of research (Garfield, 2004), and to generate information on the characteristics of current research on a topic, past trends and future directions (Sarango-Lalangui *et al.*, 2018).

To conduct the bibliometric analysis presented in this paper, procedures and techniques similar to other bibliometric studies and literature reviews were adopted (Linnenluecke, 2017; Santos *et al.*, 2020; Sarango-Lalangui *et al.*, 2018). Statistical analyses of records and information from publications on resilience in the

area of management and business have allowed the analysis of the scientific body of knowledge on the topic, through bibliographic data analysis and information visualization (Karlsson *et al.*, 2015). This study was conducted in three main stages: (i) review planning and questions, (ii) systematic search, and (iii) bibliometric and visualization analysis.

3.1. Review planning and questions

In the planning stage, the questions were defined and the scope of the review was established (keyword, database and areas of knowledge).

The research questions are:

- How is the chronological development of the publications characterized?
- Which are the most relevant journals on the topic (according to two indicators: the number of articles published on resilience and the number of citations)?
- Who are the most influential authors on the topic (according to two indicators: the number of published articles on resilience and the number of citations per article)?
- What are the most influential articles on the subject, how are they grouped and what lines of research have received attention in the area of management and business?
- What are the key words and main topics of the most recent publications?
- What are the emerging themes and avenues for future research?

The study was conducted in Web of Science - WOS (core collection), specifically in Social Sciences Citation Index - SSCI, a high quality and comprehensive database that provides a comprehensive collection of peer-reviewed publications and journals from various areas of knowledge (e.g., applied social sciences, management, and business) recognized by the international scientific community (Crossan & Apaydin, 2010; Mas-Tur *et al.*, 2021; Sarango-Lalangui *et al.*, 2018; Shah *et al.*, 2020). Previous papers in the field of resilience research used the same database (e.g., Linnenluecke, 2017), as well as reviews of other topics studied in the area of management and business (see, e.g., Crossan & Apaydin, 2010; Flórez-Parra *et al.*, 2014). The WOS database has the advantage of incorporating bibliometric and citation counting tools that enable the analysis of scientific production and, in addition, it is the only one that allows exporting bibliographic data to a format readable by HistCite™ (Garfield, 2004) used in this work.

It was intentionally decided to consider a broad scope, so only one search word was chosen, namely “resilience” (and its variations). The procedures performed to locate and select the articles are detailed below.

3.2. Systematic search process

A search was conducted for publications in the WOS-SSCI (Web of Science - Social Sciences Citation Index), available between 2014 and 2021, up to the date when this study was conducted: May 31, 2021. This updates the other similar review, previously conducted by Linnenluecke (2017), which analyzed

articles up to mid-2014, as explained in the introduction of this paper. The term “resilien*” was searched for in topic (publications title, abstract, keywords). The asterisk (*) was used so that the search would also consider variations of the word (resilience or resilient, for example). The search was refined to include only articles indexed in the management and business categories and the other categories were excluded. Subsequently, full articles published in journals were filtered out, including only Article or Review Article. Other documents (e.g., book reviews, proceedings papers, reprints, and editorial materials) were excluded due to their variability and more restricted availability (Jones *et al.*, 2011). After applying these filters, 637 articles were obtained, which were used to perform the bibliometric analysis. Figure 1 presents a summary of the systematic search process conducted to carry out this literature review.

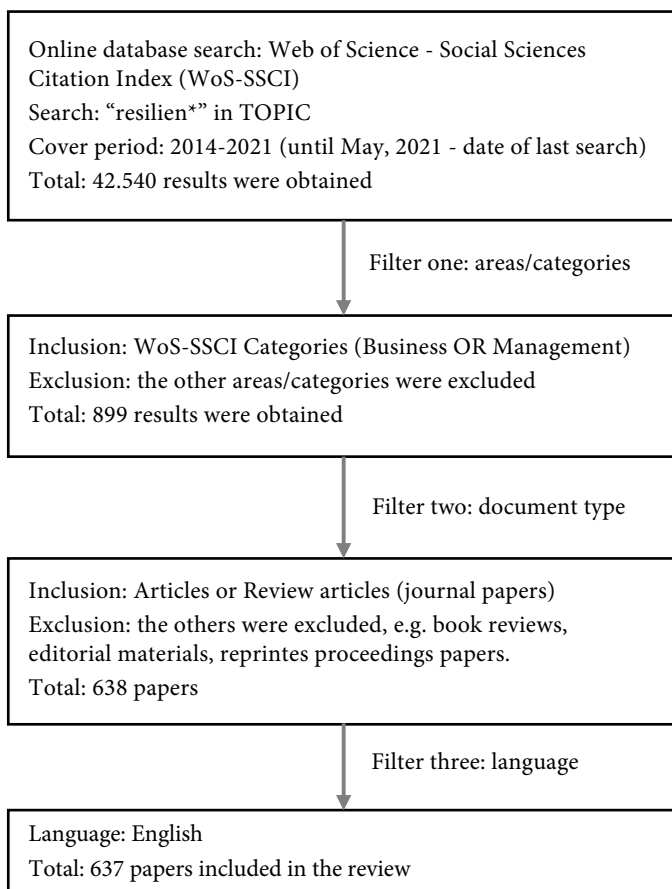


Figure 1
Summary of the systematic search process

Source: Own elaboration

3.3. Bibliometric and visualization analysis

HistCite™ and VOSviewer were used to process the bibliographic data of the 637 publications, as well as the Mendeley tool to organize and manage the bibliographic references. Similar to other studies (e.g., Santos *et al.*, 2020), the bibliometric analysis in this paper uses two main indicators: (i) quantitative indicators, i.e., number of publications on the topic, authors, journals

and countries; and (ii) qualitative or impact indicators, i.e., number of citations of each article and co-citations between articles on the topic (Campigotto-Sandri *et al.*, 2020; Cobo *et al.*, 2011; Flórez-Parra *et al.*, 2014).

HistCite™ and Visualization of Similarities (VoS) produce bibliometric maps using advanced mapping techniques with a strong visual component (Shah *et al.*, 2020; Van Eck & Waltman, 2010). In this paper the HistCite™ software was useful for, in addition to other analyses, the construction of the historiographic mapping and the visualization of the co-citation network of the most influential articles on the topic resilience (with Local Citation Score indicator: LCS \geq 5). The VOSviewer software was useful to generate visualization maps (via bibliographic linking and cartographic analysis) of keywords of the most recent publications, showing clusters of emerging topics associated with the resilience topic in the area of management and business. The results are presented in the form of tables and visual representations.

4. RESULTS

The general results are presented below according to the methodological procedures outlined above. The results are organized in such a way as to present the general profile of the literature on resilience through a synthesis based on the results of the bibliographic searches and the analyses carried out with the application of bibliometric tools, techniques, and indicators.

A total of 637 articles related to resilience were identified in the Web of Science - Social Sciences Citation Index (WoS-SSCI) database. These papers are published in 114 journals and were written by 1607 authors associated with 821 institutions from 63 countries. It was also identified that these 637 articles used 36299 bibliographic references (including other articles on resilience), an average of 57 references per article. Table 1 briefly presents the results obtained.

Table 1
General results: papers on resilience in the management and business research field

Elements	Number
Papers	637
Journals	114
Authors	1.607
Institutions (author affiliation)	821
Countries	63
References	36.299

Source: Own elaboration (WoS-SSCI, May 2021).

Figure 2 shows the number of publications (every other year) and a trend line to illustrate the evolution of the data. There is a balanced behavior in the number of articles published between 2014 and 2019. However, in the last two years, this number has grown significantly with respect to previous years, even considering only publications up to May 2021. This growth may be related to the COVID-19 pandemic, as this unforeseen event highlighted the importance of resilience for organizations.

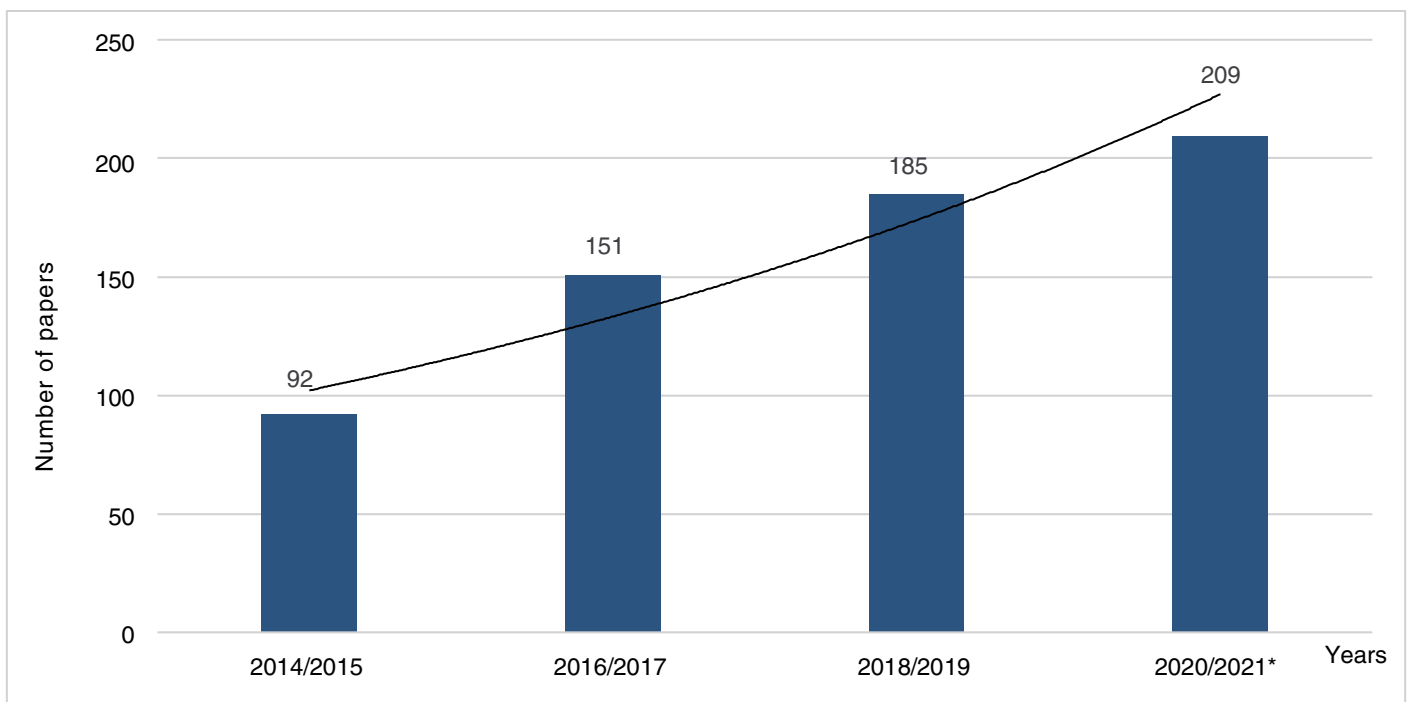


Figure 2
Chronologic distribution of the publications

Note: *until May 2021.

Source: Own elaboration.

To identify the representativeness of the journals with publications on resilience in the area of management and business, the 114 journals with articles on the subject were analyzed, observing the number of articles (Table 2). This analysis shows that the 236 articles published in ten of the journals correspond to 37% of the total number of articles. The largest number of publications is found in the Journal of Contingencies and Crisis Management, which published 44 articles related to resilience,

followed by Supply Chain Management-An International Journal, with 37 published articles. Both journals alone account for approximately one out of every three articles out of the total of ten journals (Table 2). These results allow us to deduce that the editorial line of these journals is showing interest in resilience research and, furthermore, that researchers recognize these journals as relevant channels for communicating the results of their research on the subject.

Table 2
Top 10 journals sorted by number of papers on resilience

Journals	Number of papers	Citations*
<i>Journal of Contingencies and Crisis Management</i>	44	38
<i>Supply Chain Management-An International Journal</i>	37	201
<i>Journal of Business Research</i>	32	17
<i>International Journal of Operations & Production Management</i>	24	62
<i>International Journal of Logistics Management</i>	23	44
<i>International Journal of Physical Distribution & Logistics Management</i>	21	84
<i>International Journal of Human Resource Management</i>	18	24
<i>Industrial Marketing Management</i>	14	11
<i>Management Decision</i>	12	5
<i>International Small Business Journal-Researching Entrepreneurship</i>	11	14
Total (specific)	236	500
Percentage of total **	37%	56%

Notes: *TLCS - Total Local Citation Score. **Total: 114 journals and 897 citations in the collection of 637 papers.

Source: Own elaboration (WoS-SSCI, May 2021).

To deepen the analysis related to the journals, the journals with the greatest impact within the subject of this review were identified. The number of citations received by each of the 114 journals within the collection of 637 articles was considered. As shown in Table 3, the ten most representative journals in number of citations represent 67% of the total citations received by all 114 journals (603 of the 897 citations within the collection). Supply Chain Management-An International Journal is the most cited journal, representing 22% of the total citations. Compared to the ranking presented in Table 2, five

journals appear in both tables: Supply Chain Management-An International Journal (with 201 out of 871 total citations), International Journal of Physical Distribution & Logistics Management (84 citations), International Journal of Operations & Production Management (62 citations), International Journal of Logistics Management (44 citations) and Journal of Contingencies and Crisis Management (38 citations). These five journals represent around 48% of the total citations, which means that most of the publications on resilience have used these journals as a source of reference.

Table 3
Top 10 journals sorted by citation frequency in the collection on resilience

Journals	Number of papers	Citations*
<i>Supply Chain Management-An International Journal</i>	37	201
<i>International Journal of Physical Distribution & Logistics Management</i>	21	84
<i>International Journal of Operations & Production Management</i>	24	62
<i>International Journal of Logistics Management</i>	23	44
<i>MIT Sloan Management Review</i>	6	42
<i>Academy of Management Annals</i>	4	38
<i>Journal of Contingencies and Crisis Management</i>	44	38
<i>International Journal of Management Reviews</i>	3	35
<i>Entrepreneurship Theory and Practice</i>	5	32
<i>European Management Journal</i>	9	27
Total (specific)	176	603
Percentage of total **	28%	67%

Notes: *TLCS - Total Local Citation Score. **Total: 114 journals and 897 citations in the collection of 637 papers.

Source: Own elaboration (WoS-SSCI, May 2021).

Among the 1607 authors of the articles, seven are listed with more articles published on the subject (with four or more publications). As can be seen in Table 4, these authors are responsible for 32 articles and 14 of them were published in the last two years. Blackhurst (University of Iowa - USA) is the most productive author, with six articles published on the subject, followed by Golgeci (Aarhus University - Denmark) and Shepherd (Uni-

versity of Notre Dame - USA), both with 05 articles. Of the 07 authors with the most articles published on resilience, five are representatives of European countries (Denmark, France, and England) and two of North America (USA). Analyzing the list of 1607 authors, it was identified that 20 authors published 3 articles each, 111 authors published 2 articles and 1,469 authors published 1 article.

Table 4
Authors with the largest amount of publications in the collection on resilience

Authors	Number of papers	Years of publication (quantity of papers)	Institutions (Author's Affiliation)*	Country
Blackhurst, Jennifer	6	2014; 2015(2); 2018; 2020(2)	University of Iowa	USA
Golgeci, Ismail	5	2019; 2020(2); 2021(2)	Aarhus University	Denmark
Shepherd, Dean A.	5	2016(2); 2017; 2019; 2020	University of Notre Dame	USA
Durach, Christian F.	4	2015; 2017; 2018; 2020	ESCP Business School	France
Khan, Zaheer	4	2019; 2020; 2021(2)	University of Kent	England
Stevenson, Mark	4	2015; 2017; 2019; 2020	Lancaster University	England
Wieland, Andreas	4	2015; 2016; 2020; 2021	Copenhagen Business School	Denmark

Note: *Institution reported by the author in the most recently published article.

Source: Own elaboration (WoS-SSCI, May 2021).

We also identified the authors who were most cited within the collection of 637 articles. Table 5 indicates that, among the 11 authors, Scholten (University of Groningen - Netherlands) was the most cited, despite having published three articles in the period analyzed. It can also be seen that Blackhurst (University of Iowa - USA), responsible for the largest number of articles (as

shown in Table 4), is not among the most cited. A comparison of Tables 4 and 5 shows that only Shepherd (University of Notre Dame - USA) is included in both tables. Eleven authors were selected for this analysis since the last two had the same number of citations in the collection of articles.

Table 5
Most cited authors in the papers collection on resilience

Citations*	Authors	Number of papers	Institutions (Author's Affiliation)**	Country
74	Scholten, Kirstin	3	University of Groningen	Netherlands
54	Shepherd, Dean A.	5	University of Notre Dame	USA
54	Williams, Trenton A.	3	Indiana University	USA
43	Feisel, Edda	1	Friedrich-Alexander-Universität	Germany
43	Giunipero, Larry	1	Florida State University	USA
43	Hartmann, Evi	1	Friedrich-Alexander-Universität	Germany
43	Hohenstein, Nils-Ole	1	Friedrich-Alexander-Universität	Germany
38	Schilder, Sanne	1	University of Groningen	Netherlands
37	Linnenluecke, Martina K.	3	Macquarie University	Australia
36	Fynes, Brian	2	University College Dublin	Ireland
36	Scott, Pamela Sharkey	2	Dublin City University	Ireland

Notes: *TLCS - Total Local Citation Score. ** Institution reported by the author in the most recently published article.

Source: Own elaboration (WoS-SSCI, May 2021).

Table 6 specifies the 15 countries (out of a total of 64) with the highest number of articles on resilience in the period 2014 to 2021. In addition to the USA with 190 publications, the United Kingdom with 122 publications, Australia with 68 publications, Germany with 40 publications and Canada with 39 publications are in the top five positions in the ranking. In the list, Brazil is the only country from South America and occupies the 14th position in the ranking with 19 articles related to the topic.

Table 6
Main countries

Country	Number of papers	Citations*
USA	190	350
UK	122	141
Australia	68	103
Germany	40	93
Canada	39	29
Italy	38	46
France	36	20
New Zealand	34	30
Spain	34	46
Peoples R China	33	14
Netherlands	25	83
Denmark	23	23
Sweden	23	54
Brazil	19	35
South Korea	17	14

Note: *TLCS - Total Local Citation Score.

Source: Own elaboration (WoS-SSCI, May 2021).

To identify the most cited publications in the set of 637 articles in the timeline between January 2014 and May 2021, a citation map was generated using HistCite™ software (Figure 3). Referred to as a *historiograph* (Garfield, 2004), the map is a co-citation network where articles are shown as “nodes” (circles) and citation connections between them are shown by lines (links). The size of each node reflects the number of citations the article received from other articles that are part of the same dataset (637 publications). That is, they are citations received within the set of publications on resilience in the area of management and business in WoS. As required by Garfield (2004) and other review papers on the subject (e.g., Linnenluecke, 2017) the cut-off point $LCS \geq 5$ was used, i.e., total local citation equal to or greater than five citations. The result of applying this criterion was a total of 47 articles. These articles have between 5 and 43 citations within the collection and are connected to each other through 93 links. The bibliographic details and corresponding citation count for each article are presented in Table 7.

In Figure 3, the shaded spaces represent the main lines of research. Two main lines were identified. On the left side of Figure 3 are publications (author and year) on **supply chain resilience** or resilience in supply chains. On the right side of the historiograph are publications predominantly from the **organizational resilience** line of research, addressing a few research topics, including topics associated with resilient en-

trepreneurship, learning, employee resilience and psychological capital, resilience as an organizational behavior or characteristic of an organization, among others.

Through the visualization from historiographer's, four “authority” articles on the topic are identified in the line of research on **resilience of/in supply chains** (articles represented by the larger circles). These articles are: Hohenstein *et al.* (2015) with $LCS=43$, Scholten and Schilder (2015) with $LCS=38$, Scholten *et al.* (2014) with $LCS=31$, and Pereira *et al.* (2014) with $LCS=24$ (see Figure 3 and Table 7).

The second type is the hub article, i.e., the linking article that connects other significant works on the topic. Examples of hub articles in Figure 3 are Ali *et al.* (2017), Stone and Rahimifard (2018), and Scholten *et al.* (2019).

In the line of research on **organizational resilience** (or resilience in organizations) there are four “authority” papers on the topic, which are: Linnenluecke (2017) with $LCS = 35$, Bullough *et al.* (2014) and Williams *et al.* (2017), both with $LCS = 27$, and Fiksel *et al.* (2015) with $LCS = 25$ (see Table 7). As shown in Figure 3, the Williams *et al.* (2017) article is also a hub article, but the work of Linnenluecke (2017) and Fiksel *et al.* (2015) actually connect other significant papers in the research area and are also the main connectors of the two lines of research on resilience in the area of management and business (shaded in Figure 3).

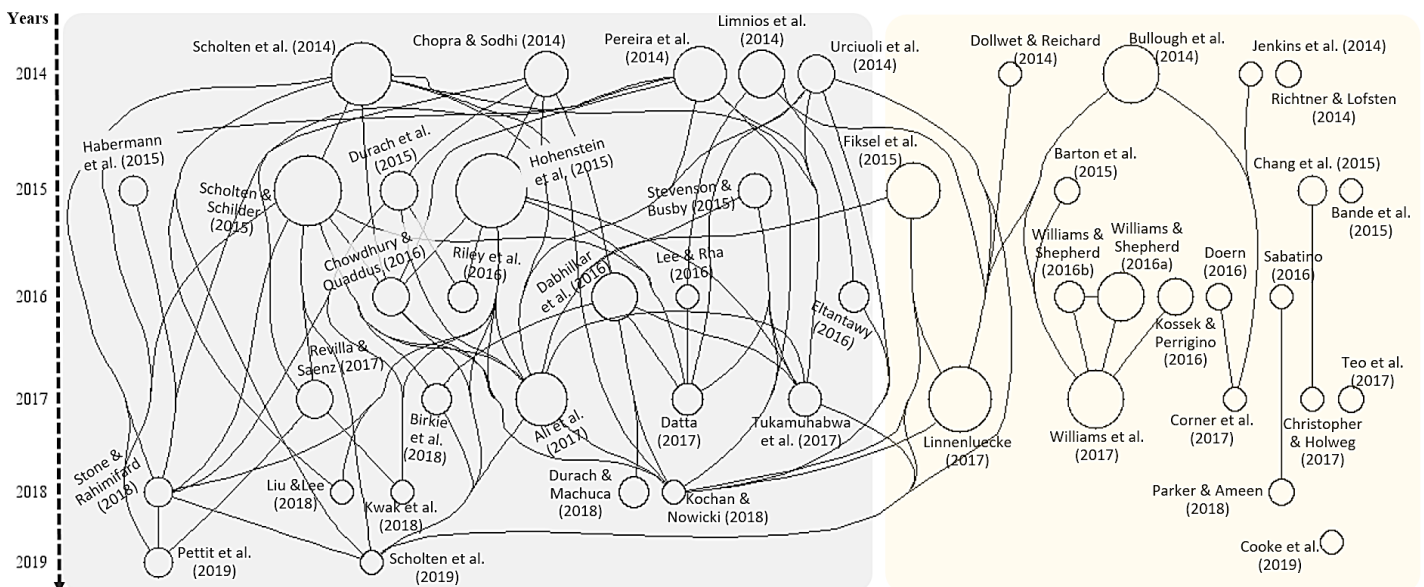


Figure 3

Chronological historiograph highlighting the most-cited papers in the collection on resilience (from 2014 to 2019): co-citations analysis

Source: Created from HistCite (WoS-SSCI, May 2021).

Table 7
Most cited papers (in the collection) on resilience in business and management research field

LCS	Author (year)	Journal	LCS	Author (year)	Journal	LCS	Author (year)	Journal
43	Hohenstein <i>et al.</i> (2015)	<i>International Journal of Physical Distribution & Logistics Management</i>	12	Revilla & Saenz (2017)	<i>International Journal of Operations & Production Management</i>	6	Doern (2016)	<i>International Small Business Journal-Researching Entrepreneurship</i>
38	Scholten & Schilder (2015)	<i>Supply Chain Management-An International Journal</i>	11	Kossek & Perrigino (2016)	<i>Academy of Management Annals</i>	6	Parker & Ameen (2018)	<i>Journal of Business Research</i>
35	Linnenluecke (2017)	<i>International Journal of Management Reviews</i>	10	Stevenson & Busby (2015)	<i>International Journal of Operations & Production Management</i>	5	Jenkins <i>et al.</i> (2014)	<i>Journal of Business Venturing</i>
31	Scholten <i>et al.</i> (2014)	<i>Supply Chain Management-An International Journal</i>	10	Tukamuhabwa <i>et al.</i> (2017)	<i>Supply Chain Management-An International Journal</i>	5	Dollwet & Reichard (2014)	<i>International Journal of Human Resource Management</i>
27	Bullough <i>et al.</i> (2014)	<i>Entrepreneurship Theory and Practice</i>	9	Datta (2017)	<i>International Journal of Logistics Management</i>	5	Bande <i>et al.</i> (2015)	<i>Industrial Marketing Management</i>
27	Williams <i>et al.</i> (2017)	<i>Academy of Management Annals</i>	8	Riley <i>et al.</i> (2016)	<i>International Journal of Physical Distribution & Log. Management</i>	5	Lee & Rha (2016)	<i>Management Decision</i>
25	Fiksel <i>et al.</i> (2015)	<i>MIT Sloan Management Review</i>	8	Eltantawy (2016)	<i>Journal of Business & Industrial Marketing</i>	5	Sabatino (2016)	<i>Journal of Business Research</i>
24	Pereira <i>et al.</i> (2014)	<i>Supply Chain Management-An International Journal</i>	8	Williams & Shepherd (2016)	<i>Journal of Business Venturing</i>	5	Christopher & Holweg (2017)	<i>International Journal of Physical Distribution & Logistics Management</i>
23	Ali <i>et al.</i> (2017)	<i>Supply Chain Management-An International Journal</i>	8	Birkie <i>et al.</i> (2017)	<i>Supply Chain Management-An International Journal</i>	5	Corner <i>et al.</i> (2017)	<i>International Small Business Journal</i>
19	Williams & Shepherd (2016)	<i>Academy of Management Journal</i>	8	Durach & Machuca (2018)	<i>International Journal of Operations & Production Management</i>	5	Teo <i>et al.</i> (2017)	<i>Journal of Contingencies And Crisis Management</i>
18	Limnios <i>et al.</i> (2014)	<i>European Management Journal</i>	7	Chang <i>et al.</i> (2015)	<i>International Journal of Logistics Management</i>	5	Liu & Lee (2018)	<i>International Journal of Logistics Management</i>
18	Dabhilkar <i>et al.</i> (2016)	<i>International Journal of Operations & Production Management</i>	7	Habermann <i>et al.</i> (2015)	<i>Decision Sciences</i>	5	Kwak <i>et al.</i> (2018)	<i>International Journal of Operations & Production Management</i>
16	Chopra & Sodhi (2014)	<i>MIT Sloan Management Review</i>	7	Stone & Rahimifard (2018)	<i>Supply Chain Management-An International Journal</i>	5	Kochan & Nowicki (2018)	<i>International Journal of Physical Distribution & Logistics Management</i>
13	Durach <i>et al.</i> (2015)	<i>International Journal of Physical Distribution & Logistics Management</i>	7	Pettit <i>et al.</i> (2019)	<i>Journal of Business Logistics</i>	5	Scholten <i>et al.</i> (2019)	<i>Supply Chain Management-An International Journal</i>
12	Urciuoli <i>et al.</i> (2014)	<i>Supply Chain Management-An International Journal</i>	6	Richtner & Lofsten (2014)	<i>R & D Management</i>	5	Cooke <i>et al.</i> (2019)	<i>International Journal of Human Resource Management</i>
12	Chowdhury & Quaddus (2016)	<i>Supply Chain Management-An International Journal</i>	6	Barton <i>et al.</i> (2015)	<i>Journal of Contingencies and Crisis Management</i>			

Note: LCS (Local Citation Score) is the number of times a paper was cited by other papers in the 637 papers collection.

Source: Created from HistCite (WoS-SSCI, May 2021).

As presented in Figure 3 and Table 7, the co-citation network (historiographic mapping) enabled the identification, in the period considered for this review, of articles representative of research on resilience in the area of management and business. It was also identified that more than 30% of the total number of articles were published between January 2020 and May 2021 (Figure 2) and that among the most cited articles there are three from 2019 (see Figure 3). Thus, to identify the central and emerging topics in the most recent publications, the keywords of the 209 articles published from January 2020 to May 2021 (total of 1229 keywords) were explored. A network was constructed using VOSviewer software (Van Eck and Waltman, 2010), with the keywords used in the articles. These words were filtered by a minimum of 5 occurrences, i.e., each keyword was used by at least five articles. For each word the VOSviewer software calculated the total coexisting link strength and those with the highest total link/link strength were selected. Subsequently, repetitive, and similar words (e.g., variations of singular and plural words) were excluded, leaving 55 keywords. The visualization of these words and their connections is shown in Figure 4. In this figure, the size of the circle represents the frequency of occurrence

(the larger the size of the circle, the larger the frequency) and the color represents a specific group, which is a cluster of words based on co-occurrences (Park & Nagy, 2018).

In Figure 4 it is possible to observe four clusters of words, which are distinguished by the colors red (cluster 1), green (cluster 2), yellow (cluster 3), and blue (cluster 4). The third and fourth clusters are relatively small, and the keywords have fewer connections and relatively larger distances than in cluster 1 for example. The four clusters confirm the two lines and topics of research identified earlier in the co-citation map formed by the 47 articles on resilience in management and business published between 2014 and 2019 (see Figure 3). In each word cluster representing articles published between January 2020 and May 2021 (Figure 4), the three words with the strongest connecting links (Total Link Strength greater than 50) are: resilience (TLS = 320), performance (TLS = 149) and covid-19 (TLS = 54) in cluster 3; management (TLS = 125), risk (TLS = 63) and impact (TLS = 58) in cluster 4; framework (TLS = 80), innovation (TLS = 59) and supply chain resilience (TLS = 55) in cluster 2; and dynamic capabilities (TLS = 64), model (TLS = 61) and disruptions (TLS = 56) in cluster 1.

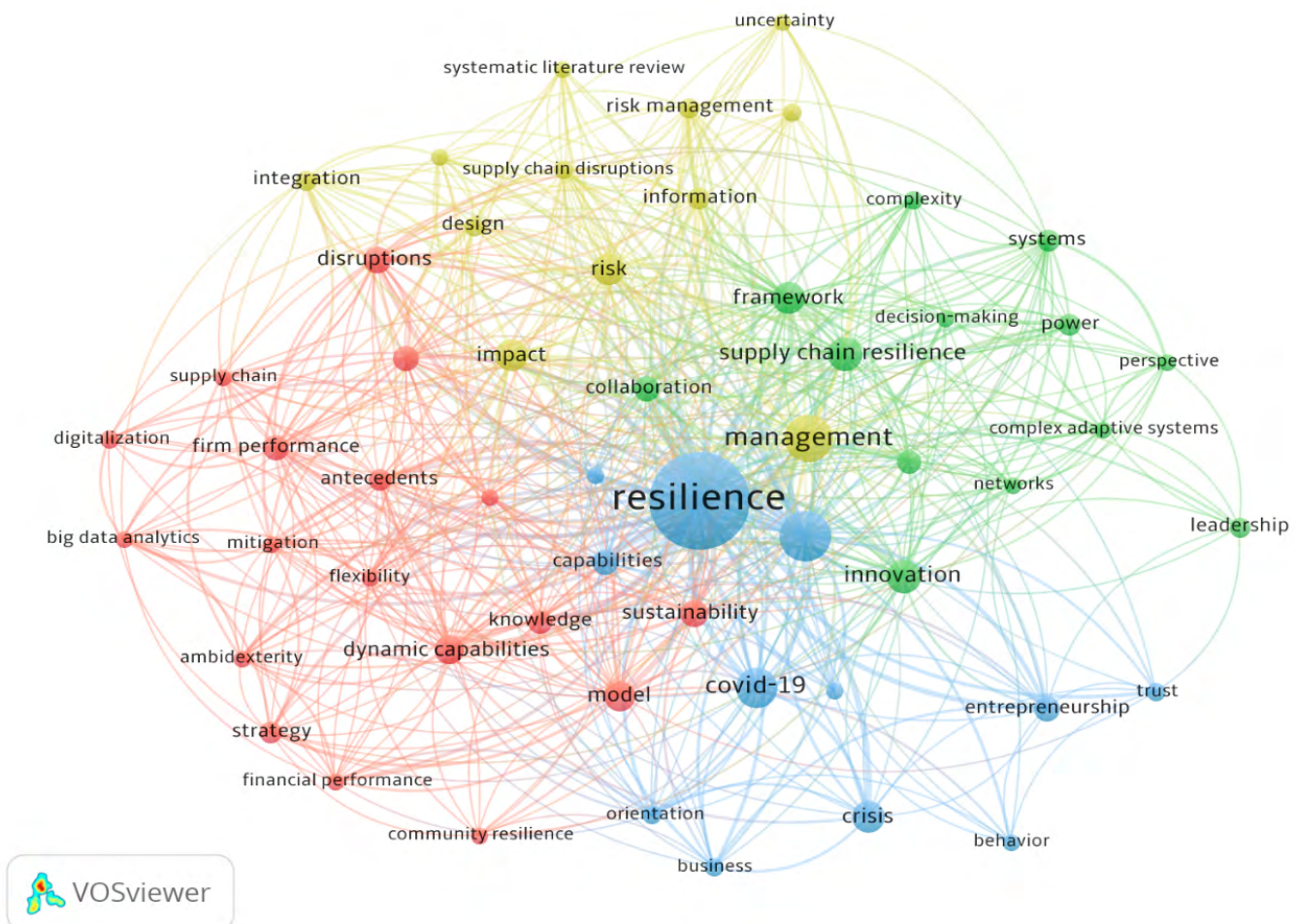


Figure 4

Keyword co-occurrence network: papers in the collection on resilience (2020 - May 2021).

Source: Own elaboration, created by VOSViewer

In cluster 1 (marked in red) are the cross-cutting topics, i.e., topics linked to the two lines of research presented above in the historiograph. It is the cluster with the most words and connections (Figure 4) and in it there are papers that use a strategic management approach to study resilience in organizations (from the perspective of dynamic capabilities, [Conz and Magnani \(2020\)](#)), in communities (e.g., resilience of communities in climate-related emergencies - see [Adekola and Clelland \(2020\)](#)) and in situations of supply chain disruptions (see e.g., [Durach et al. \(2020\)](#)). There is a concern in developing and proposing models to overcome the existing fragmentation of definitions of resilience in the area of management and business (e.g., [Conz and Magnani \(2020\)](#)), and some of these models identify backgrounds of resilience capacities, i.e., backgrounds that may be other capabilities and resources that the organization mobilizes (or factors that affect resilience) in a given situation or context, as [Cotta and Salvador \(2020\)](#) have done, by empirically reaffirming the idea that managers' characteristics (their individual resilience, for example) influence organizational resilience practices.

In cluster 2 (marked in green) are topics mainly linked to the "supply chain resilience" line of research, including papers that address innovation and that develop frameworks for analyzing resilience starting from various perspectives (most recently the systemic approach / complex adaptive systems). The article by [Adobor \(2020\)](#), for example, develops a conceptual framework to broaden the understanding of resilience in complex adaptive systems. The adaptive cycles approach indicates that the resilience of a complex adaptive system, such as a supply chain, is not fixed, but expands and contracts over time, and from a pragmatic point of view, generates opportunities for innovation and renovation to build more resilient supply chains ([Adobor, 2020](#)). Studies in this direction have the potential to explain and improve the understanding of the dynamics of resilience. The work of [Adobor \(2020\)](#) is one of the few studies that have associated the concept of complex adaptive cycle to that of supply chain resilience. In operational terms, the concepts of adaptive cycles can generate insights for the management practice of organizations and expand the repertoire of strategies, mechanisms, and actions to manage the resilience of supply chains.

In cluster 3 (marked in blue) some of the main topics are organizational resilience (where the words resilience and performance are most frequently cited); resilience in times of crisis, including articles on crisis management and the impact of the covid-19 pandemic (some of the most frequently used keywords are: covid-19, crisis, crisis management); and topics on entrepreneurship and resilience (incorporated in the keywords entrepreneurship, trust, behavior). Similarly, in cluster 4 (marked in yellow) are words frequently used in studies on resilience and management in general (management), and others, more specifically on information management and risk management. It is interesting to note that the main word of cluster 3 (i.e., management) is very close to two other clusters, i.e., clusters 4 and 2. In cluster 2, linked to cluster 3, for example, in general, research on supply chain resilience looks at the impacts and practical implications of resilience for supply chain management and for managing risks and information. Whether in supply chains or in companies, there is still an absence of emerging studies concerned with developing and validating scales or other resilience measurement tools. [Hillmann and Guenther \(2021\)](#) point out that, although empirical research on the concept has increased, more clarity is needed in terms of its measurement. Moreover, empirically validated metrics for organizational resilience are necessary.

To better understand the 209 publications for the years 2020 and 2021/May, a set of articles representing the most recent publications was identified. Articles with the word resilience* in the title were selected from the list of the top ten most cited journals (Table 3). From this information, it is possible to state that the top ten most cited journals (identified in this study) have also recently published articles on the topic. Table 8 shows the main bibliographic data of the 24 selected articles, presented according to the impact indicator (TLCS - Total Local Citation Score) and the name of the corresponding journal. The keywords of the publications were also analyzed and in Figure 5 it is possible to visualize the emerging topics, based on the words found within the lighter areas. The words in part A of Figure 5 represent the 24 publications selected from the top journals, and part B puts a lens on the articles addressing resilience in the context of the COVID-19 pandemic. In these analyses, words used in more than one article were considered, excluding the word "resilience" so as not to distort the results.

Table 8
**Most recent papers (from most cited journals in the collection)
 on resilience in business and management research field (2020 - May 2021)**

TLCS	Journals	Authors according to the order/numbering of the paper	Year
201	<i>Supply Chain Management-An International Journal</i>	da Silva Poberschnigg, TF; Pimenta, ML; Hilletoft, P.	2020
		Sawyerr, E.; Harrison, C.	2020
		Um, J.; Han, N.	2021
		Yaroson, EV; Breen, L; Hou, J.; Sowter, J.	2021
84	<i>International Journal of Physical Distribution & Logistics Management</i>	Zouari, D.; Ruel, S.; Viale, L.	2021
62	<i>International Journal of Operations & Production Management</i>	Cotta, D.; Salvador, F.	2020
		Durach, CF; Wiengarten, F; Choi, TY.	2020
		Fan, Y.; Stevenson, M.; Li, F.	2020
		Kahiluoto, H.; Makinen, H.; Kaseva, J.	2020
		van Hoek, R.	2020
44	<i>International Journal of Logistics Management</i>	Adobor, H.	2020
		Childerhouse, P; Al Aqqad, M.; Zhou, Quan; Bezuidenhout, C.	2020
		Sundarakani, B.; Pereira, V.; Ishizaka, A.	2021
42	<i>MIT Sloan Management Review</i>	Kaplan, S.	2020
		Shin, W.	2020
		Yu, H.; Greeven, MJ.	2020
38	<i>Academy of Management Annals</i>	Olekalns, M.; Caza, B.B; Vogus, TJ.	2020
38	<i>Journal of Contingencies and Crisis Management</i>	Adekola, J; Clelland, D.	2020
		Therrien, M-C; Usher, S; Matyas, D.	2020
		Huck, A.; Monstadt, J.; Driessen, P. J.; Rudolph-Cleff, A.	2021
35	<i>International Journal of Management Reviews</i>	Hillmann, J.; Guenther, E.	2021
32	<i>Entrepreneurship Theory and Practice</i>	Chadwick, I.C.; Raver, J. L.	2020
27	<i>European Management Journal</i>	Conz, E.; Magnani, G.	2020
		Fatima, T.; Majeed, M.; Jahanzeb, S.	2020

Note: TLCS (*Total Local Citation Score*) is the number of times the journal was cited in the 637 papers collection.

Source: Own elaboration, created by HisCite

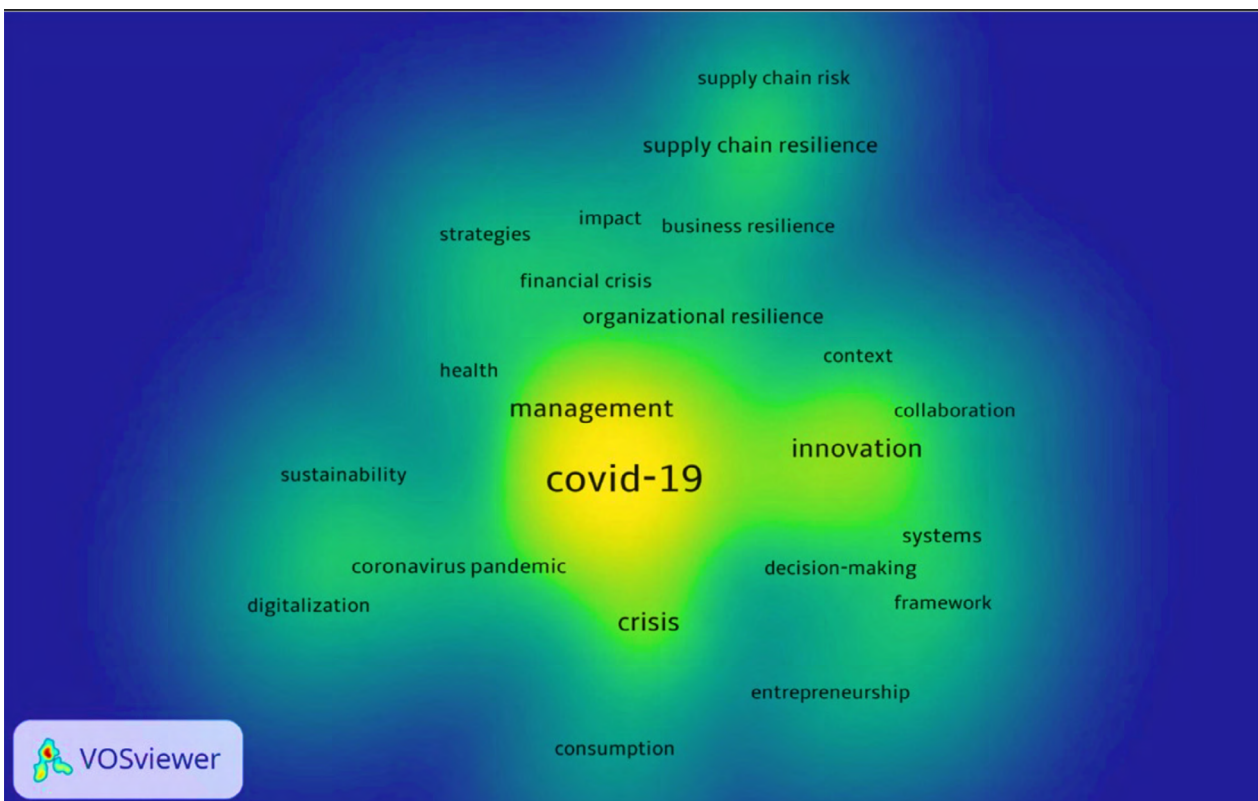
One of the emerging topics (part A of Figure 5) is the association of resilience with digitization or digital transformation. In the supply chain resilience line of research, for example, Zouari *et al.* (2021) address supply chain resilience as a key capability to cope with unexpected disruptions and, in the study conducted with 300 managers, they analyze the relationship between resilience and supply chain digitization. The results indicate that supply chain resilience is positively affected by both the degree

of digital maturity and the adoption of digital tools, i.e., there is a positive impact of digitization on supply chain resilience.

Another emerging topic since 2020 is the association of resilience with the coronavirus pandemic or COVID-19 (part B of Figure 5). In general, studies highlight the importance of resilience in the pandemic context, review theories, propose models, and discuss practical implications for organizations and supply chains.



(a) Terms clusters of the publications on resilience from top journals (2020 - May 2021)



(b) Terms clusters of the publications on resilience and Covid-19 (2020 - May 2021)

Figure 5

Keyword co-occurrence: emerging issues from recent papers in the collection on resilience

Source: Own elaboration, created by VOSViewer

4.1. Topics and avenues for future research

This section analyzes in more detail the main lines of research and central themes previously identified through bibliometric and information visualization tools. From these analyses, some avenues for future studies in the management and business research field are identified, considering the most (co-)cited articles and recent articles published between January 2020 and May 2021.

In the **supply chain resilience (or resilience in supply chains) line of research** there is evidence of opportunities towards conducting theoretical studies and, mainly, empirical research increasingly transiting through organizations embedded in inter-organizational contexts and specific industries with highly interconnected supply structures, which determine their resilience and vulnerability to adverse impacts - for example, resilience in the oil and gas industry (Urciuoli *et al.*, 2014) or in the pharmaceutical industry (Yarosan *et al.*, 2021), supply network resilience (Childerhouse *et al.*, 2020; Datta, 2017), and risk mitigation strategies in global supply chains (Um & Han, 2021). As Linnenluecke's (2017) review has previously noted, this literature suggests that resilience is generally not only determined by organizational resources and capabilities, but by the interrelationships and interactions that organizations have with other actors.

The past five years have produced research focused on the empirical operationalization of the construct to measure the background and dimensions of the supply chain resilience (see, for example, Chowdhury & Quaddus, 2016; Cotta & Salvador, 2020) and to study resilience capabilities, the practices and strategies associated with those capabilities, and the performance of recovered operations after supply chain disruptions (see, for example, Dabhilkar *et al.*, 2016). Some emerging topics and avenues for future research are, for example, the operationalization and measurement of resilience as a set of dynamic capabilities and practices that help recover operations after supply-disrupting events in supply chains. While progress is needed in the empirical operationalization of resilience in these contexts, the opportunity remains for theoretical studies to reduce the conceptual gaps that hinder its empirical investigation. More recently, the development of conceptual models of resilience points to options to aid the understanding of the phenomenon in different contexts. In this sense, applying and testing theories and tools from the complex adaptive systems approach - e.g., adaptive cycles approach (Adobor, 2020) - to study the resilience of supply chains (or other complex contexts and systems) is a promising avenue for future work investigating resilience and its dynamics - in the long term - under adverse conditions. Some recent papers have also developed models for future research to empirically test which capabilities can lead to "better" responses from more resilient companies and supply chains. These models also offer researchers the opportunity to examine resilience in various contexts from a dynamic perspective (see e.g., Conz & Magnani, 2020) and explore its background at the individual and company level (Cotta & Salvador, 2020). There is also a wide-open path for studies linking resilience to the digitization or digital transformation of supply chains. The article by Zouari *et al.* (2021) is the first quantitative study to assess the impact of the degree of digital maturity and digital tools on supply chain

resilience. However, there is still a need to study which tools contribute most to the resilience of these chains or which resilience capabilities are key to the digital transformation of these chains or organizations.

In the **organizational resilience (or resilience in organizations) line of research**, there is a tendency to address, compound, or associate resilience with other topics. Some articles mapped in the co-citations network go in this direction (e.g., Fiksel *et al.*, 2015; Williams *et al.*, 2017) as well as more recent works from 2020/2021-May (Adekola & Clelland, 2020; Huck *et al.*, 2021; Kaplan, 2020). In this line of research, some avenues for theoretical and empirical studies are also observed. One promising topic for future research is learning. Situations that require resilience represent a learning opportunity for organizations, which is why answers are sought to questions such as: How can companies learn to be more resilient? (Fiksel *et al.*, 2015), how can organizations develop their learning capacity in order to improve resilience in crisis situations and unknown future challenges? Although it seems undeniable to associate resilience with learning (especially from the perspective of the dynamic capabilities theory in organizations), little has been directly explored in this line of research.

In a similar direction there is a trend of integration and approximation of the resilience literature with crisis management (either "crisis as an event" or "crisis as a process", Williams *et al.* (2017)). There is a need for more research that seeks to understand and explain the interaction between crisis and resilience, examining it in specific contexts and investigating it as it occurs as a dynamic process. By focusing on the dynamic relationship between resilience and crisis, future studies may explore the role of elements such as leadership, time, complexity, and mindfulness of managers or employees. Equally important is to examine more deeply, through empirical studies, the "dark side" of resilience, as there are likely to be "downsides" of resilience in certain scenarios, as noted by Williams *et al.* (2017). With recent articles on resilience in the context of the COVID-19 pandemic, the relevance of these topics is increasingly emerging. At this moment in time, these topics are little or virtually unexplored in the organizational resilience or business resilience literature.

On another track there are opportunities for research on employee resilience and psychological capital/psychological resilience) - e.g., Dollwet and Reichard (2014), Cooke *et al.* (2019), Chadwick and Raver (2020). Future studies can focus on the development of psychological capital and employee resilience in different cultural contexts (Dollwet & Reichard, 2014), examine the role of employee resilience in the organizational context and its contribution to organizational performance (Cooke *et al.*, 2019), and analyze how psychological resilience influences the survival of early companies created by new entrepreneurs (Chadwick & Raver, 2020). The role of entrepreneurship and organizational resilience in unstable contexts affected by war and terrorism can also be studied (Corner *et al.*, 2017; Doern, 2016). Given the relevance of entrepreneurship for reconstruction in war zones and turbulent contexts (such as the coronavirus pandemic), resilience (of entrepreneurs) can be studied as an important background of entrepreneurial action (see Bullough *et al.*, 2014); the role that entrepreneurial resilience plays in the re-entry into entrepreneurship and in learning from failure; or explore

how the resilience of micro and small businesses can cope with pandemic disruptions (e.g., Paunescu & Matyus, 2020).

In the set of analyzed articles, in a general way, it is possible to see some characteristics and cross-cutting topics that are present in both lines of research, which are relevant aspects and paths to be considered in future studies. The importance of context for resilience studies in the area of management and business is clear. In the previous review paper, Linnenluecke (2017) had already pointed out that research on resilience has been very context-dependent (it is a context-dependent phenomena), generally based on cases about resilient responses in the context of accidents and catastrophes, from the analysis and diagnosis of what happened (or “how was it resilient” in the context of an organization, a supply chain, or a community, for example) in a given situation. For this same reason, events of high contextual impact such as the COVID-19 pandemic have raised the attention and relevance of resilience in the area of management and business. On the other hand, it is a multilevel phenomenon, i.e., resilience can be understood and investigated as a capacity of individuals, groups, organizations, inter-organizational networks, industries, and local communities.

5. CONCLUSIONS

This study presents a mapping of the recent scientific literature on resilience and analyses the bibliographic characteristics of publications on the subject in the area of management and business. The indicators and the bibliometric and visualization tools used in this work – such as historiographic mapping from HistCite™ and bibliographic coupling from VOSviewer – will forge useful information for the development of the field of resilience research, as researchers often point to previous work to base and develop their studies.

The bibliometric analysis in the WOS-SSCI database (January 2014 - May 2021), identified a considerable increase in the number of publications on the subject, especially in the last two years. It is likely that this growth is related to the COVID-19 pandemic, which is why resilience has been considered relevant and essential for the survival of organizations in turbulent and unstable contexts.

Among other findings, five influential journals were identified—namely: Supply Chain Management—An International Journal, International Journal of Physical Distribution & Logistics Management, International Journal of Operations & Production Management, International Journal of Logistics Management, and Journal of Contingencies and Crisis Management – that are frequently used as reference sources, as they have the largest number in publications and citations. Blackhurst is the author with the most published articles and Scholten the most cited. The analysis also indicates that the most productive countries are mainly those with developed economies, such as the USA and the UK.

In addition to the data that characterize the scientific production, this bibliometric study generated networks of co-citations and co-occurrence of keywords, through which it was possible to identify some of the prevailing lines, emerging topics, and avenues for future research on resilience in the area

of management and business. The results indicate that supply chain resilience is a consolidated line of research, with a body of knowledge already produced, but that still presents opportunities for further studies, especially with respect to the measurement of resilience itself, its antecedents or determinants, and its outcomes. Another relevant line of research is organizational resilience or resilience in organizations. The association between resilience (of employees, groups, and organization), risk management and multilevel organizational learning, for example, are avenues for future research. In this sense, a promising avenue would be to directly associate organizational resilience with other research topics, such as dynamic capabilities, unlearning, organizational memory, knowledge management and organizational ambidexterity.

Some of the topics that deserve more attention in both lines of research – either in future studies, or in managerial practice – are those that associate resilience with digitalization and digital transformation of companies, industries, or supply chains. Moreover, the context of the COVID-19 pandemic remains a relevant opportunity to bring (the processes and results of) resilience research closer to the pragmatic efforts and needs of organizations.

6. ACKNOWLEDGMENTS

This study was carried out within the scope of the Human Factors Project (HF Project) of the Pontifical Catholic University of Rio Grande do Sul (PUCRS), funded by the Libra Consortium, with support from the ANP (Brazilian National Agency for Petroleum, Natural Gas and Biofuels) associated with the investment of resources from the R,D&I Clauses - Regulation No. 03/2015 (process 2019/00105-3).

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