

# The Influences of Social Media and Scientific Citation in Hasanuddin University and Halu Oleo University: An Altmetric Approach

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## ABSTRACT

Altmetrics is a statistical measuring tool to measure interactions in scientific articles through data obtained from social media. This research examines the effect of social media data on citation data of scientific papers from Hasanuddin University and Halu Oleo University. This research uses quantitative descriptive with correlational analysis method. The stages of this research consist of problem identification, data collection, data pre-processing, analysis of the altmetrics approach, and discussion results. This research was conducted online by retrieving data in the form of citation data of scientific papers entering keywords with affiliates of Hasanuddin University and Halu Oleo University and the year was limited from 2019-2021, while social media data was obtained from Altmetrics.com by extracting DOIs from every scientific publication on Scopus. The results of this study indicate the correlation test results from Hasanuddin University 0.29 and Halu Oleo University 0.91. These results show a positive meaning that there is a substantial relationship between the alt value metrics with citation rate of the scientific papers of Hasanuddin University and Halu Oleo University, in addition to showing the scientific paper of Hasanuddin University and Halu Oleo University, besides being popular on academic platforms or international journals (Scopus), they are also popular on social media platforms Twitter, Facebook, Blog, and Mendeley.

**Keywords:** Bibliometric; social media; citation

## 1. INTRODUCTION

One of the indications, the success of a scientific work performed, can be used to assess the advancement of education in a country (Ekawati, 2021). One of the skills that researchers possess is scientific work, which is evidenced by the information and knowledge that come through their works and can be utilized as sources or references by other researchers. Scientific publications are one of the cornerstones for researchers in communicating their research findings or new scientific work. A peer-review publication process is used for scientific publications to ensure high objectivity (Haryani, 2019). By publishing scientific journals, the findings or ideas will be known by the public so that they can be immediately known widely and the most important thing at this time is to get recognition from the community and colleagues in the field (Lukman et al., 2019) and the existence of scientific journals as a form of

the presence of a research-based institution and as community service (Sulastri, 2007). Darmalaksana & Suryana (2018) said that research without publication is the same as not being meaningful.

Researchers or writers experience the greatest joy and pride when a scientific article they have written is published and has an impact on other researchers and the general public since the impact of publishing scientific articles serves as a barometer for the quality of scientific publications. However, comprehensive data and facts are needed to know the effect of the publication of these scientific journal articles. Several tools are used to determine the impact of the publication of scientific journal articles, for instances the Impact Factor, h-index, and citation analytics. These three tools cannot be separated from bibliometrics, which relies on citations as the object of study (Kurniawan, 2020).

The use of bibliometrics, or what is commonly called the citation analysis method, is traditionally done by counting how other journal articles cite many journal articles. However, it takes several years to obtain results from computing the number of citations for journal articles after the journal articles are published, however, is one of the problems with bibliometrics as a whole. Traditional or traditional citation analysis has frequently come under fire for taking a while to identify how scientific writings have affected scientists in particular fields of science (Seyyedhosseini et al., 2021). The publication of Indonesian scientific journal articles published by institutions in Indonesia, such as universities and other research institutions, has been widely spread on international journal platforms such as Scopus or Web of Science (Ibrahim et al., 2019). Scopus and Web of Science are the most prominent journal indexing database platforms in the international world, which has been widely used as reference material and references in research. There are universities in Indonesia that publish their scientific journal articles on the Scopus journal database, such as Hasanuddin University and Halu Oleo University. According to the circular letter of the Ministry of Education and Culture of the Directorate General of Higher Education number: 152/E/t/2012, scientific publications are a mandatory requirement for undergraduate students to graduate. Therefore, every university in Indonesia has a responsibility and is encouraged to improve the quality of management regarding the publication of scientific papers (Simaremare et al., 2017).

Journal index Scopus is not only for reference material but also as an indicator of the impact of the publication of a scientific journal article. The number of citations can only measure the impact of publications published on Scopus. However, there is one problem with citation indexes such as WoS and Scopus: Their primary coverage is focused on journals and less on the means of diffusion of scientific knowledge such as books, proceedings, and reports (Mongeon & Paul-hus, 2015). However, citation computations have not considered new forms of scientific communication such as online reader behavior, engaging networks with text (content), and social media due to the way One of the types of social media, according to Nasrullah in Setiadi (2014), is social media as a simple online journal (micro-blogging) which provides facilities for users to publish their activities or opinions. According to this statement, the study advantages of one type of social media, micro-blogging, by publishing scientific papers or writings on their social media accounts. The development of social media has provided a significant increase in the dissemination of scientific works published at various levels of society and readers (Seyyedhosseini et al., 2021). Cho (2017) also said that over time researchers used social media such as Blogs and Twitter not only to discuss and recommend research problems among researchers but also to explore ideas and collect research information.

The effect of publishing a scientific study can be measured with the current sophisticated technology. (Mathar et al., 2017). Through social media, the study wants to know the response from the general public through their comments, how many times the scientific work has been viewed, downloaded, or liked, and so on. The impact of posting scientific papers on social media may therefore be swiftly calculated statistically using the measured metricized technique to account for this. This measured approach is newly known as Altmetrics (Prasetyawan, 2018), a tool used to measure and see the extent to which the publication of scientific journal articles reacts to social media (Ibrahim et al., 2019). Altmetrics is a matrix and quantitative data that provides information about how often scientific journals and research results are discussed and used worldwide (Seyyedhosseini et al., 2021). Altmetrics measures the more expansive, more comprehensive, and broader impact of scientific articles based on mentions across social media platforms, such as Twitter, Facebook posts, comments on YouTube, Wikipedia, and so on (Yoshimura et al., 2021). Through Altmetrics.com one might calculate the impact of publishing scientific journal articles such as journals, articles, proceedings, and others on social media, the main base of which is social media (Ibrahim et al., 2019).

In an overview of new forms of impact measurements, the study identified four benefits that altmetrics has compared to traditional metrics: (1) Broadness: altmetrics measure impact beyond science. (2) Diversity: altmetrics can measure the impact of scholarly products other than papers. (3) Speed: altmetrics permit impact to be measured shortly after the publication of a paper (or the completion of other products). (4) Openness: as a rule, it is easy to download altmetric data (Bornmann, 2014). Altmetrics is now widely used from these advantages in calculating the impact of social media publications. This is evidenced by several previous studies discussing altmetrics, namely the review of Iranian Journal Articles Indexed in Web of Science-Based on Altmetric Indicators in Scientific Social Media (Shenavar, 2020), Do Altmetrics Point to The Broader Impact of Research? An Overview of Benefits and Disadvantages of Altmetrics (Bornmann, 2014), and Altmetric: Top 50 Dental Articles in 2014 (Kolahi & Khazaei, 2016).

Research conducted by Shenavar (2020) determines the impact of social media on Iranian articles published in Iranian English-language journals indexed in the Web of Science (WoS) citation database, while this study discusses the impact of a scientific publication on an agency. In this research focus Indonesian scientific paper especially scientific paper Halu Oleo university and Hasanuddin university indexed on Scopus. Previous research also conducted by Kolahi & Khazaei (2016) is a study that looked at the top 50 dental clinic articles based on altmetric scores on various social media. Meanwhile, this research looks at altmetric values, citation data, and only focuses on four social media, namely Twitter, Facebook, Blog, and Mendeley. Based on several previous studies, the author will conduct research by looking at the extent of the influence of social media data on the citation data for the publication of scientific papers at both universities.

## **2. METHODS**

The research data of scientific papers from Hasanuddin University and Halu Oleo University 2019-2021 are obtained from Scopus.com. Meanwhile, to obtain Altmetrics data, a DOI is required from each publication of scientific papers in Altmetrics.com service. Altmetrics automatically finds the DOI (digital objective identifier) or PMID (PubMed ID) on the article webpage and a report pops up in the right corner of the browser providing altmetrics that include a score indicating how much online attention the article has received (Kolahi & Khazaei, 2016). Apart from describing the citation data for scientific publications indexed by Scopus and social media data on Altmetrics.com, the study also looks for the relationship or influence

between citation data for scientific publications indexed by Scopus and social media data on Altmetrics.com. This study uses four stages: identifying problems, data collection, data pre-processing, correlation analysis of citation data published by Hasanuddin University and Halu Oleo University with Altmeterics data, then analyzing the results and discussion.

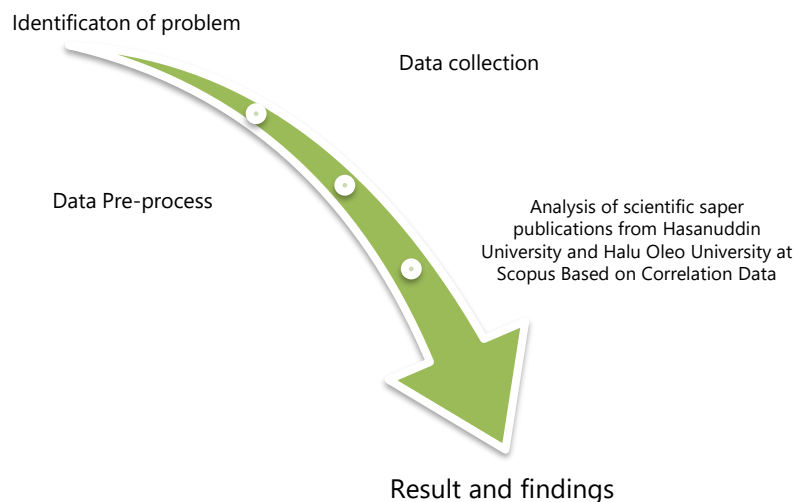


Figure 1. Research Stages

### *Identifying Problems*

This research begins by categorizing social media on Altmetrics.com, which will be used as a data source in this study. The five categories of social media categorized by Mayfield 2018 are social media that has participation (there is a collection of people), is open or easily accessible, there is communication in it, community, and is connected. Of the five categories, the social media that are the focus of this research are Twitter, Facebook, Blog, and Mendeley.

### *Data Collection*

The study also took citation data for the publication of scientific papers from both universities in 2019-2021 at Scopus.com, as seen from the tables below.

Table 1. Total publication of a scientific papers during 2019-2021

Years	Hasanuddin University	Halu Oleo University
2019	1334	144
2020	1640	174
2021	1373	256
<b>Total</b>	<b>4347</b>	<b>574</b>

Table 2. Total citations during 2019-2021

Years	Hasanuddin University	Halu Oleo University
2019	4320	511
2020	2646	558
2021	634	45
<b>Total</b>	<b>7600</b>	<b>1114</b>

### Pre-Processing Data

In the pre-processing data stage, the scientific works data from Hasanuddin University and Halu Oleo University was taken from Scopus.com and entered into Altmetrics.com for analysis. The stages in this research are:

1. Selecting and retrieving scientific work data that have DOIs on Scopus.com,
2. Enter the DOI of each scientific work on Altmetrics.com,
3. Selecting the list of social media needed to be used in this research,
4. The data is then extracted and stored in CSV format,
5. The data is sorted according to citation and social media categories.

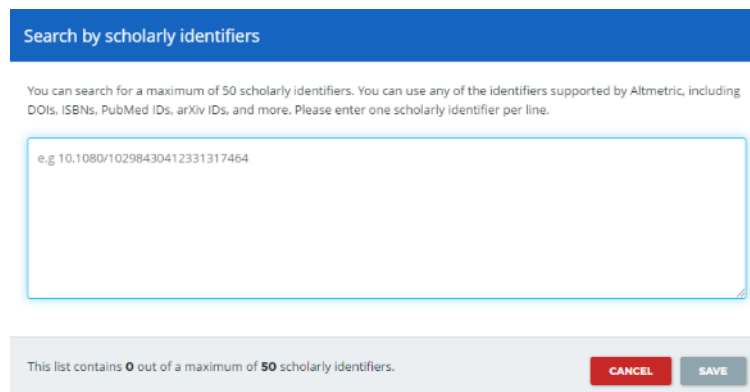


Figure 2. Step insert DOIs on Altmetric.com

### Analysis of scientific paper publications from two universities at Scopus based on correlation data

This study uses a correlation test. The correlation test used in this study is a single correlation test. To find out the relationship between altmetrics data and citation data for scientific publications from Hasanuddin University and Halu Oleo University, the researchers analyzed the correlation level of articles from 0.30 (considered weak), between 0.30 and 0.50 (strong enough), and greater than 0.50 (considered strong) and sequentially (Xia et al., 2016). The formula that can be used to calculate the correlation coefficient according to Sugiyono (2011) is as follows:

$$r_{xy} = \frac{\Sigma xy}{\sqrt{(\Sigma x^2 y^2)}} \quad (1)$$

Explanation:

X: Social media data for publication of scientific papers at Altmetrics.com

Y: Citation data for scientific work publication in Scopus.com

$r_{xy}$	: correlation coefficient between variables x and y
$x$	: $X - \bar{X}$
$Y$	: $Y - \bar{Y}$
$\bar{X}$	: average score of X
$\bar{Y}$	: mean score of Y

### 3. RESULTS AND FINDINGS ANALYSIS

For this study's initial steps, Scopus was used to collect citation information for scientific articles from Hasanuddin University and Halu Oleo University between 2019 and 2021. As previously seen in the table 2 that the number of citations of scientific publications obtained from Scopus for Hasanuddin University was 7600 citations, and Halu Oleo University as 1114 during the years. Furthermore, the highest number of citations at Hasanuddin University was of 4320 citations in 2019 while at Halu Oleo University was of 558 citations. As for the number of citations at least in the two agencies, there will be in 2021, namely at Hasanuddin University, totaling 634 citations, and Halu Oleo University totaling 45 citations.

This study was also able to determine the effect of the publication of scientific papers from two universities throughout 2019–2020 on social media after gathering data citations from Scopus. In this study, social media data from Altmetrics is divided into two groups: discussion (discussed), which includes Twitter, Facebook, and blogs, and view (viewed) and read (reader), which includes Mendeley.

Table 3. Total data altmetrics for Hasanuddin University during 2019-2021

Category	Social media	Total
Discussed	Twitter	4610
	Facebook	54
	Blog	82
View & reader	Mendeley	16.650

Table 4 Total data altmetrics Halu Oleo University during 2019-2021

Category	Sosial media	Total
Discussed	Twitter	1502
	Facebook	11
	Blog	50
View & reader	Mendeley	2717

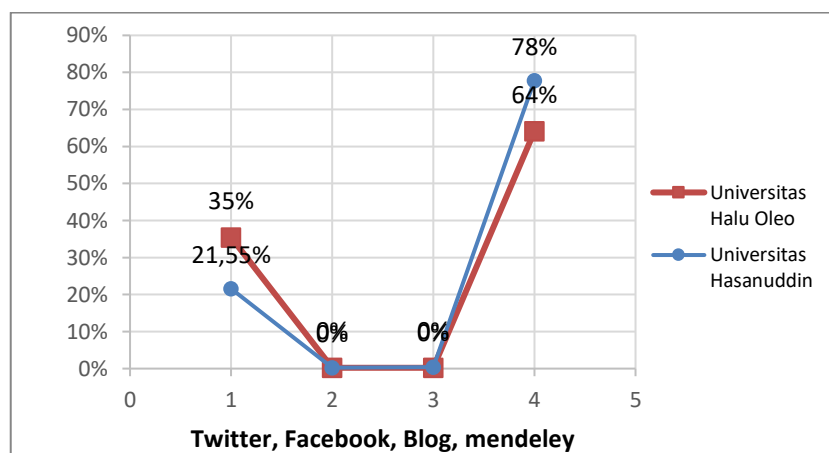


Figure 3. Percentage of data altmetrics on Hasanuddin University and Halu Oleo University

### Correlation Analysis of Citation Data for Publication of Scientific Papers from Hasanuddin University and Halu Oleo University with Altmetrics Data Data

The results of the correlation coefficient test of the two variables can be seen below.

Table 5. The correlation test of citation data and altmetrics during 2019-2021

Correlation Test Results	
Hasanuddin University	0.29
Halu Oleo University	0.91

The table clearly shows that the correlation test results between the two colleges were positive. The correlation test between altmetrics data and citation data for academic publications from Hasanuddin University in 2019–2021 produced positive results, namely (0.29), indicating that the influence of altmetrics data and citation data is still relatively small. As opposed to Hasanuddin University, which also received a positive result, Halu Oleo University results were 0.91, indicating that the two data have a significant impact on each other.

Furthermore, the results of the correlation test from citation data and altmetrics scientific work from Hasanuddin University and Halu Oleo University in 2019-2021 based on social media, which are Twitter, Facebook, Blog, and Mendeley, which can be seen in table 6.

Table 6. The correlation test based on social media

Social Media	Hasanuddin University	Halu Oleo University
Twitter	-0.94	0.43
Facebook	0.06	0.43
Blog	-0.48	0.53
Mendeley	0.67	0.92

Based on table 6, it is known that Mendeley's social media (correlation value: 0.67), Facebook (correlation value: 0.06), blogs (correlation value: -0.48), and Twitter (correlation value: 0.94) were found to have the highest correlation values in the scientific paper by Hasanuddin University based on the four social media. The Mendeley correlation test yielded positive findings, indicating a significant relationship or effect between the citation data and the altmetrics data (Mendeley). Facebook also has good results, but they are extremely modest, at the same time. Unlike Mendeley, social media blogs and twitter displayed negative correlation test findings, indicating that there was no connection between the altmetrics data from the three social media and the citation data. It is clear that Mendeley is far more widely used than Twitter, Facebook, and blogs for gathering information from the general public and academics.

According to the Halu Oleo University correlation test, Mendeley's has the greatest correlation score (0.92), followed by blogs (0.53), Facebook (0.43), and Twitter (0.42). (0.43). This demonstrates that the correlation tests of four media gained positive results, proving that citation data is influenced by altmetrics data.

The presence of social media makes communication easier without any distance or time limitations (Haryanto, 2016). It may make it easier for scientists to publish their research to the general public. Publication of scientific papers is an essential thing for researchers to do in disseminating their scientific work. One of several platforms that can be used to publish scientific papers is social media. According to Mayfield (2008), social media has a number of characteristics, including participation (there are a number of people using it), openness or accessibility, communication, community, and connectivity. Social media can be used to communicate scientific ideas. But beyond that, researchers must also consider the publication's impact because it will serve as a tool for evaluating and producing future research. One of the tools that can be used to measure the impact of scientific work on social media is Altmetric.com.

These positive results also show that scientific papers famous from Hasanuddin University and Halu Oleo University are not only popular on academic platforms or international journals (Scopus) but also on social media platforms such as Twitter, Facebook, Blog, and Mendeley. Several previous studies have also shown a correlation between altmetrics data and a high number of citations. One of these studies was conducted by Seyyedhosseini et al. (2021). His research also shows a correlation between the altmetrics index and the high number of citations in journals related to the field of nuclear medicine. This shows that the use of social media in publishing a scientific works is considered adequate because if a scientific article is only published on the platforms of national and international journals, only academics can access it, while there are millions of people in the world who need good references to support their research as well as be implemented in everyday life.

According to Chai and Kim (2012) in Zheng and Ling (2021), social networking services such as Facebook have become a popular way for people to build their image and network with others. Since its inception, social media has grown to be very popular in many countries because of its facilities such as convenience, enjoyment, and access to information. However, this study showed different results, popular social media based on altmetrics scores, namely Mendeley (table 3&4). In addition, based on the results of the correlation test between the number of altmetrics scores and the number of citations of scientific papers of Hasanuddin University and Halu Oleo University in 2019-2021 based on social media such as Twitter, Facebook, Blog, and Mendeley, it can be seen in table 6 where the results of the correlation test are primarily positive. Positive results indicate that the use of social media in publishing a scientific paper is very relevant because it enables the general public to very easily obtain the information they need. From four social media platforms, Twitter, Facebook, Blog, and Mendeley, which have the highest correlation test results, both Hasanuddin University scientific papers and Halu Oleo University scientific papers are located on Mendeley. This is similar to one of the results of previous research by Ibrahim (2019) entitled "The Effect of Social Media Data on Citation Data for Indonesian Scientific Work in Agriculture Using the Altmetrics Approach" in this study, social media was used to see the impact of publishing Indonesian scientific papers in agriculture. Namely News Outlet, Blog, Twitter, Facebook, Wikipedia, Goggle+, and Mendeley. The study stated that social media that has a stable value is the comparison between the number of mentions and the number of citations to Indonesian articles in agriculture, namely Mendeley's social media. In addition, he also said that there have been several previous studies that state that Mendeley is a compatible and consistent database application that is easy to use in managing references to scientific publications in the form of online and offline journal articles. In addition to the correlation test results. The highest Mendeley, Mendeley is also the social media with the most altmetrics data, the highest both at Hasanuddin University (78%) and Halu Oleo University (64%). In this case, it shows that



Mendeley's social media use in scientific publications is much more popular, as seen from the number of users who access information on Mendeley. Mendeley is an application that is very easily accessible to the general public, especially students, in obtaining relevant references for research needs and as a bibliography processor. This was also said by Kosasi (2019) states that Mendeley is a popular application that is easy to use. The synchronization process can be carried out at any time and quickly. It is easy to share articles with others, and it is easy to quote or cite articles to support research needs.

The response of social media users is very much needed for researchers to see the impact of the scientific work they publish on social media in terms of how many likes it has, how many times it is shared, and so on. This can let researchers know what kinds of research topics are needed or interesting for users so that it becomes an evaluation material for researchers exploring ideas for further research. This was also said by Seyyedhosseini et al. (2021) that social media has a positive effect on communication and collaboration between researchers and their users in obtaining information in certain fields of science and as material for evaluating the results of their research. The total percentage of altmetrics values of scientific publications from Hasanuddin University and Halu Oleo University (Figure 4) shows that there are still social media platforms that have low altmetrics presentation values. This study shows that academics from Hasanuddin University and Halu Oleo University have not realized the impact of using social media or using social media. How important it is to disseminate their scientific articles on social media.

Therefore, Hasanuddin University and Halu Oleo University can provide policies to academics, both lecturers and students, on utilizing social media as a scientific communication platform because social media makes it easy for lecturers and students to publish or share. Scientific work to the public on a global scale. Because of the development of science and technology, we are required to be faster in obtaining information because the information has become a necessity of life that must be fulfilled (Yani & Saputra, 2018). In addition, the Indonesian government, through the Ministry of Research, Technology and Higher Education (Kemristekdikti), encourages Indonesian academics to compete with academics from other countries, especially in the ASEAN region (Ahmar et al., 2018).

#### **4. CONCLUSION**

The social media used by Mendeley has the most influence, according to the study's findings. The amount of users who access information on Mendeley in this instance demonstrates how much more widely used Mendeley's social media is in scientific publications. Mendeley is a program that the general public, particularly students, may use extremely easily to process bibliographies and find pertinent references for research purposes. By including study subjects that are not restricted to scientific research from Hasanuddin University and Halu Oleo University and by adding research data periods, this research is anticipated to be further enhanced. Furthermore, it is advised that academics and researchers from Hasanuddin University and Halu Oleo University pay closer attention to social media activities in order to increase the global diffusion of scientific works and receive favorable evaluations.

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