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Bibliometric Mapping of Meteorological Conditions and Covid-19 Transmission Based On Vosviewer

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Abstract

The purpose of this study is that all research articles in journals discussing meteorology related to this research are to find out the form of mapping research subjects in journals discussing meteorology associated with COVID-19 transmission based on the database. Google Scholar and Scopus. The method used is descriptive research by doing research mapping. The research mapping in question is a literature study using bibliometrics. The bibliometric method aims to classify and interpret statistics related to scientific publications. Unit of analysis p with COVID-19 transmission based on database Google Scholar and Scopus since the COVID-19 pandemic until the end of 2021. The results of this study show an overview of the publication trend between meteorological conditions and confirmed cases of COVID-19 until the end of 2021, indicating that this variable is still rarely studied. This can be seen from the nets connecting the meteorological condition variables with the COVID-19 variable, which still looks far away. In addition, the diameter that describes the meteorological condition variable is still small, which means there is still a lot of room for researchers to conduct research related to the meteorological condition variable with the COVID-19 variable.

Keywords
COVID-19; SARS; Meteorology; VOSViewer; Publish or Perish

I. Introduction

Development is a change towards improvement (Shah et al, 2020). The banking industry *Severe Acute Respiratory Syndrome Coronavirus 2*(SARS-CoV-2) or better known as the Corona virus is a new type of*Coronavirus*that is transmitted to humans. The Corona Virus that emerged in 2019 (COVID-19) was recognized as a global pandemic by the World Health Organization (WHO) on March 11, 2020. This virus has become a serious threat to human health and caused widespread panic around the world. The first confirmed cases reported were in the Wuhan area at the end of December 2019, then COVID-19 spread to other provinces and eventually covered almost all of China. In Indonesia, according to Ministry of Health (2021), the first confirmed case of COVID-19 occurred on March 2, 2020.

Cumulative confirmed cases in Indonesia from the beginning of the emergence of cases in 2020 to the end of 2021 showed an increasing trend in certain months. The pattern of cases in each country may be different from other countries. From July to August 2021, the global pandemic is facing a third wave. The previous two waves occurred in January

and April 2021. When compared to the conditions of confirmed cases of COVID-19 in several countries with the trend of cases occurring in Indonesia, the pattern in the two regions in the first wave is parallel to other countries. However, when the global pandemic experienced a second wave in April 2021, conditions in Indonesia experienced a decline in cases.

The largest contributor to the number of confirmed cases of COVID-19 is the United States (US). The pattern of waves I and III in the US is similar to the global pattern. Meanwhile, when global cases surged in wave II, cases in the US decreased. Next are Malaysia and Japan. The two countries have a similar pattern to the global case pattern. In September 2021, cases in Japan began to decline while Malaysia was still at the peak of the third wave. While India is quite unique. India experienced its first spike in September 2020 when other countries had not yet reached the peak. While the world experienced its first wave in January 2021, India experienced a decline in cases. In the second wave of April 2021, India contributed the highest to global cases. However, the second wave in India declined and continued to show a flat curve for 2.5 consecutive months. Meanwhile, other countries around the world are experiencing an increase in cases. If you look at developments in Indonesia, the second peak will occur in July 2021. Meanwhile, other countries and the world will not experience the same thing. Meanwhile, when cases in Indonesia continue to decline in September 2021, world cases are still experiencing a third wave (Johns Hopkins University CSSE COVID-19 Data, 2022).

Previous researchers have argued that the spatial distribution of Corona virus infection cannot be explained through pandemic models, geographic distance, population distribution and age (Setti, et al., 2020; Becchetti, et al., 2020; Travaglio, et al., 2020). In addition to its unique model of virus transmission and the restrictive policies used by the government to limit the COVID-19 pandemic, meteorological conditions are considered as another important contributing factor that can influence transmission and infection by the virus (Bashir, et al., 2020; Fattorini & Regoli, 2020). Corona virus can spread through breathing as well as close contact with infected people (Wang, et al., 2020). So it is very interesting to study the form of research mapping that links meteorology and COVID-19 transmission.

Meteorological conditions including temperature, relative humidity, duration of sunshine and wind speed are also considered as important meteorological factors in predicting the transmission of COVID-19 (Faeni, et al., 2019; Irawan, et al., 2020; Auler, et al., 2020; Bashir, et al., 2020). Likewise, the opinion (Bi, et al., 2007; Casanova, et al., 2010; Chan, et al., 2011), that environmental temperature has an impact on the survival and transmission of Corona viruses such as MERS-CoV and SARS-CoV. Recent literature has reaffirmed the impact of temperature suppression on COVID-19 transmission based on samples from Brazil, China, and other countries (Prata, et al., 2020; Qi, et al., 2020; Wu, et al., 2020). However, other researchers have found conflicting results (Auler, et al., 2020; Jahangiri, et al., 2020; Xie & Zhu, 2020; Iqbal, et al., 2020). Then for humidity parameters according to Casanova, et al. (2010) is another important contributor to the transmission of Corona virus disease.

The emergence of COVID-19 cases in the world has sparked a wide debate about the risk of spreading the disease in relation to meteorological. Therefore, this study aims to determine the form of mapping research subjects in journals that discuss meteorology associated with COVID-19 transmission based on *the database Google Scholar* and *Scopus*. Research mapping using *Software Pubish or Perish* and *Vos Viewer*. *software* is used in conducting bibliometric analysis to see how developments are related to the topic or variable to be studied. Based on meta data from reputable international journals or have

been indexed in *the database*. The results of this study can be used as a reference for conducting research in the field of environmental epidemiology.

II. Review of Literature

The term bibliometrics (*bibliometrics*) according to The British Standard Institute is a study of the use of documents and publication patterns by applying mathematical and statistical methods. Bibliometrics comes from two words, namely, biblio and metrics. Biblio means paper or book, which comes from a city in Phenicia which is famous as a paper exporter. The term metrics denotes knowledge of meters and measurements. The word metrics itself comes from the Greek Latin word metricus or metrikos which means measure. It was further explained that mathematical and statistical methods can be applied in all forms of recorded communication media, both printed and electronic.

According to Von Ungern-Stenberg cited by Royani et al. (2013) bibliometrics is the study of the application of mathematical and statistical methods to measure quantitative changes in printed publications and other media. This means that by using quantitative analysis, the distribution of articles to several journals and the change and obsolescence of literature in various subject areas can be clearly measured. Based on this description, the researcher concludes that bibliometrics is a statistical or mathematical method used to study and measure patterns of change and literature obsolescence that is useful for knowing the development of specific literature.

Several previous studies have shown that countries with high latitudes are more vulnerable to COVID-19 pandemics than tropical countries (Araujo & Naimi, 2020; Sajadi, et al., 2020; Sun, et al., 2020; Chen, et al., 2020). Several research results by Chen, et al. (2020) and Sajadi, et al. (2020) showed ideal conditions for the corona virus to be at a temperature of around 8-10 °C with humidity between 60% to 90%. The results of the study between COVID-19 and meteorological conditions are strengthened by studies conducted previously on cases of SARS CoV (Chan, et al., 2011). The study on the SARS CoV case explained that hot and humid conditions in the air had a synergistic effect on the inactivation of the Corona virus.

Researchers have concluded that the combination of temperature, relative humidity and wind speed plays an important role in the spread of COVID-19. Low and dry temperatures are favorable environmental conditions for virus survival (Sun, et al., 2020). The study by Banister-Tyrrell, et al. (2020) obtained an inverse correlation between temperature (above 1 °C) and the number of possible COVID-19 per day. They show that COVID-19 is optimally transmitted at very low temperatures (1-9 °C), meaning that the higher the temperature, the lower the number of suspected COVID-19 per day. According to Kudo, et al. (2019), areas with warm climates, have a link between influenza virus outbreaks and reduced humidity. In addition, Wang, et al. (2020) also explained that like the influenza virus, this Corona virus tends to be more stable in meteorology cold and dryThis cold and dry air can also weaken the host's immunity, which can make a person more susceptible to the virus, according to a study by Wang, et al. (2020). Sun, et al. (2020) explained that low temperatures affect the human immune system.

III. Research Method

The type of research used in this research is descriptive research by doing research mapping. The research mapping in question is a literature study using bibliometrics. The bibliometric method aims to classify and interpret statistics related to scientific publications. Data collection was carried out using *Publish or Perish* (PoP) software. PoP is used to obtain accurate research development data. Data analysis was performed using *VOSViewer software*. The unit of analysis of this research is all research articles in journals that discuss meteorology associated with the transmission of COVID-19 based on *the database Google Scholar* and *Scopus* since the COVID-19 pandemic until the end of 2021. The steps taken for article mapping using the keyword method on *Google Scholar* and *Scopus* are as follows: 1) Tracking articles with COVID and *meteorological* database *Google Scholar* and *Scopus;* 2) Perform a search in *Publish or Perish* (POP) using search filters; 3) After the data *record* found in the number of 1,856 *links* , then the data is exported into the form of a RIS (*Research Information System*) file; 4) Analysis of research mapping data using Vosviewer to visualize articles based on predetermined keywords. Then the results of the mapping can be seen the relationship between articles.

IV. Results and Discussion

Search results based on *database Google Scholar* and *Scopus* with keywords COVID and *meteorological*, obtained as many as 1,856 articles. Articles are *exported* to RIS format, then *inputted* and analyzed the results of research mapping using *software* VOSViewer *network* of the research mappingThis visualization is done by creating a landscape map that can display research topics from the COVID-19 pandemic (Royani, et al., 2013). Network visualization serves to show the network between terms (terms) that are visualized, if the path or network in the bibliometric analysis is in bold, then it shows that there is a relationship between one term (term) and other terms (terms) which are quite numerous and strong, on the contrary if the relationship between terms (terms) with each other is thinly printed with small circles, then this indicates a weak relationship between the observed terms.

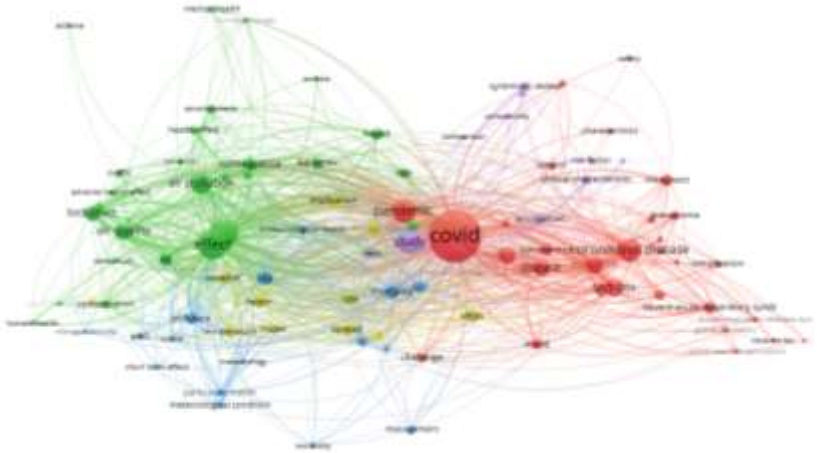


Figure 1. *Research Mapping Network Visualization*

In Figure 1 shows a *network* with keywords that describe the network or the relationship from *another* one term to *COVID* -19. From1856 based on *database Google Scholar* and *Scopus*, research maps related to COVID-19 can be grouped into 5 clusters, namely; Cluster 1 in red consists of 30 topics including *acute respiratory distress*

syndrome, characteristics of coronavirus disease, complications, cytokine storm, epidemiology, global pandemic, infection, novel coronavirus, outbreak pathogenesis, pneumonia, prevention, response, safety, SARS Cov, severe acute respiratory, stroke, treatment, World Health Organization; Green cluster 2 consists of 28 topics including *air quality, asthma, case study, climate change, concentration, environment, epidemic, exposure, health effect, human health, impact, isolation, lockdown, mental health, risk, social distancing.* Blue Cluster 3 consists of 17 topics including *city, death, information, management, meteorological condition, meteorology, morbidity, mortality, Nitrogen dioxide, Ozone, Particulate matter, pollutant, short term effect.* Cluster 4 in yellow color consists of 15 topics including *factor, characteristic, implication, model, potential effect, relationship, relative humidity, role, spread, temperature, transmission.* Cluster 5 in purple consists of 9 topics including *association, clinical characteristics, clinical features, comorbidity, comparison, meta analysis, risk factors, study, systematic review*.

Overlay serves to display historical traces of research. The darker the visualization of the bibliometric analysis, the longer the research that has been carried out, if the visualization shows a light color, the research will be conducted in the near future. As shown in Figure 2, it shows that the year 2021 displays the brightest nets.

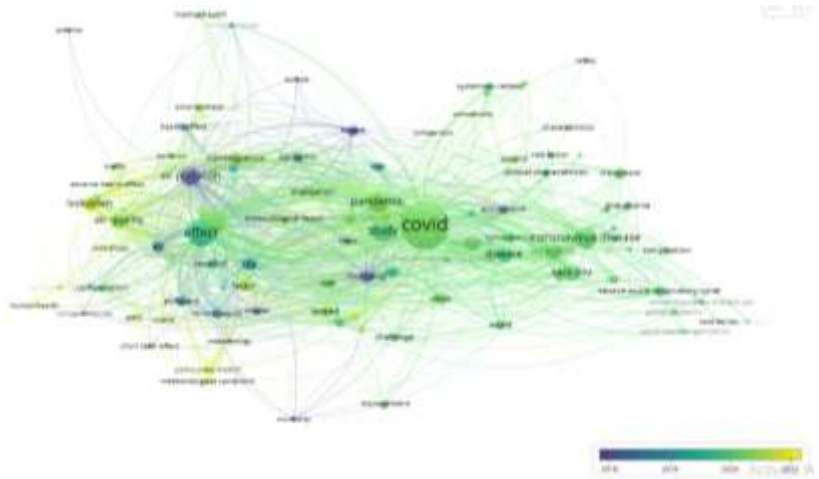


Figure 2. *Overlay Visualization of Research Mapping*

Information obtained from the Overlay Visualization in Figure 2. can be used as a reference to identify and detect state of the art research in the field of information architecture conducted in the period 2018-2021.

Visualization *Density* serves to display the density or emphasis on the research group. This visualization of bibliometric analysis can be used to determine areas of research that are still rarely done or that have been done a lot. For researchers, this is certainly very useful if they want to do research. This section is very useful for obtaining an overview of the general structure of the bibliometric map by paying attention to the items that are considered important to be analyzed. Through this worksheet, we can interpret the most used keywords in a publication. Visualization of the density of research maps related to COVID-19 can be seen in Figure 3. below.

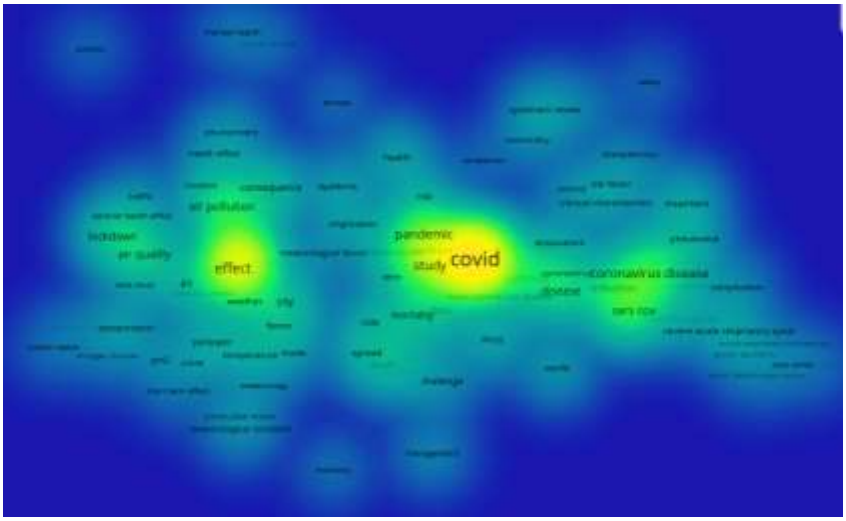
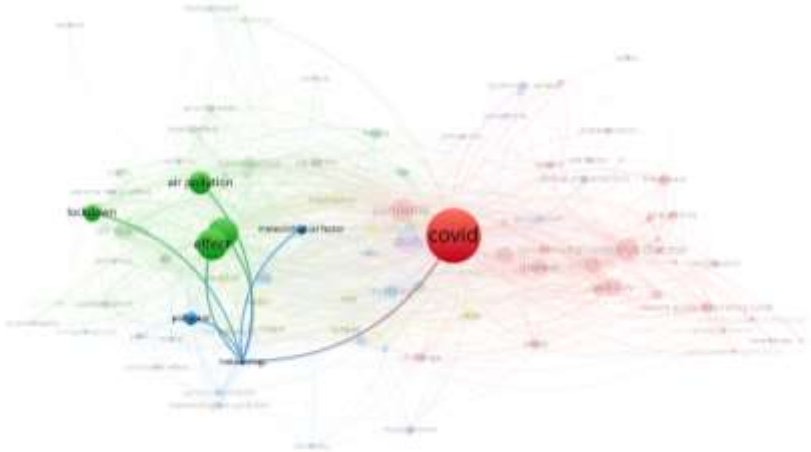


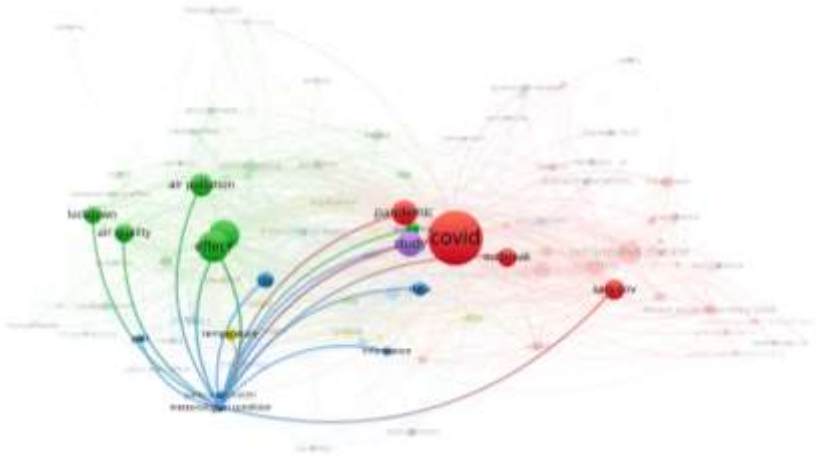
Figure 3. *Visualization of Research Mapping Density*

Figure 3 shows a density map which is the result of an analysis using all articles related to COVID-19, both related and unrelated. In this visualization, the color of the nodes represents keywords that indicate the year of publication. For example, the keyword "covid" has bright yellow nodes, which means articles containing those keywords will be published in 2020-2021. Another example, the term "asthma" has faint green nodes, which means articles containing these keywords are published on year 2018-2020.

The results of the visualization of research mapping can reveal the pattern of development from a scientific publication literature in relation to the variables associated with confirmed cases of COVID-19.visualization *VOSViewer* in Figure 4 show the relationship between articles of meteorological variables and other variables, such as; COVID-19, SARS-Cov, *pandemic*, *lockdown*, *air quality*, *effects* and others. Meteorological variables in this research mapping visualization use the keywords *meteorology* and *meteorological condition.*



(a)



(b)

Figure 4. *Visualization of Research Mapping Meteorological Variables with Keywords Meteorology (a) and Keywords Meteorology Condition (b)*

The results show that research using the keywords *meteorology* and *meteorology condition* when associated with the COVID-19 variable shows research that is still have the opportunity or space to conduct studies. This can be seen from the meteorological variable having a small circle diameter, obtained as many as 50 *links* from a total of 1856 linking variables to the incidence of COVID-19, meaning that research linking meteorological conditions and COVID-19 is still small when associated with the COVID-19 variable. 19. The nets on meteorological variables have a large distance from the COVID-19 variable, indicating that there is still little research on the meteorological variables associated with COVID-19.

V. Conclusion

The results of research mapping using the *VOSViewer* illustrate that the trend of publications between meteorological conditions and confirmed cases of COVID-19 until the end of 2021 shows that this variable is still rarely studied. This can be seen from the nets connecting the meteorological condition variables with the COVID-19 variable, which still looks far away. In addition, the diameter that describes the meteorological condition variable is still small, which means there is still a lot of room for researchers to conduct research related to the meteorological condition variable with the COVID-19 variable.

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