THE COVID-19 AND MALAYSIA ECONOMY: A BIBLIOMETRIC ANALYSIS

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Abstract: The COVID-19 pandemic is a serious issue that has been classified as a global issue. There are millions of people reported to have died after being infected with the COVID-19 epidemic. This caused the Malaysian government to create a Movement Control Order (MCO) to prevent the spread of the COVID-19 epidemic. However, this has a negative impact on the economy in Malaysia. This bibliometric study uses the keywords "COVID-19", "economy", and "Malaysia" to analyse previous studies that discuss issues related to these keywords. The Scopus database served as the source of the information used in this study's bibliometric analysis. The study can gather 511 papers to analyse the publication year, document type, source title, languages, subject area, keyword analysis, authorship, active institutions, and citation analysis. These are some common bibliometric indicators used in this study to provide the findings. For the frequency study, Microsoft Excel was used; VOSviewer was used for data visualisation; and Harzing's Publish or Perish was used for citation metrics and analysis. The study is strongly related to the top author's keywords, as COVID-19 is recorded to have 45.79%, and the Malaysia keyword is 40.90%. Most documents are the qualities Scopus articles, with the majority of articles with 348 total publications (68.10%), conference papers with 71 total publications (13.89%), book chapters with 51 total publications (9.98%), and review papers with 28 total publications. The article "The Use of the Health Belief Model to Assess Predictors of Intent to Receive the COVID-19 Vaccine and Willingness to Pay" by Wong *et al.* (2020) has received the most citations so far, with 513 citations, or an average of 171 citations per year.

Keywords: COVID-19, Malaysia, economic, bibliometric, VOSviewer.

Introduction

The COVID-19 epidemic exerts an impact on the economy across multiple dimensions. Initially, the emergence of this lethal virus instils a sense of dread throughout society of the possibility of contracting the disease (Ciotti *et al*., 2020; Singh & Singh, 2020). Many issues concern the working environment (Sharifi *et al*., 2020; Sethi *et al*., 2020). The employer admired the employee's proactive concern for work completion and timely departure. Growing apprehension is being observed as some nations initiate measures to restrict their residents from engaging in employment and social activities (Shen *et al*., 2020; Shrestha *et al*., 2020; Hasanat *et al*., 2020). These sectors are reallocating their expenditures towards essential areas due to concerns about the potential loss of their main revenue stream (Abhari *et al*., 2022). These impacts of the government's implementation of movement control measures, also known as Movement Control Order (MCO), have exacerbated the prevailing economic conditions (Khalid, 2021).

The MCO in Malaysia is a precautionary and control measure taken by the Malaysian government in dealing with the coronavirus pandemic (COVID-19) (Karim *et al.*, 2020). The MCO was implemented on March 18, 2020, under the 1988 Infectious Disease Prevention and Control Act and the 1967 Police Act. The MCO has been held until August 31, 2020, with several implementation phases (Ambikapathy & Ali, 2020). MCO1 has been implemented from March 18, 2020 until March 31, 2020. In the meantime, on March 26, 2020, the Malaysian government issued an Enhanced MCO (EMCO) in several areas that experienced an increase in coronavirus cases (Aziz *et al.*, 2020; Hassan *et al.*, 2022).

According to Musa *et al.* (2021), Malaysia has a long month to fight the COVID-19 pandemic, and the MCO has several stages. After the MCO1 is over, the Malaysian government will announce the second MCO (MCO2) phase from April 1, 2020, until April 14, 2020. Later on, MCO2 has been extended to April 28, 2020. It follows a very worrying rise in coronavirus in Malaysia in April. As a result of the execution of the MCO, Malaysian citizens have been compelled to adopt new societal norms (Omar *et al.*, 2020). The Malaysian government has implemented measures to reduce transmission and disrupt the chain of the coronavirus epidemic (Shah *et al.*, 2020).

The phenomenon under consideration has significant implications for societal activities, both in terms of social dynamics and economic aspects (Lee *et al.*, 2020; Daud, 2021). Furthermore, certain occupations have experienced reduced working hours, while others have been advised to transition to online platforms (Shakeel, 2020; Hashim *et al.*, 2021). The prevailing economic activity transitions from a discretionary consumption-oriented economy to a fundamental needs-based economy (Ganasegeran *et al.*, 2020). Nevertheless, a significant portion of the economic activity experiences adverse effects due to enterprises and workers failing to effectively adjust to the prevailing circumstances (Omar *et al.*, 2020; Menhat *et al.*, 2021). Furthermore, cross-border commercial operations are also impacted. The issue will significantly influence Malaysia, given its status as an open country (Umezaki, 2007).

This bibliometric study focuses on COVID-19 and the economy in Malaysia region. Numerous bibliometric studies have been conducted on COVID-19. This study aims to elucidate the bibliometric overview that guides researchers in this area while providing a concise overview of the comprehensive analysis conducted on the COVID-19 pandemic and the economy in Malaysia. By employing bibliometric analysis, it is possible to identify consolidation trends within a fragmented body of research. This facilitates the process of future researchers in identifying and situating their contributions to the body of knowledge.

In order to address the following Research Questions (RQs), this study focuses on the bibliometric analysis of publications linked to COVID-19 and Malaysia's economy.

RQ1: What are the top subjects in terms of COVID-19 and the economy within Malaysia?

RQ2: Who are the primary researchers in COVID-19 within the focus of the Malaysian economy?

RQ3: How are the COVID-19 and Malaysian economy research projects currently collaborating?

The subsequent portions of this essay are organised as follows: Section 2 presents a comprehensive examination of the existing literature on COVID-19 bibliometric past studies. The methods and structural approach are discussed in Section 3. Consequently, Section 4 explores the empirical findings. Section 5 investigates the extent to which this bibliometric analysis meets all of the objectives, and Section 6 provides a summary and conclusion of the entire study.

Literature Review

Bibliometric Analysis

The data acquired from the Scopus database will be utilised to conduct a bibliometric study. Bibliometrics is a commonly employed methodology for quantitative assessments of research publications to evaluate scientific research. Bibliometrics can serve as a valuable tool for researchers and institutions seeking to enhance their understanding of the influence, productivity, and effect of their scholarly endeavours. It is functions as a scientific navigational tool that guides us towards a more profound understanding of the research landscape. The primary aim of this study is to examine several elements of research publications, such as citations, authors, journals, and keywords. These indicators provide valuable information regarding a publication's intellectual impact, research collaboration patterns, and emerging trends within a specific field.

Citation analysis is one of the most often used bibliometric metrics. We can determine a publication's influence and significance within the scientific community by looking at the citations it receives. Imagine it being similar to tallying the instances in which a famous person is featured on the cover of a publication. The fundamental principle underlying bibliometric analyses is that a significant majority of scientific discoveries and advancements are ultimately disseminated through global, peer-reviewed publications, enabling other scholars to access and reference them. However, bibliometrics is more than simply math and statistics. It also involves seeing the wider picture. It enables us to recognise emerging disciplines, pinpoint research needs, and even assess the effects of financing and policy decisions for science. It is like having a superpower that allows us to make wise choices and influence the direction of scientific inquiry. Moreover, with meticulous bibliometric analysis, additional specific details regarding the publications, such as the authorship of the research, might potentially be revealed. The examination of co-authorship is a bibliometric methodology that may be conveniently conducted by utilising specialised software such as VOSviewer for data visualisation. Harzing's Publish or Perish was used for citation metrics and analysis.

Past Studies

Table 1: Summary of previous studies

Author	Domain/Search Strategy	Data Source	TDE	Period	Bibliometric Attributes Examined
Aroyewun *et al.*, 2022	"COVID-19" and "Malaysia"	Scopus	3553	January 2020-August 2022	- Top 10 research institutions - Type of publications - Subject area focus
Tantengco, 2021	"COVID-19" and "Southeast Asia"	Scopus	702	January 2020-August 2021	- Publications by subject area - Most cited publications - Keyword visualization - Publications by author, countries, and journal

Author	Domain/Search Strategy	Data Source	TDE	Period	Bibliometric Attributes Examined
Nilashi *et al*., 2023	"COVID-19", "Sustainable Development Goals" and "Malaysia"	Scopus	378	January 2020-July 2021	- SWOT analysis - Co-authorship countries and organizations - Keyword co-occurrence - Term co-occurrence network
Dwijayani *et al*., 2023	"COVID-19", "Vaccine", "Indonesia", and "Malaysia"	Scopus	935	2020 to 2022	- Document total publications - Document per author, country, and affiliation
Mangindaan *et al*., 2022	"COVID-19", "Indonesia", and "waste"	Scopus	24	January 2020 - December 2021	- Publication gap
Ling *et al*., 2021	"COVID-19" and "Social Media"	Scopus	1994	January 2020-April 2021	- Author keyword analysis - Most productive and highly cited authors - Co-authorships - Research growth - Top nations, collaborations, and institutions - Top productive journals
Pathak and Singh, 2023	"COVID-19", "E-learning" and "ASIAN"	Scopus	417	2020–2023	- Source impact factor - Country collaboration map - Corresponding author's country and world tree map - Globally most cited articles, most cited countries, social collaboration map - Most relevant affiliations and thematic evolution - Co-citation network
Ageel, 2022	"COVID-19" and "Critical Care"	Scopus	2778	2020 to 2022	- Collaborative research and co-authorship network - Citation networking - Co-citation analysis - Keywords co-occurrence

Author	Domain/Search Strategy	Data Source	TDE	Period	Bibliometric Attributes Examined
Rejeb *et al.*, 2022	"COVID-19" and "Food Supply Chain"	Scopus	287	December 2019 - June 2022	- Publications by subject area - Most cited publications - Most productive institutions, countries, and authors - Reference co-citation analysis - Journal co-citation analysis - Countries bibliographic coupling - Co-citation analysis of selected articles - Keyword co-occurrence network
Zamzuri, 2021	"COVID-19", "Malaysia" and "Latent Dirichlet Allocation"	Google Scholar	134	January 2020 - January 2021	- Number of citations - Most cited papers are based on institutions and fields
Benita, 2021	"COVID-19" and "Mobility"	Scopus and WoS	194	January 2020 - December 2020	- Publication venues and monthly number of articles - Distribution of article publication by corresponding - Publication venues - Identification of sub-themes - Keyword co-occurrence network
Gong *et al.*, 2020	"COVID-19"	PubMed and China National Knowledge Infrastructure	<1500	January 2020 - March 2020	- Networks formed by collaborative countries - Number of publications collaborations between China and collaborative countries - Distribution of Chinese articles

Author	Domain/Search Strategy	Data Source	TDE	Period	Bibliometric Attributes Examined
Zhing and Lin, 2022	"COVID-19" and "Economy"	Web of Science	2274	2020 - 2022	- 10 most essential literature - 10 most cited literature - Type and distribution over publication journals - Journal co-citation network - Document co-citation network and co-citation clusters
Boubaker *et al.*, 2023	"COVID-19" and "Finance Scholarship"	Web of Science	818	January 2020 - May 2022	- Author and country collaboration network - Prominent countries and most collaborating countries - Prominent authors - Most cited publications - Intellectual structure analysis with multi-dimensional scaling

TDE=Total documents examined.

Methods

Search Strategy

Information used in this paper was sourced from the online Scopus database. Bibliometric analyses reflect the coverage of their underlying databases, as the coverage essentially determines what is included in the study. Furthermore, bibliometric assessment further contextualizes these articles against the database, which also relies on the coverage (Borgman & Furner, 2002). Note that Elsevier developed Scopus in 2004. Under the direction of a team of subject-matter experts, Scopus is the "most comprehensive overview of the world's research outputs," according to Elsevier. Scopus aims to create the most extensive possible collection of reliable research publications (Norris & Oppenheim, 2007). Scopus is being used for

this study because of its depth of information and the quality of journals it offers. The Web of Science (WoS) database houses 84% of all indexed publications and has about 42,180 fewer academic journals indexed by Scopus than it does (Mongeon & Paul-Hus, 2016; Rejeb *et al.*, 2022).

Figure 1 shows the flow diagram of this study's search strategy. The keywords selected are COVID-19, economic proxy as "econom*" and "economi*", and Malaysia. Coverage of documents generally includes all types of language, types of documents, subject areas, and time frames. This study extracted the data starting from October 1, 2020, and after the screening process, 511 documents were selected as final data for analysis.
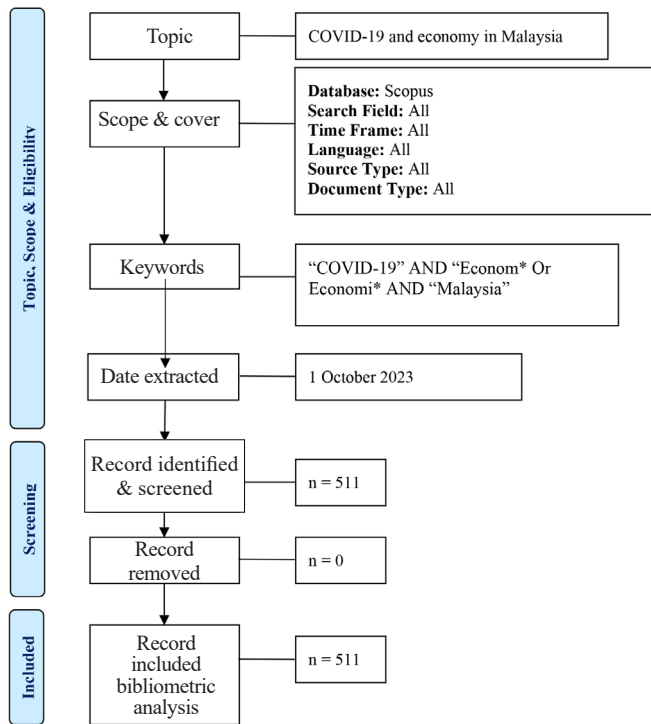
Figure 1: Flow diagram of the search strategy
Source: Zakaria *et al*. (2020)

Results

Documents Profiles

Table 2 and Figure 2 identified a total of 511 documents found in the Scopus database from the keywords of this study. This study identified 10 different types of documents.

Table 2: Document type

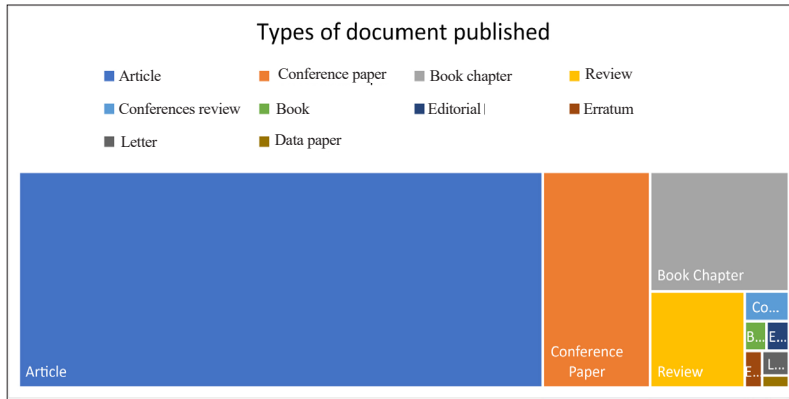| Source Type	Total Publications (TP)	Percentages (%)
Article	348	68.10
Conference paper	71	13.89
Book chapter	51	9.98
Review	28	5.48
Conference review	4	0.78
Book	2	0.39
Editorial	2	0.39
Erratum	2	0.39
Letter	2	0.39
Data paper	1	0.20
Total	**511**	**100.00**

Figure 2: Types of documents published

According to Table 3, most articles in this research field are written in English, with 506 total publications covering 99.02% of all the documents. The other language written is Malay, with only less than 1% of overall documents written in that language.

Table 3: Languages

Language	Total Publications (TP)	Percentages (%)
English	506	99.02
Malay	4	0.78
Spanish	1	0.20
Total	**511**	**100.00**

Next, as indicated in Table 4 and Figure 3, the published materials included in this study are categorised based on their subject matter. The majority of the research using the keywords COVID-19 and Malaysia economy comes from the social sciences, with 31.12% overall documents or 159 total publications, followed by the economics, econometrics, and finance with 106 total publications, 97 business, management, and accounting (18.98%), and 94 from medicine area (18.40%). However, as shown in Table 5, other disciplines, such as energy, physics and astronomy, engineering, art and humanities, computer science, and environmental science, have also produced publications on the Malaysian economy and COVID-19.

Table 4: Top 10 subject areas

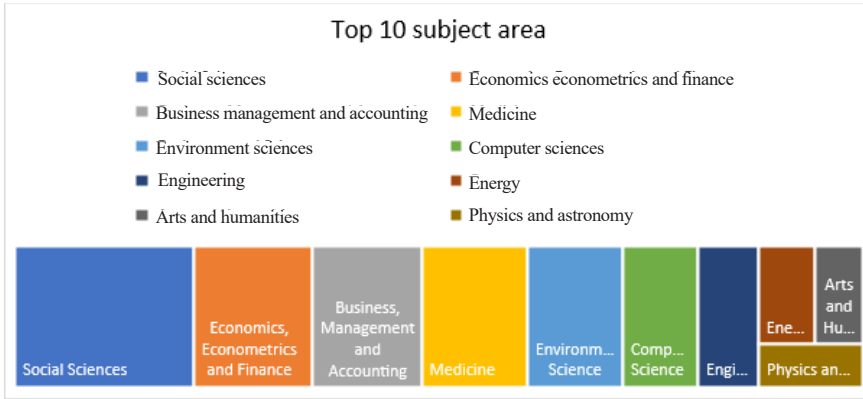| Subject Area	Total Publications (TP)	Percentages (%)
Social sciences	159	31.12
Economics, econometrics, and finance	106	20.74
Business, management, and accounting	97	18.98
Medicine	94	18.40
Environmental science	85	16.63
Computer science	67	13.11
Engineering	54	10.57
Energy	35	6.85
Arts and humanities	29	5.68
Physics and astronomy	28	5.48

Figure 3: Top 10 subject areas

Publication Trends

As indicated by Table 5 and Figure 4, this study analyses the distribution of the papers by year of publication and citation information. The first article was released in 2020, with only 35 publications. This is relevant with COVID-19 as a keyword.

Table 5: Year of publication

Year	TP	Percentages (%)	NCP	TC	C/P	C/CP	h	g
2020	35	6.85	27	1496	42.74	55.41	16	35
2021	173	33.86	133	1348	7.79	10.14	17	31
2022	188	36.79	117	599	3.19	5.12	13	18
2023	115	22.50	38	122	1.06	3.21	4	9
Total	**371**							

Notes: TP = total number of publications; NCP = number of cited publications; TC = total citations; C/P = average citations per publication; C/CP = average citations per cited publication; h = h-index; and g = g-index.
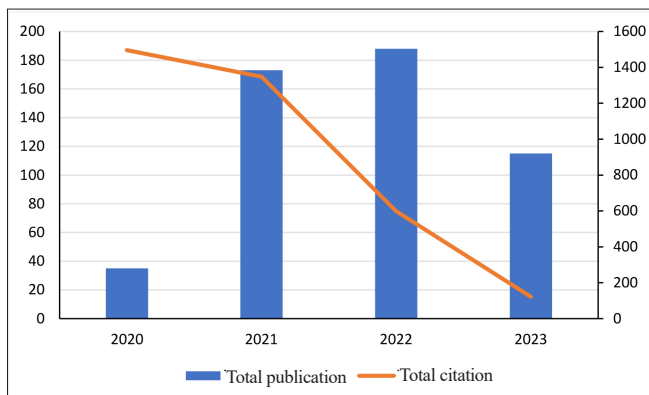

Figure 4: Total publications and citations by year

Publications by Authors

Cheah, P. K. is the most productive author, with five publications and 66 citations. All top nine authors in Table 5 have similar total publications. However, there is a different total of citations.

Table 6: Most productive authors

Author's Name	Affiliation	Country	TP	TC	NCP	C/P	C/CP	h	g
Cheah, P.K.	Universiti Tunku Abdul Rahman	Kajang, Malaysia	5	66	5	13.20	13.20	4	5
Amlus, M.H.	Universiti Malaysia Perlis	Arau, Malaysia	4	20	2	5.00	10.00	1	4
Cheah, P.Y.	Mahidol Oxford Tropical Medicine Research Unit	Bangkok, Thailand	4	62	4	15.50	15.50	3	4
Ling, G.H.T.	Universiti Teknologi Malaysia.	Johor Bahru, Malaysia	4	47	3	11.75	15.67	2	4
Ongkili, D.	Kementerian Kesihatan Malaysia	Putrajaya, Malaysia	4	62	4	15.50	15.50	3	4
Osterrieder, A.	Mahidol Oxford Tropical Medicine Research Unit	Bangkok, Thailand	4	62	4	15.50	15.50	3	4
Rashid, I.M.A.	Universiti Teknologi MARA	Shah Alam, Malaysia	4	20	2	5.00	10.00	1	4
Rashid, M.F.	Universiti Teknologi Malaysia	Johor Bahru, Malaysia	4	1	1	0.25	1.00	1	1
Shaari, M.S.	Universiti Malaysia Perlis	Arau, Malaysia	4	6	2	1.50	3.00	1	2
Siau, C.S.	Universiti Kebangsaan Malaysia	Bangi, Malaysia	4	6	3	1.50	2.00	1	2

Notes: TP = total number of publications; NCP = number of cited publications; TC = total citations; C/P = average citations per publication; C/CP = average citations per cited publication; h = h-index; and g = g-index.

Table 7 shows the total number of authors for each document. Here, 44 papers (8.91%) are single-authored, whilst 467 papers (91.09%) are classified as multi-authored publications and include two to 20 authors.

Table 7: Number of author(s) per document

Author Count	Total Publications (TP)	Percentages (%)
4	105	21.26
3	88	17.81
2	86	17.41
5	59	11.94
1	44	8.91
6	35	7.09
7	29	5.87
8	15	3.04
9	8	1.62
0*	8	1.62
11	7	1.42
10	5	1.01
12	3	0.61
20	2	0.40
Total	**494**	**100.00**

*Document with no author is listed.

Publications by Institutions

This analytic paper also looks at the most productive institutions with at least 18 publications. Table 8 and Figure 5 shows that the most productive university is Universiti Teknologi MARA, followed by Universiti Kebangsaan Malaysia, with 70 and 61 publications, respectively. The third productive institution is Universiti Malaya, with 9.78% of the overall percentage.

Table 8: Top 10 most productive institutions

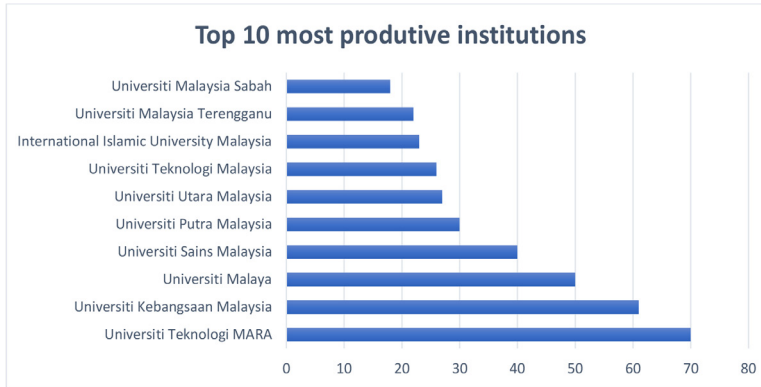| Affiliation	TP	Percentages (%)
Universiti Teknologi MARA	70	13.70
Universiti Kebangsaan Malaysia	61	11.94
Universiti Malaya	50	9.78
Universiti Sains Malaysia	40	7.83
Universiti Putra Malaysia	30	5.87
Universiti Utara Malaysia	27	5.28
Universiti Teknologi Malaysia	26	5.09
International Islamic University Malaysia	23	4.50
Universiti Malaysia Terengganu	22	4.31
Universiti Malaysia Sabah	18	3.52

Notes: TP = total number of publications.

Figure 5: Top 10 most productive institutions

Publications by Source Titles

Table 9 indicates that most 10 active source titles under publishers: American Institute of Physics, Multidisciplinary Digital Publishing Institute (MDPI), Institute of Physics (IOP) Publishing Ltd, Springer Nature, Frontiers Media, Ascociacion Internacional de Economia Aplicada, Malaysian Institute of Planners, and Universiti Kebangsaan Malaysia.

Table 9: Most active source titles

Source Title	TP	%	Publishers	Cite Score	SJR 2022	SNIP 2022	NCP	TC	C/P
AIP Conference Proceedings	19	3.72	American Institute of Physics	0.7	0.164	0.247	2	2	0.11
Sustainability Switzerland	19	3.72	Multidisciplinary Digital Publishing Institute (MDPI)	5.8	0.664	1.198	16	106	5.58
IOP Conference Series Earth and Environmental Science	16	3.13	IOP Publishing Ltd	0.8	0.197	0.255	8	18	1.13
International Journal of Environmental Research and Public Health	11	2.15	Multidisciplinary Digital Publishing Institute (MDPI)	5.4	0.828	1.280	9	73	6.64
Lecture Notes in Networks and Systems	10	1.96	Springer Nature	0.7	0.151	0.190	3	4	0.40
Frontiers in Public Health	9	1.76	Frontiers Media	3.8	1.125	1.374	9	149	16.56

Source Title	TP	%	Publishers	Cite Score	SJR 2022	SNIP 2022	NCP	TC	C/P
Estudios De Economia Aplicada	7	1.37	Ascociacion Internacional de Economia Aplicada	0.5	0.123	0.325	4	11	1.57
Frontiers in Psychology	6	1.17	Frontiers Media	4.5	0.891	1.422	5	30	5.00
Planning Malaysia	6	1.17	Malaysian Institute of Planners	1.3	0.249	0.757	4	13	2.17
Sains Malaysiana	6	1.17	Universiti Kebangsaan Malaysia	1.7	0.235	0.488	3	7	1.17

Notes: TP = total number of publications; % = percentage; TC = total citations; Cite Score = average citations received per document published in the source title; SJR = SCImago Journal Rank measures weighted citations received by the source title; SNIP = source normalised impact per paper measures actual citations received relative to citations expected for the source title's subject field.

Citation Metrics

The number of citations per year indicates a researcher's output. The citation metrics for the documents retrieved as of October 2023 are summarised in Table 10. As shown, 511 retrieved publications have received 1188.33 reported citations per year (2020-2023), meaning around 6.98 per paper. The data also shows the citations per author is 170.51, reflecting the authors per paper citation is 4.19. The h-index and g-index are 24 and 51, respectively. The citation is indeed the highest since COVID-19 is considered a favourite topic after the global had dealt with this deadly infection.

Table 10: Citations metrics

Metrics	Data
Papers	511
Number of citations	3565
Years	3
Citations per year	1188.33
Citations per paper	6.98
Citations per author	818.11
Papers per author	170.51
Authors per paper	4.19
h-index	24
g-index	51

Highly Cited Documents

The top 15 articles that have received the most mentions are listed in Table 11 of the Scopus database. The article by Wong *et al.* (2020), "The Use of the Health Belief Model to Assess

Predictors of Intent to Receive the COVID-19 Vaccine and Willingness to Pay" has gotten the most citations, with 513 citations or an average of 171 citations per year. The second, with 270 citations and 135 cited per year, is "the impact of COVID-19 Pandemic on Physical and mental health of Asians: A study of seven middle-income countries in Asia" by Wang *et al.* (2021).

Table 11: Top 15 highly cited articles

No.	Authors	Title	Cites	Cites per Year
1	Wong *et al.* (2020)	"The use of the health belief model to assess predictors of intent to receive the COVID-19 vaccine and willingness to pay"	513	171
2	Wang *et al.* (2021)	"The impact of COVID-19 pandemic on the physical and mental health of Asians: A study of seven middle-income countries in Asia"	270	135
3	Shah *et al.* (2020)	"COVID-19 outbreak in Malaysia: Actions taken by the Malaysian government"	258	86
4	Kanniah *et al.* (2020)	"COVID-19's impact on the atmospheric environment in the Southeast Asia region"	216	72
5	Hashim *et al.* (2021)	"COVID-19 Epidemic in Malaysia: Epidemic progression, challenges, and response"	78	39
6	Menhat *et al.* (2021)	"The impact of COVID-19 pandemic: A review on maritime sectors in Malaysia"	67	33.5
7	Aziz *et al.* (2020)	"Malaysia's approach in handling COVID-19 onslaught: Report on the Movement Control Order (MCO) and targeted screening to reduce community infection rate and impact on public health and economy"	61	20.33
8	Naderipour *et al.* (2020)	"Effect of COVID-19 virus on reducing GHG emission and increasing energy generated by renewable energy sources: A brief study in Malaysian context"	60	20
9	Parveez *et al.* (2021)	"Oil palm economic performance in Malaysia and R&D progress in 2020"	56	28
10	Godman *et al.* (2020)	"Rapid assessment of price instability and paucity of medicines and protection for COVID-19 across Asia: Findings and public health implications for the future"	56	18.67
11	Waiho *et al.* (2020)	"Potential impacts of COVID-19 on the aquaculture sector of Malaysia and its coping strategies"	56	18.67
12	Marzo *et al.* (2022)	"Hesitancy in COVID-19 vaccine uptake and its associated factors among the general adult population: a cross-sectional study in six Southeast Asian countries"	53	53

13	Taghizadeh-Hesary *et al.* (2022)	"COVID-19 and regional solutions for mitigating the risk of SME finance in selected ASEAN member states"	50	50
14	Osterrieder *et al.* (2021)	"Economic and social impacts of COVID-19 and public health measures: Results from an anonymous online survey in Thailand, Malaysia, the UK, Italy, and Slovenia"	45	22.5
15	Selvanathan *et al.* (2023)	"Students learning experiences during COVID-19: Work from home period in Malaysian Higher Learning Institutions"	39	39

Top Keywords

The study is strongly related to the top author's keywords, as COVID-19 is recorded to have 45.79%, and the Malaysia keyword is 40.90%.

Table 12: Top author's keywords

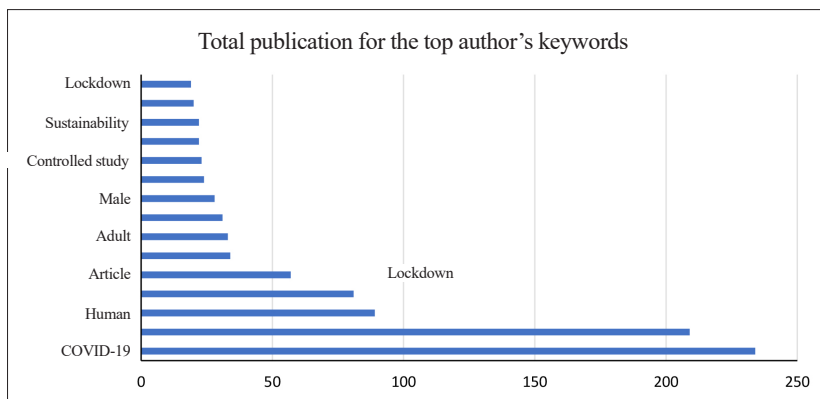| Author Keywords	Total Publications (TP)	Percentages (%)
COVID-19	234	45.79
Malaysia	209	40.90
Human	89	17.42
Pandemic	81	15.85
Article	57	11.15
Epidemiology	34	6.65
Adult	33	6.46
Female	31	6.07
Male	28	5.48
Cross-sectional study	24	4.70
Controlled study	23	4.50
Public health	22	4.31
Sustainability	22	4.31
Epidemic	20	3.91
Lockdown	19	3.72

Figure 6: Total publication for the top author's keywords

Co-authorship Analysis

Co-Authorship by Organisations

With a minimum of three organisations' documents, Figure 7 displays the overlay visualisation that charts organisations' historical trajectory of co-authorship. Using fractional counting, only eight organisations out of 1,402 met the requirements. Most documents came from Northern University Malaysia, which published four publications. The College of Art and Social Science, however, received the most citations out of the minimum three periodicals published by the organisation (University Tunku Abdul Rahman) and the Department of Global Health and Development (London School of Hygiene and Tropical Medicine),

with 61 citations (same cluster). The darker and blue tones refer to the backward year (2021), meaning the Department of Global Health and the University of Malaya produced the earliest publication journals among eight other organisations, followed by the School of Management (University of Science Malaysia), then, the University of Northern Malaysia and Saw Swee Hock School of Public Health (National University of Singapore). The newest contribution within the year 2022 was from the Mara University of Technology and Faculty of Economics and Management (Universiti Kebangsaan Malaysia).
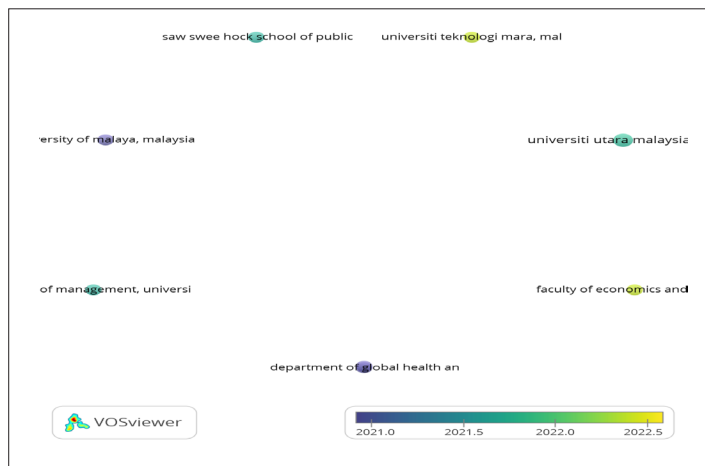

Figure 7: Network visualisation map of the co-authorship by organisations

Co-authorship by Countries

Figure 8 represents the fractional counting method applied to a minimum of 5 papers from each nation. The findings of the 90 countries analysed indicate that 21 countries satisfy the established requirements. Malaysia possesses the largest potion, with 410 documents, 3,140 citations, and a total link strength of 106. Indonesia ranks second with 44 documents, 220 citations and a total link strength of 32. The third country on the list is the United Kingdom, while the fourth is the United States. This study primarily focused on the region of

Malaysia, resulting in the majority of research collaborations being conducted by researchers from Malaysia. There are four clusters identified; the first cluster comprises China, India, Malaysia, Pakistan, Saudi Arabia, South Korea, the UAE, and the United States. This is followed by the subsequent cluster consisting of Australia, Bangladesh, Canada, Iran, Japan, and the Philippines. The third cluster comprises Italy, Singapore, Thailand, and the United Kingdom. The final cluster comprises only three countries: Indonesia, Taiwan, and Vietnam.

The analysis of these three clusters reveals that the predominant co-authorship among these countries primarily occurs in Asia. The yellow and light green colours show the latest publications from August 2021 until 2020 from the UAE, Singapore, Japan, Australia, and India. The earliest publications are co-authorships from Pakistan, Italy, and Vietnam.
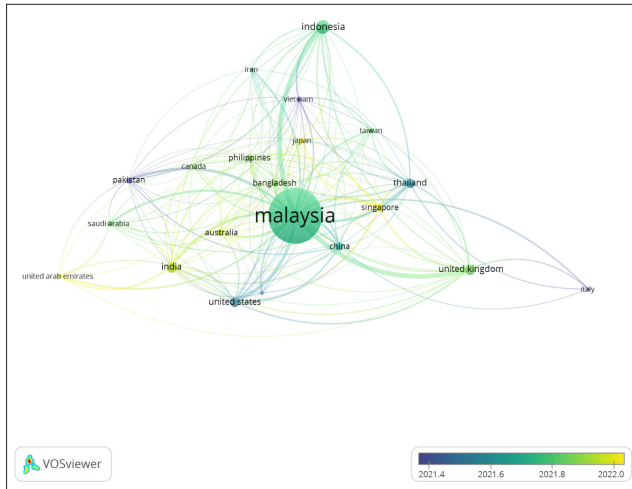

Figure 8: Network visualisation map of the co-authorship by countries

Co-occurrence Analysis

Co-occurrence Analysis of All Keywords

Figure 9 shows the fractional counting with a minimum of five keyword occurrences and finds that among 2,999 keywords, 100 meet the threshold. There are five clusters identified. There are four largest variations found in six colours: COVID-19 and Malaysia (blue cluster), economics (yellow cluster), and humans (green cluster). The red cluster and purple cluster are more likely to have equal sizes within the keywords. It was found that the blue-coloured keywords are towards the Malaysia and COVID-19 cases, such as Movement Control Order, sustainability, e-learning, west Malaysia, tourism, and hers. The green-coloured keywords are more involving humans and countries such as Indonesia, the Philippines, India, Thailand, China, South Korea, Taiwan, Japan, Brazil, Italy, and more; others are about terms such as public health, COVID-19 vaccines, health policy, disease transmission, and more. The red-coloured keywords are a mixture of terms such as cross-sectional study, controlled study, questionnaire survey, education, major clinical study, household income, gender, adult, male, female, child, aged, anxiety, mental status, employment, household income, health care cost, and many more. The yellow cluster focuses more on economics, such as health care costs, forecasting, the stock market, investment, and a few more terms. Lastly, the purple clusters are unemployment, lockdown, prevention and control, lifestyle, distress syndrome, poverty, and communicable disease control.
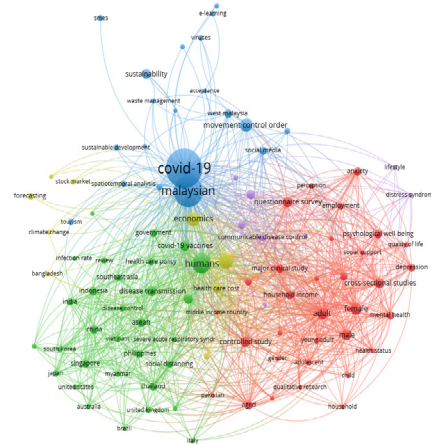
Figure 9: Network visualisation of the author's keywords

Co-occurrence Analysis of Author's Keywords

Figure 10 uses fractional counting with a minimum number of occurrences of five, and 18 thresholds meet the requirement among the 1,510 keywords. There are six clusters identified. The first cluster author's keywords are acceptance, COVID-19, COVID-19 vaccines, public health, and Southeast Asia. The second cluster is anxiety, depression, mental health, and social media. The third cluster is Malaysia, Indonesia, and sustainability. There are three more clusters, but the study only mentions the top three clusters. The keywords in purple or darker blue colour show the publications were in early 2021, such as Movement Control Order, economics, Asean, and anxiety. Malaysia has declared a semi-lockdown in order to control the spread of the virus COVID-19; thus, it is likely that the term movement control order was found in early 2021 journal publications. However, the latest publications in yellow, indentified the keywords such as the sustainability, COVID-19 vaccines, acceptance, and mental health. These keywords from all author keywords represents are clarified most recently research area are more focusing on the impact of COVID-19.
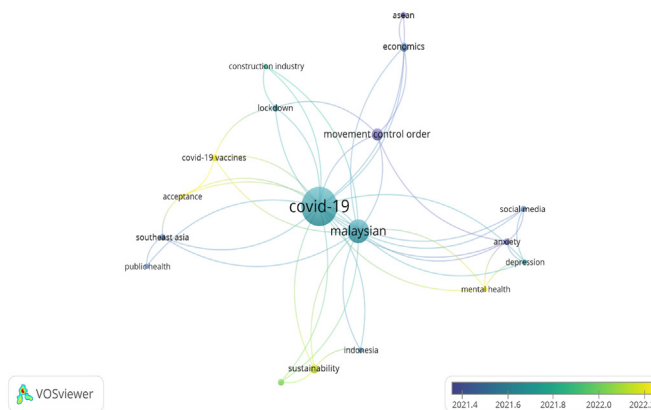

Figure 10: Co-occurrence analysis of author's keywords

Co-occurrence Analysis of Terms Based on Title and Abstract

Figure 11 uses the binary counting method, and the research considers the least number of times each of the 10 terms appears in the titles and abstracts of the publications. As a result, there were 12,736 terms to choose from but only 318 satisfied the criteria. There are 191 terms that need to be chosen, and data has been recorded for three clusters. The first cluster co-occurrence terms are benefit, business, case study, company, economic growth, environment, industry, market, policymaker, performance, sustainability, technology, tourism, and many more. The second cluster terms are China, country, disease, economic sector, effectiveness, Indonesia, India, Japan, lockdown, Philippines, Thailand, vaccine, and many more. The last cluster terms are anxiety, education, Malaysia, health, Movement Control Order, survey, attitude, household, student, and many more. By comparing the cluster from the overview timeline, the earliest publications terms (purple and dark blue) and keywords are the case, virus, China, Vietnam, health, March, and other terms. The latest publications terms are sustainability, technology, education, questionnaire, respondent, sustainability, education, COVID-19 vaccines, education, age, and more.
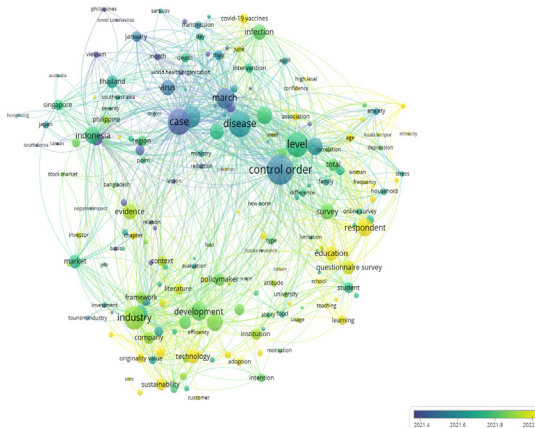

Figure 11: Network visualisation of a term co-occurrence network based on title and abstract fields

Discussion

This section addresses the findings in relation to the RQs presented in the introduction.

RQ1: What are the top subjects in terms of COVID-19 and the economy within Malaysia?

This study analyses the following information: (a) Publications by year; (b) the source and type of document; and (c) source title to respond to the RQ on the growth of COVID-19 and Malaysia economy transmission research and its distribution. The statistics of the COVID-19 and Malaysia economy research annual publications from 2020 to 2023 are shown in Figure 4. In 2020, with only 35 total publications, this is relevant with COVID-19 as the keyword. The COVID-19 was discovered on December, 2019. Thus, the earliest publication will be in 2020. Four years after the discovery of the COVID-19 virus, there has been a strong increase in the number of articles written. As the record indicates, in 2021, there are 173 total publications, which means there is an increasing rate from 2020 to 2021 of 27.01%. The most COVID-19 and Malaysia economy-related papers were published in 2022, accounting for 188 publications in total. However, the number

of total publications slightly decreases in 2023, and the citations per year also show the same pattern.

Table 2 and Figure 2 identified a total of 511 documents found in the Scopus database from the keywords of this study. This study identified 10 different types of documents. The most documents are the qualities Scopus article with 348 publications (68.10%), followed by the conference paper, 71 publications (13.89%), then book chapters with 51 publications (9.98%), and review papers with 28 total publications. The overview of the results is presented in Table 2. The 5 least published documents are data papers, followed by letters, erratum, editorials, and books.

Table 9 indicates that most 10 active source titles. The AIP Conference Proceedings and Sustainability Switzerland are the most active source titles with 19 total publications (3.72%), followed by the Institute of Physics (IOP) Conference Series Earth and Environmental Science, then the International Journal of Environmental Research and Public Health with the total publications, 16 and 11 respectively. The publishers that have more than two publications are MDPI and Frontiers Media. The cited score is based on total citations and the number of total publications within the year. The total number of publications of Sustainability Switzerland is 106, the International Journal of Environmental Research is 73, and Public Health and Frontiers In Psychology is 149. Therefore, by comparing the cite score between these 10 top source titles, Sustainability Switzerland is the highest (5.8), followed by the International Journal of Environmental Research and Public Health (5.4), and third with a 4.5 cite score is Frontiers In Psychology.

RQ2: Who are the primary researchers in COVID-19 within the focus of the Malaysian economy?

This article analyses the productive (a) authors, (b) organisations, and (c) nations that contribute most to publications on COVID-19 and Malaysia's economy within the period of 2020 until 2023 to respond to the RQ on the top contributors in this study. According to Table 6, eight academics have led the productivity in the literature on COVID-19 and Malaysia's economy was from Malaysia, and the other two are from Thailand. Cheah, P.K. from Universiti Tunku Abdul Rahman has published five journal articles with 66 total citations. The other most productive authors equally published four (4) publications. There are three authors with 62 total citations: Cheah, P.Y. from Mahidol Oxford Tropical Medicine Research Unit, Ongkili, D. from Kementerian Kesihatan Malaysia, and Osterrieder, A. from Mahidol Oxford Tropical Medicine Research Unit. Furthermore, Table 6 identified that most affiliations with a minimum of two authors recorded are Universiti Teknologi Malaysia and Universiti Malaysia Perlis.

RQ3: How are the COVID-19 and Malaysian economy research projects currently collaborating?

To respond to RQ3, Table 11 lists the top 15 papers in terms of COVID-19 and Malaysia's economy based on the number of citations they have received to date. The article by Wong *et al*. (2020), "The Use of the Health Belief Model to Assess Predictors of Intent to Receive the COVID-19 Vaccine and Willingness to Pay", has so far gotten the most citations, with 513 citations or an average of 171 citations per year. The second, with 270 citations and 135 cited per year, is "the impact of COVID-19 Pandemic on Physical and mental health of Asians: A study of seven middle-income countries in Asia" by Wang *et al*. (2021). The third is "COVID-19 Outbreak in Malaysia: Actions Taken by the Malaysian Government" by Shah *et al*. (2020), with 258 citations and 86 cites per year, followed by "COVID-19 Outbreak in Malaysia: Actions Taken by the Malaysian Government" with 216 citations and 86 citations per year by Kanniah *et al*. (2020).

Hashim *et al*. (2021) and Menhat *et al*. (2021), respectively, gained 78 and 67 citations with their papers titled; "COVID-19 Epidemic in Malaysia: Epidemic Progression, Challenges, and Response" and "The Impact of COVID-19

Pandemic: A review on maritime sectors in Malaysia". The research frequently cited in the literature begins with the basic knowledge of the COVID-19 virus. Consequently, the research shifts toward the impacts on the economy and health. Given that the researcher mostly overlooked the issue of COVID-19 and Malaysia's economy, the findings undoubtedly have a greater positive impact on the body of knowledge, especially toward the Malaysia region.

Conclusion

This bibliometric study is concentrated on COVID-19 and Malaysia's regional economy. This study began collecting data on October 1, 2020, and following a screening process, 511 documents were chosen from the database Scopus as final data to be reviewed. A large number of bibliometric studies have investigated COVID-19. However, this study was more focused on the keywords Malaysia and economy. Most of the studies in the early stage of 2020 are about the deadly virus that can infect people and how to prevent the spreading of the virus. Some studies discuss the Movement Control Order and the lockdown policy. However, after the pandemic was acknowledged as endemic, the research on COVID-19 started to change. In 2022, most research was on the impacts of COVID-19 on the economy and society.

This bibliometric study still has much to discover, and future research may concentrate on more databases, including Google Scholar, Dimensions, WoS, Microsoft Academics, and PubMed. These databases can give the potential researcher more resources and information to employ while composing a paper on this specific topic. Since this study only looks ahead less than five years, there is still space to fill. This article can educate future generations about former COVID-19 researchers who worked on Malaysia's economy.

Conflict of Interest Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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