Business Resilience During Covid-19: A Scientometric Using R

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Abstract. This scientometric study investigates the current state of various studies on the Business Resilience during the COVID19 pandemic published by journals equipped with a digital-object-identifier. The analysis is focused on descriptions of the characteristics and trends of keywords, authors, and journals. The data analyzed were 1,644 research publications in Scopus (https://scopus.com). The search used to determine the research dataset was last updated on May 27, 2022. Descriptive statistical methods were used, and bibliometric analysis was performed using the R Biblioshiny to determine the bibliometric map. The number of articles discussing the Business Resilience theme has been quite significant in the last two years. Many journals publish this theme, among which the most are IFIP Advances in Information and Communication Technology Journal which contains several authors who research this theme with various keywords. One of the most productive writers is Ivanov D. The most popular keywords used are 'Organizational resilience, supply chain resilience, sustainability, and business continuity. Finally, COVID-19 impacts business activities, so to be more substantial in the future, companies must consider several things that can support business resilience, including organizational resilience, supply chain resilience, sustainability, and business continuity.

Keywords: Business Resilience, COVID-19, Scientometric, R

1 Introduction

At the end of 2019 or the beginning of 2020, the Coronavirus (Covid 19) has attacked humans and later became a global pandemic. Covid-19 has resulted in multidimensional crises such in health, economic, social, and other aspects of life in various parts of the world (Hambari, Arif, and Zaim 2020). The emergence of COVID-19 that infected China brought China's trade activities in a negative direction, which had an impact on world trade flows and systems and Indonesia. The slightly disrupted pace of the economy is not only in Indonesia and China, but the whole world is experiencing the same problem of covid-19 (Azamfirei 2020)**.**

Sihaloho (2020) noted that there are at least five threats posed by this pandemic, namely (1) life or health threats, (2) the threat of loss of income, especially for underprivileged families, (3) bad loans for MSMEs, (4) disruptions to the performance of corporations and

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the banking sector, and (5) depreciation of the rupiah through money market volatility and capital flight.

One of the areas that are also affected is the business sector. Small businesses such as MSMEs and large companies have not escaped the negative impact of the Covid-19 pandemic. Few businesses have gone out of business due to increasingly large expenses, while business operating income is disrupted and unstable. Very few companies have been able to survive the turmoil caused by this pandemic.

Businesses that survive well or are more commonly referred to as business resilience are an exciting topic for further study because this can be a general lesson for the business sector that has been adversely affected by covid-19.

This research will try to map research related to business resilience, especially its relationship during and after the Covid-19 pandemic. This research is also necessary because by studying it, it is hoped that related parties will be able to provide valuable insights so that MSME businesses and businesses, in general, can draw important lessons so that in the future, they do not fall into the same hole when the economic shock comes back. Using a bibliometric approach with the R Biblioshiny tool, this study will map both text and bibliometric maps on Business resilience based on Scopus metadata.

2 Research Method

Scientometric is an important research topic in the bibliometric field (Börner, Chen, & Boyack, 2003). Two distinguishable bibliometric aspects are the construction of the bibliometric map and the graphical representation of the map. In the bibliometric literature, the greatest concern is in the construction of the bibliometric map. Research related to the effects of differences in similarity measures Ahlgren, Jarneving, & Rousseau, (2003); Klavans & Boyack, (2006); Van Eck & Waltman, (2009) and they tested with different mapping techniques (Boyack, Klavans, & Börner, 2005; Van Eck & Waltman, 2007; White, 2003). The graphic representation of the bibliometric map has received less attention. Although some researchers seriously study issues related to graphical representations Chen, (2003); (2006); Skupin, (2004), articles published in the bibliometric literature rely on simple graphical representations provided by computer programs such as SPSS and Pajek.

For thumbnails containing no more than, say, 100 items, a simple graphical representation usually yields satisfactory results. However, there appears to be a trend towards larger maps, and for such maps a simple graphic representation is inadequate. The graphical representation of a large bibliometric map can be further improved by, for example, a zoom function, special labeling algorithms, and density metaphors. Such functionality is not included in the computer programs commonly used by bibliometric researchers.

This research uses publication data related to the business resilience sourced from the scopus database (https://scopus.com). Scopus knows as the largest abstract and citation database of peer-reviewed literature scientific journals, books, and conference proceedings. As a result, there were 1,644 publications from 2020 to May 25, 2022. From the results of the screening, 1,644 articles were published related to the issue of the business resilience. Bibliometric mapping data for keywords, authors, journals, and document characteristics in this study were analyzed using the R Biblioshiny software which is available for free from https://bibliometrix.org/.

There have not been many studies that specifically discuss business resilience using bibliometric methods. However, several bibliometric studies are still relevant to business resilience, including this new research conducted by Del Giudice, Di Vaio, & Hassan, (2022) with the title 'Digitalization and new technologies for sustainable business models at the ship–port interface: a bibliometric analysis.' In addition, Joana and Fernandes (2021) in his research about systematic analysis of entrepreneurial resilience and forms of collaboration.

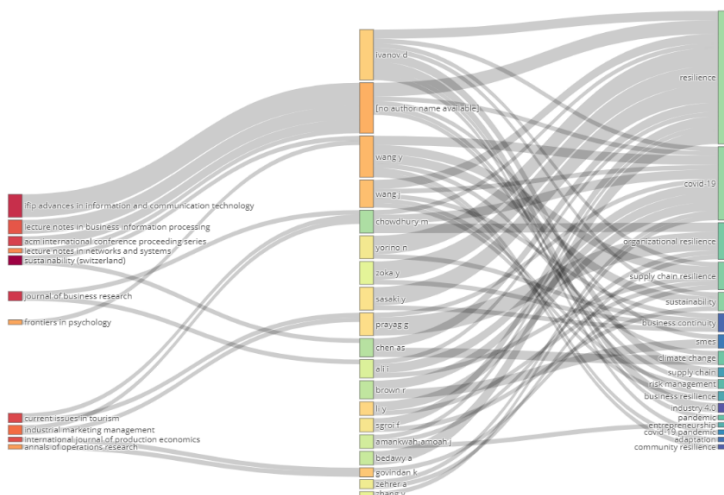## 3 Result and Discussion

3.1 Source

The development of all parts of the Business resilience continues to experience developments in published scientific research, along with bibliometric mapping that shows trends in keywords, authors and published journals.

Table 1. Document Types

No	Document Types	Number of Articles
1	Journal article	1176
2	Book	22
3	Book chapter	80
4	Conference paper	240
5	Conference review	22
6	Editorial	9
7	Erratum	4
8	Letter	3
9	Note	13
10	Review	75
	TOTAL	1,644

The table above shows the number of document collections studied on the theme of business resilience, namely a total of 1,644 data consisting of 10 different document types, with the following explanation: (1) 1,176 types of published journal articles, (2) book types are 22 documents, (3) book chapter types are 80 documents, (4) conference paper are 240 documents, (5) conference review are 22 documents, (6) editorial types are 9 documents, (7) erratum types are 4 documents, (8) letter types are 3 documents, (9) note types are 13 documents, and (10) review types are 75 documents.

Based on the table above, it can be concluded that the documents that are most widely used as objects of study in research that discusses the business resilience in the first rank are journal-published articles with a percentage of 71.5% or 1,176 documents. Meanwhile, the least used documents was letter with a percentage of 0.18% or 3 documents. This data shows that the references used are quite valid because they come from scientific written documents and are mostly dominated by published papers.

Figure 1. Three Fields Plot

The Three Fields Plot above is an illustration of 3 elements consisting of a list of journal names, a list of authors and a list of topics used. These three elements are plotted with a gray plotthat shows their relationship with each other, starting from the name of the journal, then each journal shows the author and each author is shown on the topic they use in their paper on the theme of business resilience. The size of each rectangle in the list of names shows the quantity of paper associated with that element.

The first element, namely the journal. There are 11 journals indexed in the Three Fields Plot that publish papers on the theme of business resilience, but the top journal that publishes the most papers on this theme is the IFIP Advance in Information and Communication Technology (AICT) journal which is described in the largest rectangle.

The second element in the middle is the author's name. Several writers whose publication journals are recognized will be associated with the previous element. However, some others are not indexed so that they do not have any connection with any of the journals listed. Besides, each of these authors will also be associated with frequently used keyword topics on the right. There are the top 19 authors listed in this plot. The size of the rectangle shows the quantity of the number of papers written by each author. In this plot, Ivanov D occupies the widest rectangle which shows that he wrote the most on the theme of business resilience.

The third element is the keyword topic that appears the most in the paper that is the object of research. Each topic is associated with an author who uses the topic a lot. There are 17 keywords topics listed and the most frequently occurring keywords are Covid-19, organizational resilience, supply chain resilience, sustainability and business continuity, as indicated by the size of the rectangle that dominates the other rectangles. It also appears that these three topics are used by many of the authors listed.
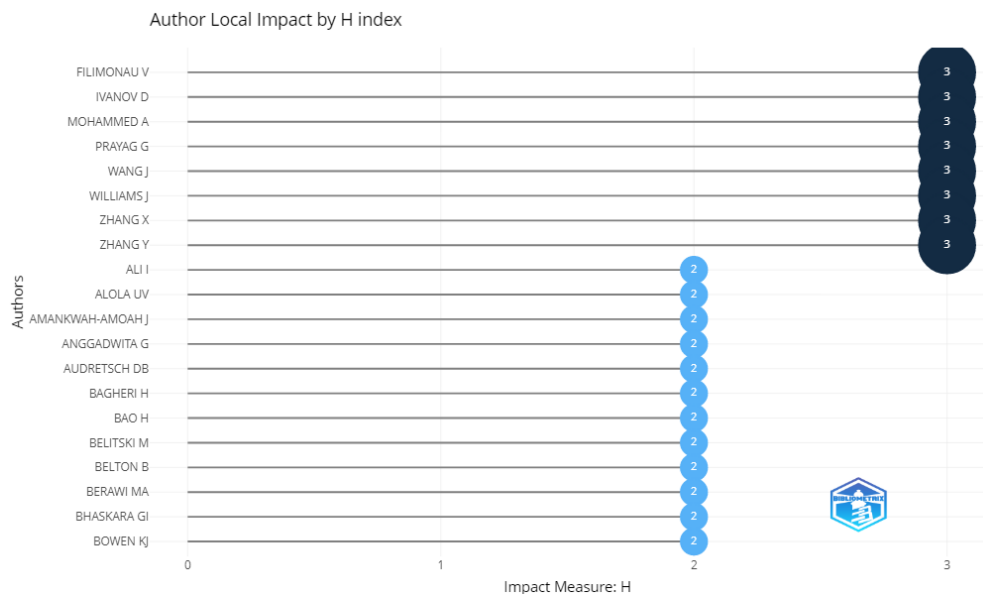

Figure 2. Authors Impact

Authors who have published their papers can also be ranked based on their impact with the h-index rating. My h-index values range from 0 to 3 and the impact level is shown in blue in the bar chart, where the darker the color indicates the bigger the impact.

The picture above shows that the author who achieved the highest h-index value of 3 with the maximum impact with the dark blue bar chart color was achieved by Filimonau V, Ivanov

D, Mohammed A, Prayag G, Wang J, William J, Zhang X, and Zhang Y, followed by other authors with the lower impact level of 1 as shown in the diagram above.

Ivanov D is one of the most popular authors with the highest impact. Based on the profile displayed on researchgate.net and his personal blog, Ivanov D is professor for Supply Chain Management at Berlin School of Economics and Law (BSEL). He has been *teaching* for 15 years the classes in operations management, production and supply management, supply chain management, logistics, management information systems, and strategic management at undergraduate, master's, PhD, and executive MBA levels at different universities worldwide in English, German, and Russian. In his paper entitled 'A digital supply chain twin for managing the disruption risks and resilience in the era of Industry 4.0', He proposed a model that can improve resilience and test contingency plans (Ivanov and Dolgui 2020).
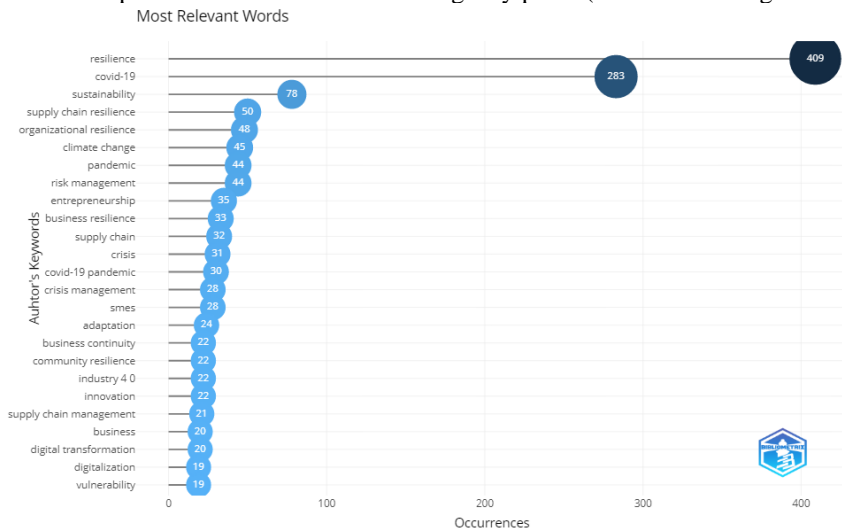

Figure 3. Most Relevant Words

This study also calculates the relevant words used in the collection of documents that are object of the study, there are several words with the number of occurrences between 0 and more than 400 times and the top 25 words are listed as well as a blue table diagram showing the comparison of the number of occurrences of each use of the word and its relevance to the theme of business resilience.

The top word with the highest number of occurrences and the most relevant to the theme of this research is 'resilience' with total usage of more than 409 times and is most relevant as shown by a dark blue line diagram, the word resilience is also following the theme of business resilience research, hence the dominant word what appears in the data collection studied is the word resilience. Next is the word 'Covid-19, sustainability, supply chain resilience' with a quantity of occurrence of more than 50 times. Then the word 'organizational resilience' with a quantity less than 50.

The word cloud in Figure 4 reveals a description of words that often appear in data collections of papers researched on the theme of business resilience. The words that most often appear in the first order are resilience, then covid, business, supply, chain, and management. The Word cloud displays an overview of words with various sizes according to the quantity of the number of words appearing. In terms of placement, the word cloud tends to be random, but the dominating words are placed in the middle so that they are more visible with their large size.

Figure 4. Word Cloud

The topic trend in figure 5 is the result of an analysis of the document's title that displays an overview of the development of the theme of business resilience from time to time with the division per year. These results show which topics have been used for a long time and which are the most recently used. In addition, the trending topic also considers the frequency value of each word shown by the log axis.

Moreover, the occurrence of the topic is also adjusted to the frequency of occurrence of the word in the research topic under study, namely business resilience. The higher the meaning, the more the word is used. Furthermore, the more it moves to the right, the more recently the word has been used. Based on the Trend Topics below, developments on the business resilience theme started in 2020 and experienced a significant increase in 2021.

The topics used since the beginning of the development of the theme of business resilience are infrastructure first and second, followed by mental health. There is one reasonably consistent topic, namely sustainability. There are many because they are almost always used in the 2020-2022 range. Then, topics widely used in 2020 include sustainable development, dynamic capabilities, resilience, digital technology, and bibliometrics.
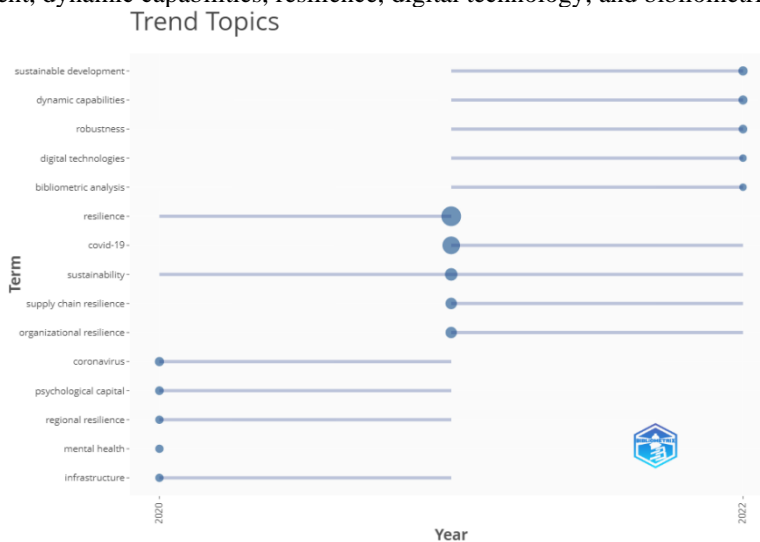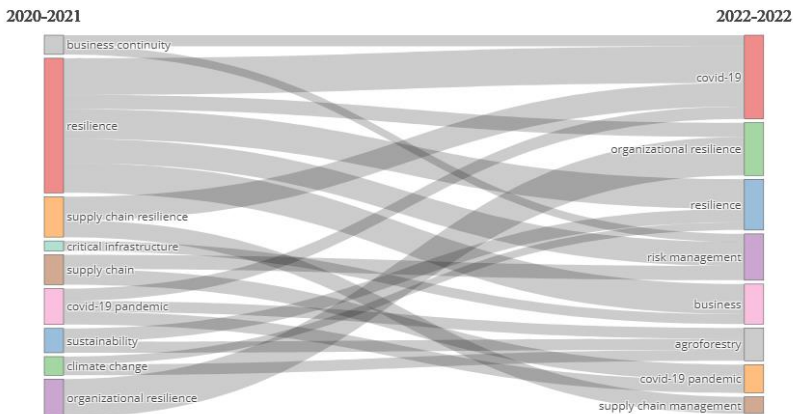
Figure 5. Trend Topics

Figure 6: Thematic evolution

The themes used in papers that are the object of research continue to change, especially from papers that have recently been published when compared to papers that have been published for a long time. The evolution of the theme is shown in the image above. Although the theme of this research is business resilience, this data shows several sub-themes that are widely used. The left section shows some of the themes that were widely used from 2020 to 2021, there are 9 themes listed with different sizes depending on the quantity of use of these themes. The theme "resilience" took first place, followed by the theme "supply chain resilience, covid-19 pandemic, and "organizational resilience".
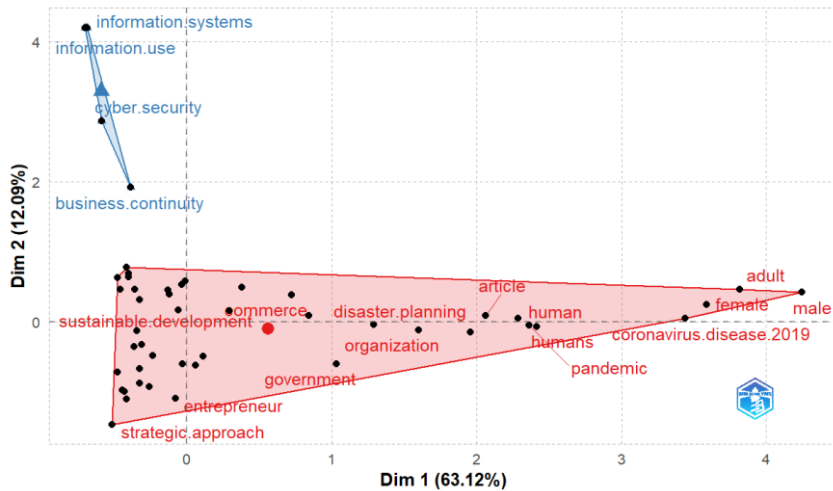

Figure 7. Conceptual Structure Map [MCA method]

Then on the right section shows some of the themes that are widely used from 2022 to 2022. Some of the themes that have emerged during this period are an evolution of the previously used themes and have a connection in their content, such as the 'risk management' theme emerging as a form of revolution from the theme. 'business continuity, resilience, and supply chain', this indicates that research using risk management themes is an extension of the research on the 'business continuity, resilience, and supply chain' theme in previous research.

This study also describes a conceptual structure map or map of the contextual structure of each word that often appears in research papers on the theme of business resilience by

dividing it based on mapping the relationship between one word and another through area mapping. Each word is placed according to the value of Dim 1 and Dim 2 (Diminutive particle) to produce a mapping between words whose values do not differ much.

In this data, there are 2 parts of the area which are divided, namely the red area, and the blue area. Each area contains words that are related to each other. Based on the image above, the area in red shows more quantity and diversity of words included in it, this shows that many research papers connect between the words listed in this area. The blue are the smallest in the area and the least words appear.

Findings

This study describes the results of a bibliometric analysis using the R Biblioshiny from various sources of research publications consisting of journal articles, book, book chapter, conference paper, conference review, editorial, erratum, letter, note, review with digital object identifiers equipped with Islamic banking themes indexed by the Scopus database.

Tabel 2. Findings

Rank	Keywords occurrence	Highest authors publication	Journals with the highest publication
1	Resilience	Filimonau V	Ifip advance in information and communication technology
2	Covid-19	Ivanov D	Lecture notes in business information processing
3	Organizational resilience	Mohammed A	Industrial marketing management
4	Supply chain resilience	Prayag A	Current issues in tourism
5	Sustainability	Wang J	ACM international conference proceeding series
6	Business continuity	Williams J	Sustainability (Switzerland)
7	SMEs	Zhang X	Journal of business research
8	Climate change	Zhang Y	Lecture notes in networks and systems
9	Supply chain	Ali I	Frontier in psychology
10	Risk Management	Alola UV	International journal of production economics

Based on the bibliometric research results above, many studies have found that business activity must be built on Resilience, so its business needs to be evaluated and reconstructed. Reviews from various studies show that Resilience can be used as a capability that business organizations should have to face the growing complex challenges (Kantur and Iseri-Say 2015). Although the term resilience has been widely utilized in general management and small and medium-sized companies (SMEs) research, understanding of the concept is fragmented, and little work has been done to validate the concept on the ground (saad et al. 2021).

Resilience has been extensively linked in the business literature with a firm's ability to adapt successfully to natural (e.g. floods or earthquakes) and man-made disasters (e.g. financial crises or wars) Silalahi and Salazar (2015); Iborra, Safón, & Dolz, (2019); Ortiz-de-Mandojana & Bansal, (2016) by modifications intended to insulate or improve the business under adverse conditions (Korber and McNaughton 2017).

Another definition of business model resilience is an enterprise's capacity to sustain its business logic for producing and delivering value Niemimaa et al. (2019); Research Gartner, (2020). It's keeping in mind the massive economic, social, technical, and environmental

changes that are becoming a part of modern corporate life at an unprecedented rate and scale, continually testing company paradigms (Mao, Zhang, and Tang 2021).

In this study, the research spans the period from 2020 to 2022. In other words, this research explicitly examines the COVID-19 pandemic, which impacts various sectors of life. Small and medium business actors are one of the sectors most affected by the COVID-19 outbreak, with restrictions on direct interaction causing Micro Small And Medium Entrepreneurs to lose their main market, given that the mainstay transactions of small and medium business actors are the main point transactions in this sector (Hidayat et al. 2021).

Another, more practical impact of the global COVID-19 outbreak is continually potentially damaging to the long-term viability of the hotel, tourist, retail, transportation, and industrial businesses. As a result of breakthroughs in information technology (IT), such as big data, the Internet of Things (IoT), and artificial intelligence (AI), new business models will emerge, effectively and unexpectedly displacing existing ones (Mao et al. 2021).

Confronting the current covid-19 pandemic situation, the business actors must keep persevering. Some things business actors can do to keep their business resilience are paying attention to organizational resilience, supply chain resilience, sustainability, and business continuity. According to Rai, Rai, and Singh (2021), building organizational resilience is a way to maintain the social and economic sustainability structure in terms of the development of society, the welfare of the manpower social security, resource conservation and environmental protection, while maintaining the proftability and cost structure of the frm.

Golan, Jernegan, and Linkov (2020) in his research, stated that he stressed the importance of innovation for supply chain resilience. Regardless of the size of the company, innovation works for every company. Because the COVID-19 pandemic clearly shows the lack of resilience in supply chains and the impact that disruptions may have on a global network scale as individual supply chain connections and nodes fail. The way that Companies can do to strengthen their supply chain resilience is by developing strong relationships with their suppliers and employees.

According to research conduct by Schaltegger (2020), The COVID-19 pandemic highlights both that many viral epidemics originate in unsustainable economic and societal practices and that this should make governments and managers rethink their policies and business to become more resilient. One first necessity is to break the three paths of epidemic development. With regard to how we can break these paths, mainly public policy on national and international levels is needed, but companies are needed to support this change.

Further, Margherita and Heikkila (2021) stated in his reseach that the concepts of business continuity and resilience against emergencies should be extended to small organizations, which face the crisis generated by the pandemic along different and equally significant dimensions.

4 Conclussion

The focus of this research is to determine the extent of the development of the theme of business resilience in research, especially in the covid-19 pandemic situation. The results show an increase in the number and types of paper publications during the research period. The most widely used keywords in papers that are the research object are 'organizational resilience, supply chain resilience, sustainability, and business continuity.' There is eight most productive writer who wrote published papers on the theme of business resilience. One of the most popular authors is Ivanov D. The most favored journal in publishing is the IFIP Advance in Information and Communication Technology (AICT) journal.

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