

What Business Researchers are producing during Covid-19 A bibliometric approach

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The way COVID-19 impacted every aspect of human life around the world, is now considered more disastrous than the World War II. Both the policy and academic researchers have been contributing to assess its severity and impact on businesses and economies while examining the foci of business researchers in this era of contagion.

In this assessment, we have applied the approaches of bibliometric and content analysis on 403 qualified studies, drawn from the Scopus database. The period of data ranges from 2003 to June 2020. We identified 11 different research streams including tourism, supply chain besides economic and finance-related research. We highlighted the sub-streams and main concerns raised in the published literature. The findings of this research indicate that COVID will force the policy makers to come up with strategy and changes in various business fields. The implications of the study may be important for business managers to chalk out a proactive approach for business handling during and post-COVID eras.

Keywords: *Bibliometric analysis, COVID-19, Business research, Research streams*

INTRODUCTION

Since December 2019, the entire world is grappling with a new public health crisis due to Corona induced highly contagious and pathogenic pandemic. The disease is believed to be originated from the Chinese town of Wuhan. The problem came to the surface when the World Health Organization (WHO) received reports about pneumonia cases with unknown etiology.

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Initially, the virus that caused the disease was recognized as a novel beta-coronavirus. However, the WHO later declared it SARS-CoV-2 and COVID-19. The instant spread of the virus within China then across the world indicated the severity as highly infectious and transmissible nature of the disease that spread from a single person to many others (Singhal, 2020; Whitworth, 2020). Keeping this outbreak in view, the WHO Director-General declared it a pandemic and public health emergency of international concern. The declaration was a manifestation of the fact that in the absence of a proper vaccine or treatment, the virus might spread far and wider (Whitworth, 2020; World Health Organization, 2020). However, almost three years down the road, many vaccinations are available. But the distribution and administration of vaccine is still one of the biggest challenges faced by the world in public health sector. It is pertinent to note that this is not the first breakout of coronavirus. The recent outbreak reminds the health workers about the severe acute respiratory syndrome (SARS-CoV) that also originated from China in 2002 and the Middle East respiratory syndrome coronavirus (MERS-CoV) that was first reported from Saudi Arabia in 2012. The COVID-19 has fewer fatalities than SARS-CoV and MERS-CoV but is considered to be more infectious (Y.-C. Liu et al., 2020; Singhal, 2020). SARS-CoV was hazardous, and in the absence of a proper vaccine, the transmission was controlled and almost completely eradicated, mainly due to what the epidemiologists call the herd immunity. The public health authorities are currently endeavoring to introduce appropriate treatment and vaccination and have also achieved success in this regards with the preparation of many vaccinations in different countries. However, the vaccination rate in less developed countries is very slow. Therefore, the traditional health measures have also been adopted to confine the pandemic. For this purpose, the most commonly used strategies all over the world are lockdown, social distancing, quarantine and isolation (Shah et al., 2020; Whitworth, 2020; Wilder-Smith & Freedman, 2020; Yuen et al., 2020).

In these circumstances, many countries' decision to confine the pandemic reflects their priority of saving lives first before saving the economy. As a result, billions of humans are under the lockdown situation and the life in cities has come to a standstill with an impending economic recession. Many countries that have been able to get rid of poverty and strengthening their economies while following the principles of global trade and openness. But due to this pandemic, it seems difficult for these nations to continue with the same

openness. Now they have to adopt steps to contain the disease for an unpredictable duration that can result in more poverty in the world (Donthu& Gustafsson, 2020; Normile, 2020).

A growing number of studies have been conducted on the juncture of COVID-19 and Business, understandably, focusing on the impact of COVID on various aspects of the businesses. However, some of these are with limited coverage and scope. For example, Wang et al. (2016) carried out a bibliometric study only from Pub Med publications on Middle East Respiratory Syndrome (MERS). Sweileh et al. (2015) have provided a bibliometric assessment of research productivity related to infectious disease based on the Web of Science data source. A recent study by Hossain (2020), focuses on COVID-19 research retrieving data from the Web of Science Core Collection only, published between 2019-2020. Bonilla-Aldana et al. (2020) conducted a bibliometric analysis restricting their scope only to major biomedical indexing databases. Hamidah et al. (2020b) studied the COVID-19 trends by using the Scopus as the data source only. Dehghanbanadaki et al. (2020) also conducted a bibliometric analysis related to COVID-19 that was confined to the Scopus indexing database. The data used for the study was from December 1, 2019, to April 1, 2020. A recent study by Chahrour et al. (2020) was limited to the Pub Med and the World Health Organization (WHO) database publications that appeared between December 2019 to March 2020. Lou et al. (2020) and Kambhampati et al. (2020) used the Pub Med database for their bibliometric analysis of COVID-19 publications.

Among these bibliometric studies, only Verma and Gustafsson(2020) investigated COVID-19 research trends in the field of business and management. The study was conducted using data sources of Scopus and Web of Science by including only articles published between January 1, 2020, to May 11, 2020. However, their study was limited to the review of 107 articles. Since the data period selected by our study is large, therefore, it has extended this work by adding 403 articles to the review.

As discussed earlier, COVID-19 has impacted global business operations. To offset its impact, the business community has adopted more resilient and innovative business operations. New business challenges, like real-time decision-making, growing online operations, continuity threats, workplace hygiene, etc., are testing businesses' resilience and shaping new dimensions for the future (Ivanov, 2020). In this connection, various studies in different disciplines have been conducted ,highlighting the key changes required in the post-COVID

scenario e.g. Brodeur et al. (2021) for economics, Campra et al. (2021) for business and accounting.

This study will assist the business community and researchers by highlighting the impact of COVID-19 on business growth. The objective of the study is to answer the following questions (i) to explore the trends and trajectories of the publications in the early stages of COVID-19. (ii) What is the main research focus regarding COVID-19 and businesses? (iii) Furthermore, we have attempted to highlight the most important aspects of selected literature including the major sources of publications, the countries, and major authors etc.

We found that the researchers in the field of business have contributed reasonable literature, focusing on the effects of coronavirus on areas like crisis management, economic impact, entrepreneurship, financial market, food & agriculture, leadership, marketing, risk management, SARS& business, supply chain, and tourism, etc. In the period under discussion, the main publication sources include: tourism geography, economic and political weekly, and the journal of business research. The main contribution was from the authors from the countries USA, China, and the UK. Furthermore, these studies recommend the need to rebalance economies in the post-COVID era, Businesses in various sectors need sustainable short, medium, and long-term strategies. To ensure compliance in the services sector like tourism and supply chain, only robust and dynamic policies are required.

Data and Methodology

Broadus (1987) defined Bibliometrics as "the quantitative study of physical published units, or of bibliographic units, or of the surrogates for either." The analysis is commonly used in business and management-related studies, e.g., see (Helbing, 2019; Paltrinieri et al., 2019). This study applied two prong methodology. First, a bibliometric review mainly focuses on the influential aspects of the selected literature. Second, the study provides its readers with an overview of the on-going literature on COVID and Business juncture, highlighting main streams and sub-streams.

As mentioned above, this study has used bibliometric analysis, that is in contrast to a systematic review that uses statistical and econometric procedures for synthesizing the findings and analyzing data (Ahmad & Omar, 2016). A bibliometric analysis is normally used to quantitatively assess the relevant literature on a given scientific research topic and empirically determine the most

influential articles, authors, journals, etc., and detect thematic clusters and tendencies (Campos et al., 2020). Furthermore, the number of selected articles in this study is large, so the bibliometric analysis is the most appropriate method in line with previous studies e.g. (Ahmad & Bajwa, 2021; Bajwa et al., 2022; Tijjani et al., 2021).

The first step in data collection is the selection of the database for the collection of the articles. For this purpose, we used Scopus. The objective of selecting Scopus was mainly due to the fact that it is a broad database that covers over 25,100 titles and over 5000 international publishers. Moreover, the database has good social science coverage, i.e., 26% of the titles belong to social sciences (Elsevier, 2019). The second phase is the literature/data search in the selected database. We search from the database with relevant keywords. These keywords contain terms related to business and COVID. The following search query was used;

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TITLE-ABS-KEY ( coronavirus OR covid* OR ncov* OR hcov-* OR sars-cov* OR "severe acute respiratory syndrome" OR mers-cov* OR "Middle East Respiratory Syndrome" OR "corona virus" ) AND ( LIMIT-TO ( SUBJAREA , "BUSI" ) OR LIMIT-TO ( SUBJAREA , "ECON" ) ) AND ( LIMIT-TO ( DOCTYPE , "ar" ) OR LIMIT-TO ( DOCTYPE , "re" ) OR LIMIT-TO ( DOCTYPE , "sh" ) OR LIMIT-TO ( DOCTYPE , "cp" ) OR LIMIT-TO ( DOCTYPE , "bz" ) OR LIMIT-TO ( DOCTYPE , "no" ) OR LIMIT-TO ( DOCTYPE , "ed" ) OR LIMIT-TO ( DOCTYPE , "le" ) OR LIMIT-TO ( DOCTYPE , "ch" ) ).
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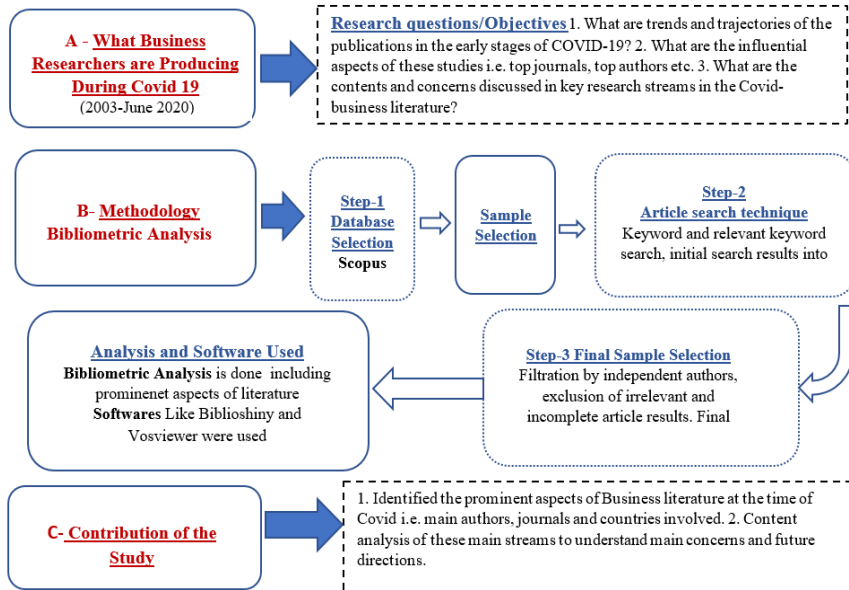
One of the objectives of the extensive keyword query was to conduct an exhaustive search of relevant articles and to include those not covered by earlier studies. The initial search result yielded over 735 papers. We limit our search to business, management, finance, and economics domains. Furthermore, two independent authors manually filtered the irrelevant record. This was done through title and abstract reading. We don't include the proceedings, conference papers, and books instead restricted our research to journals. Moreover, as discussed previously, the database extends from 2003 to June 2020, after the first pandemic of COVID virus family SARS started in 2003, and globally, the researchers have started focusing on its impact from 2003 onward.

We used Biblioshiny and VOS viewers software for bibliometric analysis purposes. Biblioshiny is a powerful analytical tool for data visualization and bibliometric analysis (Ahmi, 2022). Whereas, the VOSviewer has outstanding visualization and is capable of loading and exporting information from many

sources (Moral-Muñoz et al., 2020). Both are powerful tools for such analysis and have been used in previous studies (Ahmad & Bajwa, 2022; Bajwa & Syed, 2022; Farooq et al., 2021). Figure 1 summarizes the entire methodology process.

Figure 1

Methodology flowchart



Results

Overall results are based on two main findings. First, we discussed the significant aspects of the selected literature. This includes the primary authors, journals, and countries involved in COVID & business research. Secondly, we used cartography and a manual review process to identify the main clusters or streams in the selected literature. Further, we provide insight into these streams, which can be useful for future investigators. These streams and sub-streams highlight the main issues discussed in these articles and indicate the direction of research and on-going deliberations in academic and policy circles.

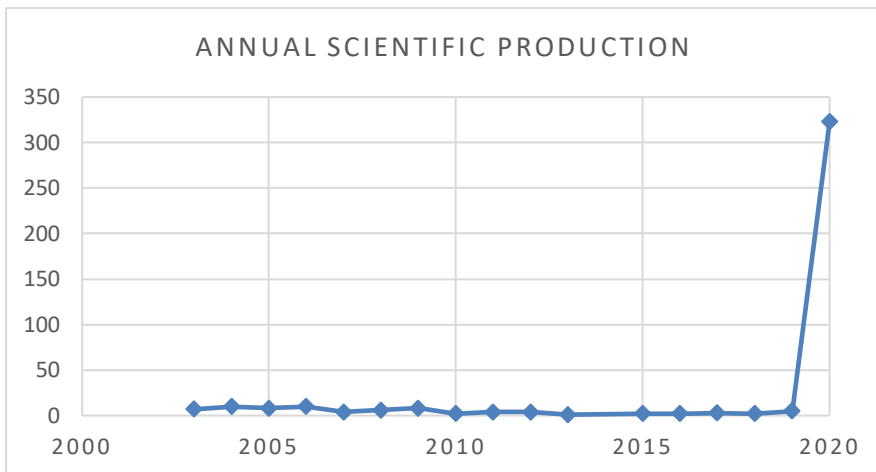
Annual Scientific publications

Figure 2 indicates that business researchers, connecting business and COVID, started publications in 2003, mainly after the outbreak of SARS as the first COVID family virus and its impact on businesses. Seven studies were published by business researchers in 2003, while from 2004 to 2006, a further (28) papers

were published concerning the effects of a pandemic on business. The frequency of studies came down to less than five after (2009) onward, and the number reduced to one in 2013. However late 2019 onwards, the publication number skyrocketed and from October 2019 to June 2020, 328 articles were published in various journals as per the selected criteria. Starting from China, COVID-19 kept the entire world standstill, melting down the world economy which escalates the business researchers' work on the impacts of the virus.

Figure 2

Annual Scientific Production



The most active business research regions and regional collaborations

Figure 3 summarizes the studies conducted by various business researchers in different regions of the world. The analysis has been conducted using Biblioshiny software using dataset of 403 studies. The USA is the leading region in research productivity, with 147 studies (24%) conducted on pandemic & business juncture. China is second on the list with 84 studies (14%), whereas the UK stands third in the list with 74 articles (12%) in the selected period.

Figure 4 below gives the country collaboration map; it identifies the collaborative relationships between authors, institutions, and countries on COVID and business research. This process of collaboration helps researchers in a particular domain to attain the objective with cooperation. The analysis is done using Biblioshiny software. The thickness of lines between countries indicates (in the map/figure 4) the strength of collaboration. The analysis indicated that the

authors from China and the USA collaborated on 12 articles, and authors from China and UK collaborated on 5 articles. In contrast, other major collaborations include Denmark and the USA's, 5 articles. China & Australia, Denmark & UK, France & Germany, Italy & Australia; all with 3 collaborative articles each. China can be seen as most connected in collaborations with different countries, which is mainly due to the fact that COVID started from that country.

Figure 3
Active Research Regions

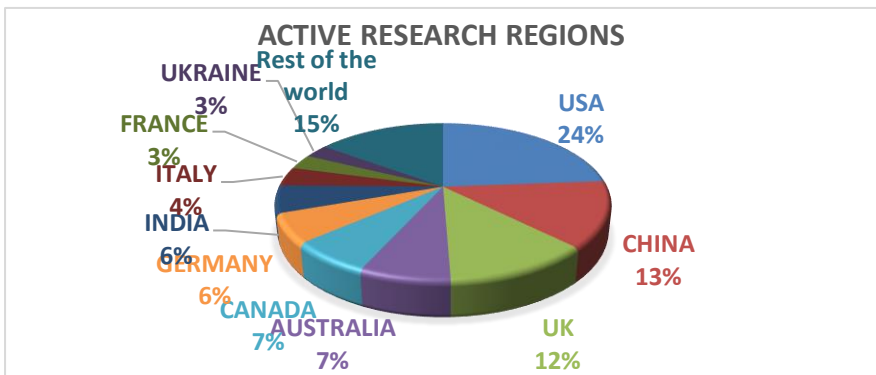
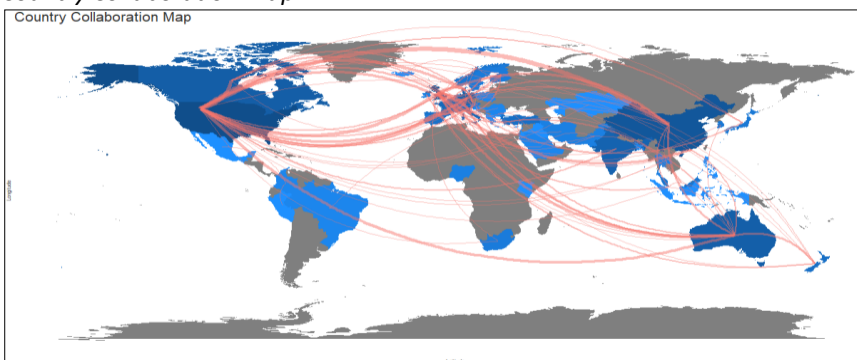


Figure 4
Country Collaboration Map



Major Sources of Publications

This research was based on the data published in Scopus from 2003 to 2020, and the top 16 sources ($P_{cb} > 5$) publishing the COVID & business articles are

shown in the table below. Top in the rank is Tourism Geographies with 25 articles, followed by the journal of Economic and Political Weekly with 18 articles, the Canadian Journal of Agricultural Economics and Journal of Business Research with 15 articles each remained third in the list. The other prominent journals with their number of publications are shown in table 1 below.

Table 1*Major Publication Sources COVID and Business Research*

No.	Publication Sources	P _{CB} ¹
1	Tourism geographies	23
2	Economic and political weekly	18
3	Canadian Journal of agricultural economics	15
4	Journal of business research	15
5	Industrial marketing management	14
6	Current issues in tourism	12
7	Intereconomics	11
8	Finance research letters	10
9	Journal of risk research	9
10	Leadership	7
11	Tourism management	7
12	Annals of tourism research	6
13	International journal of hospitality management	6
14	Journal of public policy and marketing	6
15	Asian business and management	5
16	Wirtschaftsdienst	5

1 = P_{CB} here means the publication on the juncture of COVID and business

Prominent authors in COVID and business research

The information regarding authors who contributed the most to COVID and business research is drawn mainly from the data source, and the author's appearance frequency is recorded. Table 2 below is based on the prominent authors with the highest number of publications in the discussed area. According to the findings, the most productive authors are Rob Law with five published papers; Dimtry Ivanov and Jun Wen are among the top three authors with four publications each. Further, the top ten authors, having three or more publications (P_{CB} ≥ 3) are given in table 2.

Table 2*Top Authors in COVID & Business Research*

No.	Authors	Affiliation	Area of Research	PCB ¹
1	Rob Law	Hong Kong Polytechnic University,	Tourism	5
2	Dmitry Ivanov	Berlin School of Economics and Law	Supply Chain	4
3	Jun Wen	Edith Cowan University, Australia	Tourism	4
4	Patrick Brouder	Vancouver Island University, Canada	Tourism	3
5	John W. Goodell	University of Akron, USA	Finance/Eco.	3
6	Grace O.M. Lee	City University Hong Kong	Public & Social Admin.	3
7	Alan A. Lew	Northern Arizona University, USA	Tourism	3
8	Jennifer C.H. MIN	Ming Chung University, Taiwan	Tourism	3
9	Malcolm Warner	University of Cambridge	Human Recourse	3
10	Zahang H.	Jiangxi University of Finance and Eco, China	Tourism	3

¹ = PCB here means the publication on the juncture of COVID and business

The acknowledgment is very important regarding the involved people in writing and pursuing the research. The corresponding author is the one who takes the responsibility of correspondence with the journal from the group of researchers working on the same research. Furthermore, the corresponding author is the one available for communication with the journal until the paper is published, even after publication, to answer the study's critiques. This study analyzes the corresponding authors within the selected sample, and findings reveal that China and the USA are top-ranked with 25 corresponding authors each. Moreover, Germany is third with 13, Hong Kong, the fourth with 10, and Singapore and UK are fifth with six corresponding authors each, for details see figure 5.

Keyword Analysis

Finally, in this section, we applied cartography analysis, (see figure 6). This type of analysis highlights the most repeated keywords used in the articles. We used VOSviewer software for cartography analysis. This analysis is based on the assumption that keywords are descriptors of the content in an article and the same keywords in articles establish a cluster/network in a field of research.

Figure 5

Corresponding author country

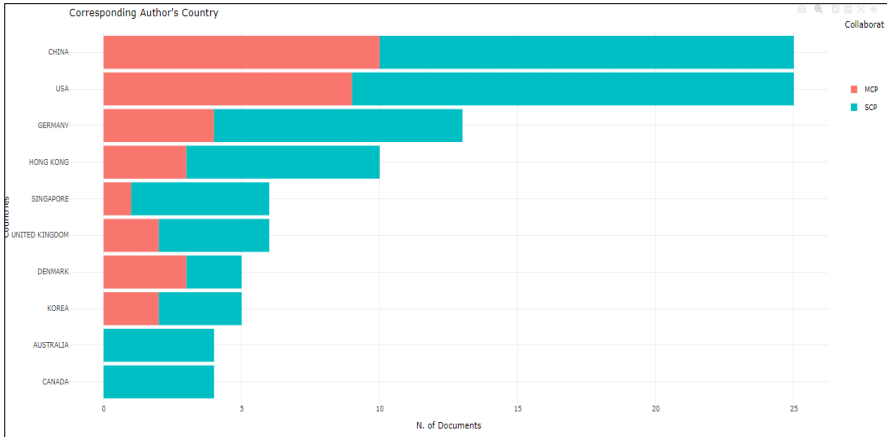
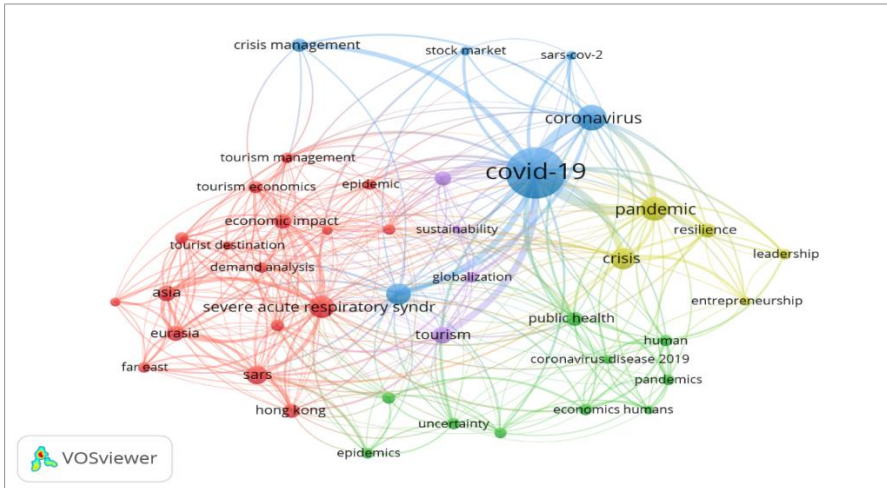


Figure 6

Most repeated keywords



Cartography is based on the most repeated keywords using VOSviewer software

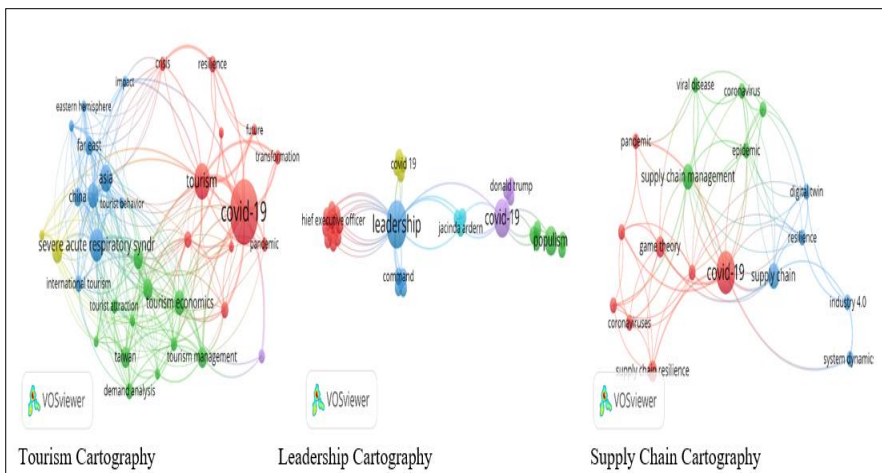
Most prominent streams/clusters in COVID and Business Research

Finally, using content analysis, this study categorized the main streams available in the selected sample. We reviewed the selected articles and grouped them according to the subject matter discussed in these. We categorized the top

11 streams with $N > 5$. These streams with the number of articles are given in table 3 below. Tourism, economics, and research on COVID's impact on the financial sector are at top of the list. The other main domains include supply chain, risk management, and food and agriculture research. Further discussion on these streams is presented in the next section.

Table 3*Main Streams in COVID & Business Research*

No.	Main Streams of Research	No. Of Publications	(%)
1	Tourism	81	20%
2	Economic Researches	32	8%
3	Financial Sector	25	6%
4	Supply Chain	19	5%
5	Risk Management	13	3%
6	Agriculture & Food	12	3%
7	Leadership	11	3%
8	SARS & Business	9	2%
9	Marketing	8	2%
10	Crisis Management	5	1%
11	Entrepreneurship	5	1%

Figure 7*Repeated keywords in selected streams*

Stream one: COVID and the tourism industry

The outbreak of COVID is considered the most disastrous and impactful pandemic of modern times. The absolute priority during these times is the human life. However, this pandemic damaged businesses worldwide (Benjamin et al., 2020). The hospitality and tourism industry is the major victim, facing crises and serious challenges. Our sample consists of 81 tourism-related studies. Under this cluster, these studies discussed multiple issues related to tourism such as the post-COVID transformation in the tourism industry. The footprints of the damage caused by this virus will not go away soon. Therefore, the operation of the tourism industry in post-pandemic time is majorly based on its transformation. This is the time to take serious actions to redesign the industry and tourism landscape with complete planning and lead by the ethics of safety for the sustainable future of the tourism industry.

Sustainability will be another major aspect of the post-pandemic era as far as the tourism and travel industry is concerned. During the pandemic's peak time, restrictions on traveling locally and internationally and quarantine greatly impacted this industry. The policymakers may consider it an opportunity for a true transformation of the tourism industry to deal with current and future pandemics and consider the challenges to its sustainability. As tourism is extremely exposed to such viruses' risk, any such crisis can cause tourism destruction (H. Chen et al., 2020). The risk of such crises can be seen in SARS and influenza and now COVID-19. These pandemics create negative perceptions of tourists regarding health and security, which ultimately leads to the recession of this business (Chen, 2020). For instance, SARS seriously impacted the Hong Kong hotel industry, as Hong Kong is a popular destination in terms of tourism and transportation. During the SARS times, Hong Kong faced an economic recession as Hong Kong heavily relies on business travelers and 80% of hotel bookings decreased due to the cancelation of all trips (Chien & Law, 2003). Similarly, China estimated that 20.6% of the revenue of internal tourism is expected to decline in year 2020 as compared to the previous year due to COVID-19 breakout. Unfortunately, the prospective future of this industry that we visualize is based on past knowledge. What the post-COVID has in the store for humanity is not known yet. But it is sure that the situation will be detrimental for the future of the tourism industry and its management. Further sub-streams of this tourism stream are mentioned in table 4.

Table 4
COVID and Tourism Research

Research Sub-Group	Selected References
Tourism Sustainability	J. A. Cooper and Alderman (2020); Fennell (2020); Galvani et al. (2020); Romagosa (2020)
SARS and Tourism	Au et al. (2005); M. Cooper (2006); W. Zhang et al. (2005)
Tourism Transformation	Brouder (2020); Cheer (2020); (Lew et al., 2020)
Effect on the hotel industry	M. H. Chen (2011); Chien and Law (2003); Jiang and Wen (2020); Kim et al. (2005)

Stream two: COVID and Economic Impact

The COVID outbreak is considered the worst crisis around the world after World War II, which immediately affected human life. It's hard to quantify the economic and societal impact of COVID. Shutting down the whole world is greatly affecting economies and social life. The speedy reaction of governments to COVID is meant to save human capital as healthy people undoubtedly lead to healthy economy. Though every country tried to control the economic downturn during the lockdown, priority remained human life (Sarkodie & Owusu, 2020). Taking strict measures is considered the safeguard against economic depression as well as human life. This is the time for policymakers to switch the strategy and save the life of people and the economy from disaster. There are 32 studies published out of 403 in our sample, which mainly relate to the pandemic's economic impact.

China was the country where COVID started and hit the economy. This damage was limited to China, but its spillover effects are seen in other Asian economies too due to the industry disruption. COVID is now considered the worse crisis as compared to financial crisis of 2007 and 2008 by the International Monetary Fund (IMF). Asia's expected growth is expected to fall near to 0% in 2020 (Austermann et al., 2020). Furthermore, it is stated as the worst underperforming Asian year in the last six decades. China encountered a 6.5% short-term fall in GDP, according to the official data during the 1st quarter of this year (Austermann et al., 2020). Another major reason is an export-oriented crisis in China due to the interruption in logistics, and low industrial production contributed greatly. However, this pandemic let the world know the disease has

no nationality as it started in china and impacted whole world. For instance, in South Africa, due to the COVID outbreak, the growth has decreased from 7% to 4%, according to the forecast (Ataguba, 2020). Moreover, France remained one of the strictest nations in enforcing the measures to control the pandemic spread. These measures are resulting in the slowdown of the economic activity. Besides, Germany expected a fall in export by 6% (Austermann et al., 2020). Undoubtedly COVID created an economic crisis, but it's a mitigation of world health and economic downturn (Soofi et al., 2020). This macroeconomic uncertainty caused by COVID-19 has also instigated a future economic policy debate, e.g., Chakraborty and Thomas (2020) suggested a policy intervention in the areas of infrastructure, public health, and employment challenges. Similarly, Ozili (2020) also suggested policy initiatives like improving the healthcare capacity, financial support to entrepreneurs and corporations, and avoiding layoffs in African nations. Further sub-streams of this COVID and Economic research stream are mentioned in table 5.

Table 5
COVID and Economic Research

Research Sub-Group	Selected References
COVID and Economic Policy	Albert and Tercero-Lucas (2020); Bofinger et al. (2020); Chakraborty and Thomas (2020); Hüther and Bardt (2020); Ozili (2020)
Economic Implications and effects	Ataguba (2020); Bofinger et al. (2020); Ceylan et al. (2020); Weersink et al. (2020); Yotzov et al. (2020)
Region/Country specific studies	Ataguba (2020); Austermann et al. (2020); Chou et al. (2004); Danylyshyn (2020); Ng (2020); Qiu et al. (2020); Tan and Yu-Hung (2016)

Stream three: COVID and Financial Sector

The markets always react against natural disasters such as earthquakes, terrorism, and pandemic activity, as seen in the recent COVID crisis. Financial Markets decline is linked with the Economy if the Economy is in depression, it can have a direct impact on financial market activities. As discussed above, the short-term economic recession has been encountered by whole world due to the COVID outbreak. The pandemic disrupts all kind of economic activity which

eventually influences financial markets. Further financial markets or especially stock markets are like a barometer of economic conditions. For instance, a major stock market, came across an enormous decline during this COVID time (Ali et al., 2020). Stock market returns negatively correlated with COVID during this time; an increase in death negatively influences the stock market return (Ashraf, 2020). Another major aspect that caused the volatility of the stock market is the crash in oil prices and demand and supply during the pandemic time. Sharif et al. (2020) further confirmed these results for the US market and concluded that both COVID and oil price shocks have an impact on geopolitical risk and stock market volatility. Pandemic created stock market risk is not encouraging for investors, especially since a chunk of short-term investors are expected to have a more negative effect on their portfolios.

Consequently, diversification may be a good remedy and a search for an alternative safe haven may be conducive in this regard. Conlon et al. (2020) investigated the international safe haven for the properties of crypto currencies. Using the three crypto currencies and the six most affected markets, the authors could not find convincing evidence of these virtual currencies acting as a good hedge for equity portfolios. Overall the studies indicate the augmentation of financial market risk due to the pandemic D. Zhang et al. (2020), and it is estimated that in the first 100 days of the virus, the global bourses have witnessed a 30% erosion of their wealth (Ali et al., 2020). Further sub-streams of this COVID and Financial Sector stream are mentioned in table 6.

Table 6
COVID and Financial Sector Research

Research Sub-Group	Selected References
COVID and Stock Markets	Al-Awadhi et al. (2020); Bhuyan et al. (2010); Harjoto et al. (2020); He et al. (2020); H. Liu et al. (2020)
COVID and Oil prices	Ajami (2020); Salisu et al. (2020); Sharif et al. (2020)
COVID and Other Financial Markets	Ali et al. (2020); Conlon et al. (2020); D. Zhang et al. (2020)

Stream four: Supply chain During COVID

The outbreak of COVID in the beginning majorly hit the frontline staff of the healthcare industry due to the shortage or unavailability of personal

protective equipment. One of the main reasons for this shortage is considered to supply chain disruptions (Govindan et al., 2020). For instance, the pandemic started in China. If china is locally producing medical equipment for personal protection, then the supply is going to be under stress due to lockdown, quarantine, and all these protective measures that occurred in China. Therefore, the supply chain process is considered the major cause of delay and unavailability of different necessary items required to protect from the virus. Owing to pandemics, the future of the supply chain will be different; the organizations must redesign the future supply chain strategy as well as supply chain dependency as the old strategy is strictly linked with demand and supply (Sharma et al., 2020).

This pandemic escalates serious challenges for businesses in the future that are majorly relying on the supply chain. Therefore, It is vital to understand the issue and look forward to a possible solution in the future to deal with this type of crisis (Esper, 2020). Demand is seen as a core factor during the pandemic; some sectors reported a sudden spike in demands like protective equipment, and the demand of some sectors declined, such as transportation, oil, and automobile. Another significant issue regarding the supply chain is its management during the pandemic, as the products need to be on the shelves and consumer protection from the virus. However, the impact of the pandemic on supply chain management is already at the global level, as it is reported that the major companies around the world linked with China through supply chain operations, and they confronted a great disruption due to the pandemic and related safety measures policies (Esper, 2020). Such supply chain management risks are a threat to the future, and possible remedial measures are required. Further highlights of this COVID and Supply Chain stream are presented in table 7.

Table 7
COVID and Supply Chain Research

Research Sub-Group	Selected References
Supply chain management	Craighead et al. (2020); Esper (2020); Knight et al. (2020)
Healthcare Supply Chain	Govindan et al. (2020)
Food Supply Chain	Hobbs (2020); Reardon et al. (2020)

Stream five: COVID and Risk Science

The COVID situation triggered many issues related to future risk, perception of risk, and overall risk science. Business researchers published 13 research papers on risk linked with COVID, which are available in our dataset. Risk science is a vast domain, and many issues have been discussed in the field in recent years. For example, a great deal of literature has discussed climate change lately. As the pandemic has engulfed the world, many scholars have started comparing the COVID risk with climate change risk. The developed practices adapted to communicate climate risk are being applied to COVID risk (Bostrom et al., 2020). In this regard, the proper communication of COVID risk is very vital. Since apt communication may build a perception of risk, according to Dryhurst et al. (2020), risk perception is significantly correlated with the reported adoption of preventative health behaviors in many countries. On the other hand, any mishandling of communication on such a delicate issue may engender a more significant risk in itself (Krause et al., 2020).

The risk management approaches on the individual, organization, and national levels are also echoed in recent COVID literature. Girtli Nygren and Olofsson (2020) reviewed the Swedish approach to the nation, which is usually regarded as exceptionally risk-averse and cautious. Unlike other neighbouring and European countries, the individual responsibility-based risk management approach remained astonishing and successful.

Stream six: COVID and Food & Agriculture Research

Food security is the prime concern of every country on this globe. Food and nutrition security challenges already exist in this world. As per the Food and Agriculture Organization (FAO) statistics, more than 800m people suffer from food deficiencies in the world. The outbreak of COVID is expected to increase further this number (Fan et al., 2020). Further issues may arise in the domain of livestock production and the import of food items in the medium to long run. The food supply chain is another area under strain. Although most countries have worked effectively to achieve a continuous supply of food items and avoid panic buying. However, in the post-pandemic era, countries may attempt to think about more food self-dependence based on their experience. Consequently, increasing the isolationist approach may gain popularity (Kerr, 2020). Moreover, the implication of demand-side shock of the food supply chain and its resilience are also interesting aspects to be tested in the future (Hobbs, 2020).

Stream seven: COVID and Leadership

When organizations face crises, most senior management comes in the spotlight. During this time, the chief executive officer CEO is greatly responsible for tackling any crumbling situation. This can be an enormous task and huge responsibility for the top management team to lead the organization during a stressful time (Alknawy, 2019). Our data sample contains 11 studies that discuss the leadership role regarding the pandemic. Leadership role in coping with stresses, providing clear guidelines and information, supporting the team with honest commitment, and side by side keeping in mind the organizational goals is a great challenge (Greenberg & Tracy, 2020). It's a tough time for leaders to secure more positive outcomes for the organization as compared to negative ones. This pandemic crisis is also a leadership practice crisis as the leaders' social and core responsibility is to maximize company profit: whereas, the pandemic created an economic lockdown and put the business leaders in a serious situation where the decision-making is the most difficult aspect (Tourish, 2020). The core aim of research on leadership is to develop theories that can help leaders handle this type of situation efficiently and effectively. It is very much undeniable that decisions are not easy, but leaders must consider the long-term goals and welfare of society rather than short-term benefits for a few. Otherwise, pretending is pointless. Though the shareholders' benefits are a significant thing for the organizational leaders, according to business theory but many organizations avoided layoffs during COVID crisis and set an example for society (Tourish, 2020). Further highlights of this COVID and Leadership stream are presented in table 8.

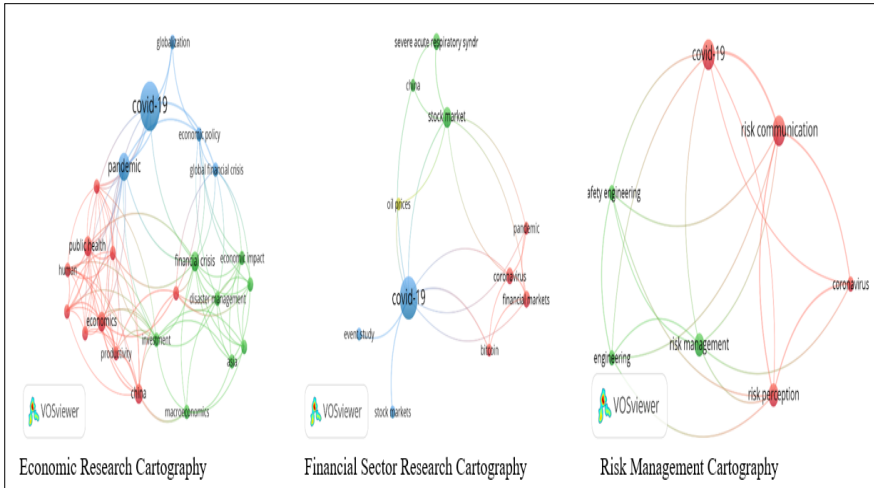
Table 8

COVID and Leadership Research

Research Sub-Group	Selected References
Leadership in Crises	Alknawy (2019); Tomkins (2020); Tourish (2020)
Discussion on Global Leadership	Ladkin (2020); Tomkins (2020); Wilson (2020)

Figure 8

Repeated keywords in selected streams



Stream eight: SARS and Business

Since SARS was the first significant episode of the current COVID pandemic affecting East Asian countries, the studies that emerged at the time of SARS were quite similar in their approach to investigating its impact on various aspects of business and the Economy. Lee and Warner (2005) examined the impact of SARS on labor markets and jobs in Hong Kong. The study concluded that the Human Resource in the service industry was the most affected area. Lee and Warner (2006a, 2006b) further extended their studies to examine the impact of SARS on China and Hong Kong, and Singapore's economies. The studies focused on the service sector and hotel industry in these countries. The overall results indicated the varied impact of SARS on the hotel industry work force in these countries. Overby et al. (2004) also discussed the severe effects of SARS on South East Asia after the Asian financial crisis. The impacts of SARS were not significantly different from COVID-19 at that time; travel advisories were issued, quarantine and isolation measures in major cities were advised, and the economists reduced the overall growth forecast for Asian economies.

Stream nine: COVID and Marketing

A unique change has occurred in commerce due to the COVID outbreak. Such as, working from home during the pandemic time is due to the instructions

by the policymakers. The demand for online orders and home delivery is increased. Most businesses faced a serious crisis, and certain sectors changed their strategy according to the health and safety measures and performing better, such as retailers and food business restaurants provided home delivery and takeaway services. Apart from the usual sales and operational activities, innovative marketing strategies is another area that firms need to implement to survive and recover from COVID shocks (Y. Wang et al., 2020).

In selected instances, the pandemic influenced the history of modern marketing, the philosophy of basic marketing, and consumer ethics. Such as the marketing's central ideology and strategy is to look for consumer demand and try to capture it better than the competitor. But during these times, major organizations focused on social welfare in the long run and consumer demands in the short term. In this regard, Crick and Crick (2020) discussed the competition experience of organizations during the novel Coronavirus era. They were indicating a different competition and marketing strategy in the process. Examples include stock-level information sharing by retailers, the collaboration of technological giants for welfare, common vaccine development caused by pharmaceutical firms, etc.

Stream ten: COVID and Crises Management

The Global Economy and businesses have witnessed severe crises in the last few decades, starting from the Asian crises in 1997, and the 2008 global financial crises, which jolted the entire developed world. Now, COVID-19 is even posing more enormous challenge. Although crisis management has remained a long-standing issue in the economic and business framework, its importance will further increase during the ongoing pandemic (Liu & Froese, 2020). Similarly, the studies like Tse et al. (2006) discussed the crisis management strategies of Hong Kong restaurants during the SARS crisis, whereas Anderson (2006) discussed the impact of SARS and other crises on Australia's tourism industry. The results indicated that the overall sector was not fully prepared to meet these challenges.

Stream eleven: COVID and Entrepreneurship

The Covid-19 (coronavirus) pandemic has presented unique problems and opportunities for international business and entrepreneurship (Ratten, 2020). While other health pandemics have affected the global economy, the uncertainty caused by covid-19 has resulted in new ways of looking at entrepreneurship. It was not only problematic for some entrepreneurs to

withstand the ongoing wave of the pandemic, the evidence suggested that early-stage seed investments fall sharply in the countries like China (Brown & Rocha, 2020). The viral outbreak almost paralyzed the overall business across the world, except in the areas where quick modifications and innovation were done.

DISCUSSION

The use of bibliometric analysis is increasing in the review of trends and progress in various fields and research areas. This study presents various dimensions of COVID-19 and Business research. These include the top authors, publication trends countries of research, journals, and major research foci. Among the publication trends, the researchers started focusing on SARS and its impact on various domains of business from 2003 onward when early cases of SARS emerged in the world. However, the main hike in publication trends is seen from October 2019 onward when the main episode of COVID-19 emerged. Among the most active research-producing countries USA remained first with 147 publications, followed by china with 84 publications wherever the UK remained third with 74 publications. These results are in line with the findings of Farooq et al. (2021); Tao et al. (2020) indicating researchers from the USA produced more research compared to any other country. However, the results are in contrast to the results of Hamidah et al. (2020a) indicating China as the top research-producing country in COVID-19. Research is generally not an outcome of individual efforts instead collaborative efforts find a better solution to a problem. The study further it identifies the collaborative relationships between authors, institutions, and countries on COVID and business research. Not unexpectedly, the analysis indicated that the authors from China and the USA collaborated on 12 articles, and authors from China and UK collaborated on 5 articles. The other major collaborative country pairs include Denmark and the USA, China & Australia, Denmark & UK, France & Germany, and Italy & Australia.

The bibliometric analysis also covers the most targeted journals for research publications on COVID-19 and business. The study highlighted the top 16 journals with a minimum of 5 or more publications ($P_{CB} > 5$). Since the majority of the research is on tourism so accordingly, the Tourism Geographies attracted the highest number of publications followed by Economic and Political Weekly. The Canadian Journal of Agricultural Economics and Journal of Business Research with 15 articles each remained third on the list. The results are in line with the findings of Bhatt et al. (2022) indicating Tourism Geographies' top choice for

publication by researchers. Since both these studies highlighted that tourism research attained the highest attention from researchers in the post-COVID-19 scenario, *Tourism Geographies*' as the journal with the highest number of publications is not irrational.

In terms of the most productive authors, we have highlighted the top 10 authors in the selected data with three or more publications ($P_{CB} \geq 3$). As discussed earlier, the majority of the research is in the domain of tourism management, so six out of ten authors worked on tourism studies. Rob Law, with five published papers, from Hong Kong Polytechnic University, is top on the list. Whereas, Dimtry Ivanov and Jun Wen are among the top three authors with four publications each publishing in supply chain and tourism respectively. The other prominent authors include John W. Goodell publishing in the domain of finance and economics, Grace Lee for public and social administration, and Malcom Warner publishing in the domain of Human Resources.

The first objective of the study is to highlight the prominent aspects of the research using bibliometric analysis. Secondly, identification and analysis of the main streams in literature, or more precisely the main domains in the COVID-19 and Business literature in the early phase of COVID-19 figures high. This stream identification was done using two approaches, first cartography or co-word analysis using VOSviewer as discussed earlier, and second, a manual content analysis of studies available in the data set. Based on this analysis, the study identifies eleven main streams, within the selected dataset, based on the criteria of a minimum of five or more researches ($P_{CB} \geq 5$). These streams mainly include studies on tourism with 81 (20%) publications at the top of the list, and the studies on economics and the financial sector impact of the pandemic with 32 (8%) and 25 (6%) publications respectively. The other major streams include the supply chain with 19 (5%) publications and risk management with 13 (3%) publications. These results are contrary to the findings of Verma and Gustafsson (2020). The authors highlighted only four main streams. This may be due to the fact that their study used only 107 articles for analysis. However, in terms of substreams, highlighted by Verma and Gustafsson (2020) our study has many common findings, e.g. COVID-19 impact on tourism, supply chain, leadership style, economy, financial sector, etc.

An overall analysis of these streams highlighted many facts about various domains of businesses. The tourism and hospitality industry remained the most affected segment of business with long-lasting effects. Moreover, travel

restrictions and new hygiene requirements have changed the risk perception of travelers. The hospitality and industry including, hotels, restaurants and even airlines suffered heavy losses. Similarly, in the supply chain domain, more resilient and innovative supply chain models are required. The firms and manufacturers started considering more flexible and decentralized models of production and sales. Similarly, due to changes in order patterns (i.e. shift to online orders) and delivery systems new and novel marketing strategies are being implemented. On the economic front, the majority of the nations couldn't achieve their growth rate targets mainly due to manufacturing and trade halts. The performance of the financial markets has a direct link with the economy. The global financial markets declined enormously during the pandemic. In nutshell, businesses need to be more vigilant, strategies more dynamic and robust in the post-COVID era.

CONCLUSION

The COVID-19 literature in the business is growing and exhibiting a distinct pattern. Diverse topics with subtopics have been discussed in the literature by business researchers. Since the pandemic has impacted the current and future lifestyle in multiple dimensions and its impact on business is continuously being felt by researchers, they are bringing new perspectives on research. As the overall foci of business research are increasing, more research streams and sub-streams in business research are emerging. This study identified 11 streams that serve as pathways for the business community and academicians aiming to conduct future research.

The study is not without limitations. Since the research, on the selected topic, is ever-growing. So, any cut of date may seem outdated once the article goes through the publication process. Moreover, the situation with COVID-19 is rapidly changing, and new waves brought new dimensions of thoughts and business approaches. Similarly, the researcher's concerns may also change over time.

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