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COVID-19 research spread in Indonesia on social media

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ABSTRAK

Pendahuluan. Penelitian ini bertujuan untuk mengetahui dampak penelitian COVID-19 Indonesia, seperti produktivitas penulis, artikel yang memiliki sitasi produktif, sosial media yang paling popular untuk menyebarluaskan hasil penelitian, artikel yang paling popular di sosial media, visualiasi pemetaan atau sebaran hasil penelitian, hingga korelasi antara data sosial media dengan sitasi.
Metode penelitian. Data penelitian diambil dari database scopus dan metode penelitian yang digunakan pendekataan Bibliometrik, Altmetrik, Scientometrik hingga uji regresi linier.
Analisis data. Data penelitian ini diproses dengan program altmetrik berbasis web (altmetric.com) serta menggunakan *software* VOSViewer dan *software* SPSS.
Hasil dan pembahasan. Hasil penelitian ini menunjukkan bahwa penulis yang produktif dalam menghasilkan penelitian COVID-19 Indonesia ialah Pranata, R; lembaga atau instnasi terproduktif ialah Universitas Indonesia; artikel yang paling banyak disitasi dan di *share, mention, tweet, post* pada sosial media ialah penelitian berjudul "*Clinical, laboratory and imaging features of COVID-19: A systematic review and meta-analysis*". Sosial media paling populer untuk menyebarluaskan hasil penelitian ialah Mendeley.
Kesimpulan. Berdasarkan temuan, sebaran penelitian COVID-19 di Indonesia pada media sosial yang paling populer yaitu mendeley sebesar 17.701, kemudian diikuti twitter 2.971 dan ketiga news mentions sebesar 177. Selain itu, berdasarkan uji regresi linier, mendeley adalah platform media sosial dengan nilai korelasi paling tinggi sebesar 0,814.

Kata kunci: COVID-19; sosial media; produktivitas penelitian; sainstometrik; altmetrik

ABSTRACT

Introduction. *The purpose of this study is to determine the impact of Indonesian COVID-19 research. One of them is productive author, productive citations, the most popular social media to disseminate research results, the most popular articles on social media, mapping or distribution of research results visualization, and the correlation of social media data with citations.*
Data Collection Method. *The research data was taken from the Scopus database and this research use method Bibliometric, Altmetric, Scientometric, and linear regression tests.*
Data Analysis*. The data of the study was analyzed using program (altmetric.com), VOSViewer and SPSS software.*

Result and Discussion. *Pranata, R. was the productive author in producing Indonesian COVID-19 research. The University of Indonesia is the most productive institution. The study "Clinical, laboratory, and imaging features of COVID-19: A systematic review and meta-analysis" received the most citations and shares on social media. Mendeley is the most popular social media platform for disseminating research.*
Conclusion. *Based on the above findings, the spread of COVID-19 research in Indonesia on the most popular social media is mendeley 17.701, followed by Twitter 2.971 and news mentions 177. According to linear regression tests, mendeley is social media platform with a high correlation value of 0.814.*

Keywords: *COVID19; social media; research productivity; scientometric; altmetrics*

A. INTRODUCTION

The COVID-19 pandemic has had a significant impact on the country, particularly on the Indonesian economy. According to the Indonesian Institutes of Sciences, which investigated the impact of COVID-19 survey data on the Indonesian household economy, economic growth slowed in the second quarter of 2020 and contracted by minus 5.32%, particularly in the household sector (Nugroho, 2020). This is also reinforced by the fact that COVID-19 has a negative effect on the Indonesian tourism world, even though Indonesia is famous for its international tourism which supports the Indonesian economy (Pham & Nugroho, 2022). This is in response to research conducted by the Indonesian Institutes of Sciences on the impact of the COVID-19 pandemic on layoffs and worker income in Indonesia. The COVID-19 pandemic resulted in the layoff of 15.6 percent of Indonesian workers. Even 13.8 percent did not receive severance pay because researchers worldwide are conducting COVID-19 research to find these solutions (Ngadi et al., 2020). Both research in the health sector to find a vaccine or avoid COVID-19, and in the economic field to restore the economy, society, education, and others.

The COVID-19 scientific research in Indonesia is widely spread in various printed and online media such as journals and proceedings, both indexed by the Indonesian Science and Technology Index (SINTA) and indexed by Scopus internationally. It aims to disseminate scientific information related to COVID-19 to the broader community, to read, reviewed, or even implemented in life. COVID-19 scientific research is also widely consumed by the scientific community in Indonesia, including researchers and academicians. This scientific research is specifically used as scientific communication by researchers and academics. There are three types of scientific communication. The first group includes research on aspects of scholarly information production. The second group is concerned with how information is transmitted. The third group is concerned with the application of information. Aside from that, citations are the primary tool for measuring information use, and many studies on scientific communication have been conducted using *bibliometric* techniques.

Citation has recently emerged as a form of scientific communication. Scientific communication is used in research to be used for further research, such as the development of previous research. Scientific research is more widely consumed by the scientific community than it is disseminated through journals and proceedings. Scientific research can also be disseminated via social media, specifically via the *altmetrics* approach. This method assesses the impact of scientific research on social media, such as sharing, tweets, posts, mentions, and others, in order for scientific research to be disseminated and used by the community. Furthermore, using a *bibliometric, scientometric,* and altmetric approach, this study investigates the productivity of authors, institutions/organizations, and articles with a citing impact. The novelty of the research is to conduct research mapping in the Indonesian COVID-19 field on social media, besides that, the advantage of research is to use analysis with three approaches at once, namely bibliometric, scientometric, and altmetric so that it is more comprehensive.

B. LITERATURE REVIEW

Bibliometric

Bibliometrics is closely related to the productivity produced by institutions or organizations. Assume the relationship to university productivity is broadly measured. In that case, we have seen the evolution of language where the term "productivity" refers to the number of publications and citations of research produced by the university in bibliometrics "refers to those based on the number of publications. By contrast "Citation counts are used to calculate "impact." According to this statement, one of the *bibliometric* approach's measurements is productivity, and citation is used to assess the impact of research publications (Abramo & D'Angelo, 2014). A report reinforces this; citation analysis is probably the most traditional method applied in *bibliometrics* as an approximate measure of scientific quality, particularly in individual researchers' rankings and institutions (Waltman et al., 2012). In addition, this *bibliometric* is a methodology for evaluating the results of research or publications produced by a university. This follows the statement that *bibliometric* methods, or "analysis," are now firmly established as scientific specialties and integral to research evaluation methodology, especially within the scientific and applied fields (Ellegaard & Wallin, 2015). Previous bibliometrics research in this study includes "Bibliometric analysis of African Journal of Library, Archives, and Information Science from 2000-2012" (Tella & Olabooye, 2014) and "Climate Change Research in View of Bibliometrics" (Haunschild et al., 2016).

Altmetric

Apart from bibliometric approaches such as citation analysis, altmetrics can be used to measure the impact of research performance. Measuring the impact of research or publication can be done by calculating the magnitude of the publication's or research's impact on social media. University publications and research will be disseminated via social media platforms such as Mendeley, Twitter, Facebook, blogs, and so on. This is consistent with the assertion that Altmetrics is based on the idea that research is increasingly being disseminated through social network sites such as ResearchGate, Mendeley, Twitter, Facebook, Linked In, and Impact Story. (Onyancha, 2017). There are several points about *altmetrics* having a significant impact on measuring a research result; not only to present data from various sources, but also to evaluate the overall results of research; can assess the impact of research using the most recent data; altmetrics are more user-friendly and open to the public than citations (Bornmann, 2014).

Based on these four points, the *altmetric* approach can be used to assess the impact of a university's or institution's publications or research. This is due to the fact that *altmetrics* have several advantages, including easier distribution and more open access. After all, anyone can disseminate their research or research findings without regard for space or time constraints. When and where the research findings can be quickly disseminated after the study is completed.

Altmetrics, indices based on social media platforms and tools, have recently emerged as an alternative means of measuring scholarly impact (Haustein et al., 2013). Altmetrics has often been used as an approach to evaluate a scientific field, whether in the social, arts, technology, or health fields (Bornmann & Haunschild, 2016). The altmetric approach focuses on social media and tools as the basis for measuring the impact of research results. Web-based programs are commonly used to track research results distributed via social media. Several tools can be used to obtain *altmetric* data, including *Plos Altmetric, ImpacStory, Altmetric.com*, and *PlumX Analytic*. The four tools have several benefits and drawbacks, including the completeness of the social media data obtained, as well as open source and paid access to the four tools (Chamberlain, 2013). The previous research used as a reference for this study was “Do altmetrics correlate with citations? (Ouchi et al., 2019); “Correlating research impact of library and information science journals using citation counts and altmetrics attention” (Ezema & Ugwu, 2019); “Research evaluation of computer science

publications using altmetrics: a cohort study of Indian Central Universities" (Lamba et al., 2021).

Scientometrics

Scientometrics is an approach that uses quantitative computations across a variety of studies in a study with the aid of information technology (Uluyol et al., 2021). Both the bibliometric technique and the scientometric approach can be used to assess the outcomes of research. The earliest connections between research appraisal and citation analysis in policymaking also happened as scientometrics research projects got underway (Mingers & Leydesdorff, 2015). For instance, the OECD used the ISI data that was included in the Science Indicators Reports of the (US) National Science Board from 1972.

However, the scientometric approach is currently used to map out knowledge in the social and exact sciences, analyze citations, and determine the caliber of research in an agency or institution, with the hopes that the outcomes of this research will later be used as indicators in the development of early policies. The main themes of scientometrics include measuring research quality and impact, understanding citation processes, scientific mapping fields, and using indicators in research policy and management (Mingers & Leydesdorff, 2015). At present, along with the development of information technology, there are many software and tools that can be used to analyze mapping themes/fields of science, citation analysis, and affiliations of countries/organizations, including Cytospace; GeoVIZ; Gephi; Graphviz; Guess; Igraph; InFlow; NetDraw; NodeXL; Pajek; Prefuse; Tulip; UCINet; Visone; CiteSpace; CopalRed; InterDisciplinary Research (IDR); IN-SPIRE; HistCite; R Biblioshiny (Talmale & Singh, 2015). In addition to the software mentioned above, Nees Jan van Eck and Ludo Waltman created VOSViwer Software, which is simple to use for visualizing the mapping of themes and fields of science, citation analysis, analysis, and country/organization affiliation. "Scientometrics analysis of research activity and collaboration patterns in Chagas cardiomyopathy" is the previous study in this study (González-Alcaide et al., 2018).

C. RESEARCH METHODS

Research Data

The research data were obtained from the Scopus database, with a focus on COVID-19 research in Indonesia that was indexed in Scopus. This research data are scientific publications with the keyword "COVID-19" in the title, abstract, and keywords in the document with an Indonesian affair published until 2020. The total number of COVID-19 research publications obtained in Indonesia was 638, with a total of 1.830 citations. In addition to documents from the Scopus database, this study obtains social media data from the Altmetric.com database.

Research Flow/ Research Design

Data Processing

COVID-19 research data collected in Indonesia via the Scopus database is then processed using a variety of approaches, including bibliometric approaches, scientometrics, altmetrics, and linear regression tests, as described below: Bibliometrics was performed using Microsoft Excel; Scientometrics was performed using two-mode concept theory and then visualized using VOSViewer software; altmetrics was performed using a web-based program (altmetric.com) to obtain social media data; and the final Linear regression test was performed using SPSS.

Analysis of COVID-19 Research in Indonesia using Bibliometric Approaches, Scientometrics, Altmetrics, and Linear Regression Tests

a. Bibliometric

Bibliometric approaches are used to determine the productivity of authors on COVID-19 research in Indonesia, the most productive institutions in producing research related to COVID-19 in Indonesia, and the most productive articles that have the highest citation value or have an impact factor.

b. Altmetrics

The altmetrics approach is used to calculate the number of shares, mentions, tweets, posts, and social media posts about COVID-19 research in Indonesia. So that researchers are aware of COVID-19 research in Indonesia that is shared, mentioned, tweeted, or posted on any social media platform. Furthermore, researchers can learn which social media platforms are most commonly used to disseminate the findings of COVID-19 research, as well as which COVID-19 articles are most shared, mentioned, tweeted, and posted on social media.

c. Scientometrics

The scientometrics approach is used to disseminate the vision of COVID-19 research in Indonesia on social media platforms such as Twitter, Mendeley, Facebook, and others. In addition to using VOSviewer software, we used two-mode data concepts theory to create an algorithm to display the appropriate visualization. The article title data and total data for each social media from each article title data are used for visualization. The following is a social media data visualization that makes use of two data concept modes (Borgatti, 2012).

After being presented in two data concept modes, each article title and social media are coded to avoid confusion, as is the total number of shares, mentions, tweets, posts, and other social media activity. So that the VOSviewer software can run and produce the best visualization results when processing data. Thus, research can determine the distribution of COVID-19 scientific research on any social media platform.

d. Linear Regression Test

Regression analysis is a statistical technique used to investigate the relationship between one or more variables (independent variables) and other variables (dependent variables). A linear regression test, for example, is used to determine whether there is a relationship between the number of shares, mentions, tweets, social media posts, and citations in COVID-19 research articles published in Indonesia. This is done to determine whether or not the number of social media shares, mentions, tweets, and posts is high.

D. RESULTS AND DISCUSSION

Bibliometric Analysis

1. The most productive authors

Pranata, R was the most productive writer on COVID-19 research in Indonesia until 2020, with 31 articles, Lim, MA had 24 articles, and Hope, H had 22 articles. Huang, I comes in second with 18 articles, followed by Kurniawan, A and Purwanto with 10, Nainu, F with 9, Hariyanto, IT with 8, Mudatrsir, M with 8, and Aldila, D with 7. The ten data points above represent the top ten most productive articles in terms of research production in COVID-19 in Indonesia. Much of the research related to COVID-19 will provide an overview of the problems and solutions in Indonesia until 2020.

2. The most productive institutions

The University of Indonesia has proven to produce research in COVID-19 until 2020, particularly in Indonesia, with 85 publications. Padjadjaran University comes in second with 52 publications, and Airlangga University comes in third with 47. Pelita Harapan University is the second most productive institution, with 45 publications, and Gadjah Mada University is the fifth most productive, with 39 publications. As a result, the five most productive research institutions in COVID-19 in Indonesia are listed above. The goal of Indonesian institutions researching COVID-19 is to assist the Indonesian state in becoming free of economic, social, and, most importantly, health problems.

3. The most cited article

The most cited article in COVID-19 produced by Indonesians was "Clinical, laboratory, and imaging features of COVID-19: A systematic review and meta-analysis," which received 489 citations. “Coronavirus disease 2019 (COVID-19): A literature review” had 142 citation, followed “Diabetes mellitus is associated with increased mortality and severity of disease in COVID-19 pneumonia - A systematic review, meta-analysis, and meta-

regression: Diabetes and COVID-19" with 130 citation. "Correlation between weather and COVID-19 pandemic in Jakarta, Indonesia" had 124 citation, followed "Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2): An overview of viral structure and host response" with 111 citation, "Impact of cerebrovascular and cardiovascular diseases on mortality and severity of COVID-19 – a systematic review, meta-analysis, and meta-regression" 54 citation, "Interleukin-6 as a potential biomarker of COVID-19 progression" 51 citation, "Lymphopenia in severe coronavirus disease-2019 (COVID-19): Systematic review and meta-analysis" had 49 citation. The last cited article in Top 10 COVID-19 produced by Indonesians was "Hypertension is associated with increased mortality and severity of disease in COVID-19 pneumonia: A systematic review, meta-analysis and meta-regression" had 36 citation and "C-reactive protein, procalcitonin, D-dimer, and ferritin in severe coronavirus disease-2019: a meta-analysis" had 29 citation. A citation is one of the metrics that can be used to assess the impact of an article. This is consistent with Thomson Reuters's initiative, which began publishing Journal Citation Reports (JCR) in 1975 as part of the SCI and the Social Sciences Citation Index (SSCI), where the citation is the primary component (Allahbadia, 2014).

Altmetric Analysis

1. The most shared social media, mentions, tweets, posts

Measuring the impact of research other than through citation, the *altmetrics* approach can be used to measure the impact of a study. This is because most researchers and academics only use citations. The *altmetrics* approach allows researchers to determine the significance of the COVID-19 Indonesia research. Mendeley at 17.701 was the most widely used social media in the Indonesian context to disseminate research results, followed by Twitter 2.971 and News mentions 177. The wider community hopes that by disseminating COVID-19 research on social media, the research will be read and used.

2. The most shared articles, mentions, tweets, posts on social media

Even with the altmetric technique, researchers are able to identify which articles have received the most shares, mentions, tweets, and posts on social media, in addition to measuring the most influential or extensively utilized social media. The article with the most shares, mentions, tweets, and posts in this context is "Clinical, Laboratory and Imaging Features of COVID-19: A Systematic Review and Meta-analysis," which has received a total of 2.311 shares, mentions, tweets, and posts. The article "Clinical, laboratory, and imaging features of COVID-19: A systematic review and meta-analysis" is not only popular on social media, but it is also frequently cited as a reference source by researchers. This demonstrates that there is a correlation between the article's popularity on social media and the number of cite. This is in accordance with previous research conducted by Ibrahim (2019) "Pengaruh Media Sosial Terhadap Sitasi Publikasi Internasional Karya Ilmiah Indonesia Bidang Pertanian Dengan Pendekatan Altmetrics", articles that are popularly shared on social media are also widely cited by academics and academics. researchers to serve as a reference source in their research. This shows the importance of the popularity of a scientific paper written by a researcher to be disseminated to social media so that it can be enjoyed by a wide audience. So that it can not only be enjoyed by academics or researchers or popular among academics or researchers who are published in scientific journals (Ibrahim et al., 2019). This altmetric approach can be used as a decision-making process to disseminate research to the wider community and more focused on the community of farmers, fishermen, doctors, librarians and other professions on social media according to their respective fields of knowledge so that the benefits are felt. (Aljohani et al., 2020; Butler et al., 2017)

Scientometrics Analysis

This research also used Scientometrics to determine the visualization or description of the mapping spread of COVID-19 in Indonesia.

This scientometrics approach to understanding COVID-19 research in Indonesia, what research has the most impact, and what media is disseminated. Figure 2 depicts data input into the VOSviewer software for research titles in the Indonesian COVID-19 field. At the data processing stage, researchers applied the two-mode data concept theory to connect the citation data with the social media data owned by each article, resulting in the output depicted in figure 2. According to the data processing results in Figure 3, the most influential article is shown with the largest circle of articles, "Clinical, laboratory, and imaging features of COVID-19: A systematic review and meta-analysis," which is the most confiscated and disseminated on social media. Mendeley, shown with the largest circle in Figure 3, is the most commonly used social media to disseminate study results. As a result, it is concluded that if the researcher disseminates the results of his/ her research on social media, he/ she should use Mendeley and Twitter because the level of impact is tremendous, according to the findings of this study. Furthermore, the number of shares, mentions, tweets, and re-posts of such articles on social media is extremely high. The findings of this visualization are consistent with the findings of the research in tables 1 and 2. As a result, with this VOSviewer visualization, readers can more easily determine the distribution of research in the COVID-19 field in Indonesia.

Linear Regression Test Analysis

The linear regression test is used to determine the relationship between social media and citation data. According to linear regression tests, the social media platforms with a relationship to citation data are Blog mentions, Policy mentions, Twitter mentions, Facebook mentions, video mentions, and the number of Mendeley readers with Sig 0.05 or less. Whereas there is no relationship between the value of social media data and citations, there is a relationship between the social media platform News mentions, F1000 mentions, and Reddit mentions because a Sig value greater than 0.05 or > 0.05. Mendeley has the highest Rsquare value at 0.814, indicating that the platform has a high level of connectedness. The findings of this study are consistent with previous research conducted by researchers around the world and published in various journals indicating that the most influential social media is discovering Mendeley's social media (Cho, 2017; Ibrahim et al., 2019; Lamba et al., 2021; Shrivastava & Mahajan, 2016; Tang et al., 2020). Mendeley Social is a social media platform where researchers can use data to search for various research literatures. Mendeley can also be used as a digital personal library to store various search results literature. Mendeley's main function, which makes it popular among researchers and academics, is to help them create citations and references automatically and systematically. The Mendeley application is simple to use and works with a variety of operating systems, including Microsoft and Mac.

E. CONCLUSION

COVID-19 studies in Indonesia have been conducted by a number of researchers from various institutions. Pranata, R, with 31 articles, is the most productive researcher in producing COVID-19 research in Indonesia, according to Bibliometric, Altmetric, and Scientometric approaches to linear regression tests. "Clinical, laboratory, and imaging features of COVID-19: A systematic review and meta-analysis," according to the most cited Indonesian COVID-19 article. This article has also received the most attention on social media, including News mentions, Blog mentions, Policy mentions, Twitter, Facebook, Wikipedia, F1000 mentions, Reddit, Video mentions, and Mendeley. As a result, there is a correlation between the most frequently cited article titles and the most popular or widely disseminated articles on social media. Meanwhile, Mendeley is the most popular social media platform for disseminating research or research results. According to the results of this study's linear regression test, social media Mendeley has an influence or relationship between social media data shared, mentions, tweets, posts, and the number of citations, and the value of the relationship is

significant, namely 0.814 or 81.4%. Based on the above findings, bibliometric analysis can be used to measure the productivity of the most productive authors, institutions and citations. Meanwhile, altmetric and scintometric analysis can be used to analyze social media and their visualizations to make it easier to understand and comprehensive.

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FIGURE LIST

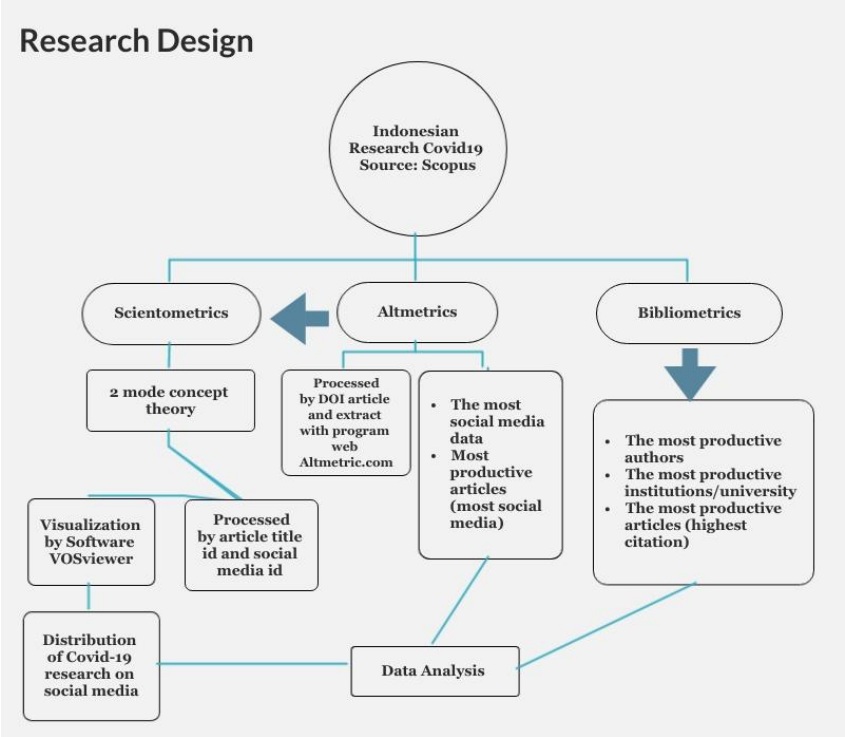

Figure 1 Research Flow
Source: Author

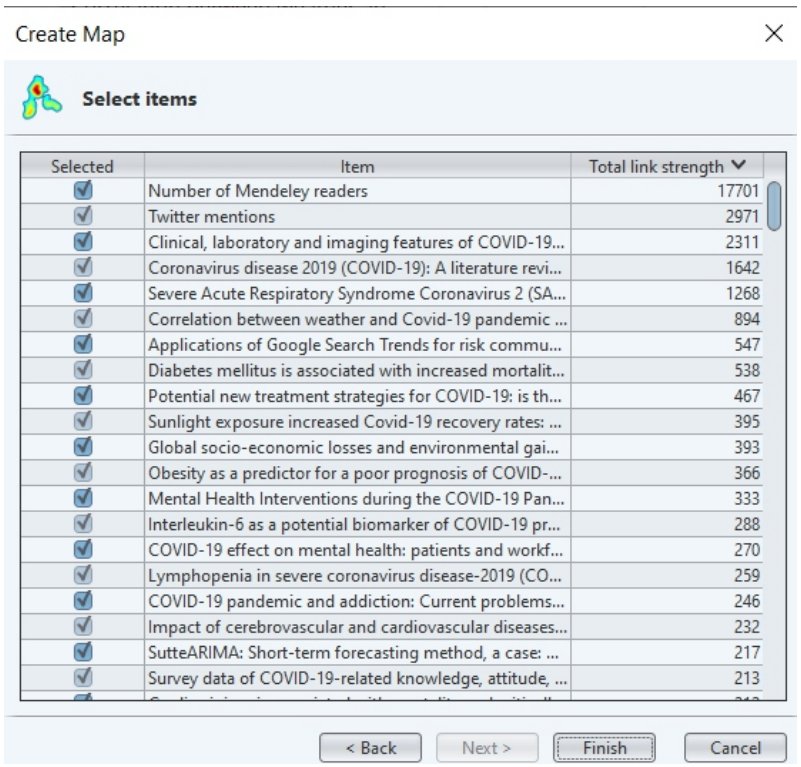

Figure 2. Title and social media data on VOSviewer
(Source: VOSviewer)

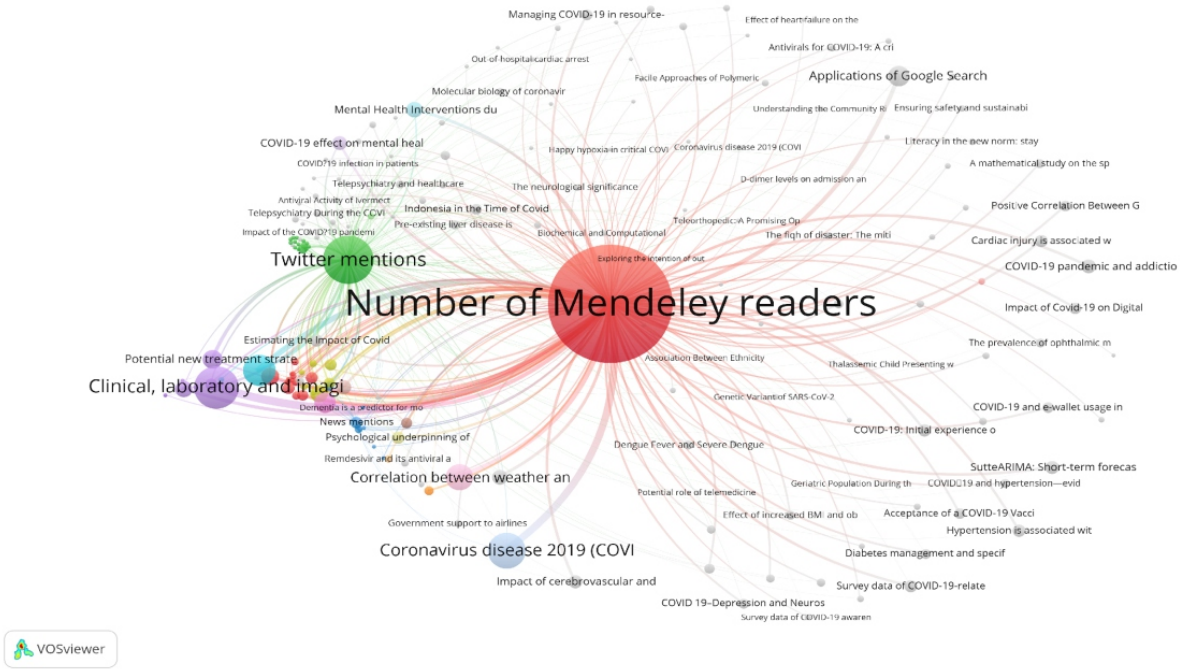

Figure 3. Distribution of COVID-19 Indonesia's research on social media
(Source: VOSviewer)

TABLE LIST

Table 1. The most shared social media, mentions, tweets, posts in Indonesia's COVID-19 research

No.	Social media	Total
1	Number of Mendeley readers	17.701
2	Twitter mentions	2.971
3	News mentions	177
4	Facebook mentions	32
5	Blog mentions	25
6	Reddit mentions	8
7	Policy mentions	6
8	Video mentions	5
9	Wikipedia mentions	3
10	F1000 mentions	2

(Source: The author's excel processed data, 2021)

Table 2. The most shared articles, mentions, tweets, posts on social media in the Indonesian COVID-19 research

Title	Total social media
Clinical, laboratory and imaging features of COVID -19: A systematic review and meta-analysis	2.311
Coronavirus disease 2019 (COVID-19): A literature review	1.642
Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2): An overview of viral structure and host response	1.268
Correlation between weather and COVID-19 pandemic in Jakarta, Indonesia	894
Applications of Google Search Trends for risk communication in infectious disease management: A case study of the COVID -19 outbreak in Taiwan	547
Diabetes mellitus is associated with increased mor tality and severity of disease in COVID-19 pneumonia - A systematic review, meta -analysis, and meta-regression	538
Potential new treatment strategies for COVID -19: is there a role for bromhexine as add-on therapy?	467
Sunlight exposure increased COVID -19 recovery rates: A study in the central pandemic area of Indonesia	395
Global socio -economic losses and environmental gains from the Coronavirus pandemic	393
Obesity as a predictor for a poor prognosis of COVID-19: A systematic revi ew	366

(Source: The author's excel processed data, 2021)

Table 3 Linear Regression Test for social media data with citations

Social media platforms	**Dependent Variable**	**Independent Variable**	**R Square**	**Beta**	**T**	**Sig**
News mentions	Citations	Social media	0.018	0.133	1,821	0.070
Blog mentions	Citations	Social media	0.166	0.408	6,045	0.000
Policy mentions	Citations	Social media	0.058	0.242	3,368	0.001
Twitter mentions	Citations	Social media	0.176	0.420	6,255	0.000
Facebook mentions	Citations	Social media	0.034	0.184	2,534	0.012
Wikipedia mentions	Citations	Social media	0.271	0.520	8,238	0.000
F1000 mentions	Citations	Social media	0.000	0.004	0.056	0.955
Reddit mentions	Citations	Social media	0.000	-0.015	-0.202	0840
Video mentions	Citations	Social media	0.220	0.469	7,191	0.000
Number of Mendeley readers	Citations	Social media	0814	0.902	28,335	0.000

(Source: The author's SPSS processed data, 2021)