

The Significance of Multidisciplinary Research in Driving Innovations and Breakthroughs

ISBN Number: 978-93-95305-10-5

ASSESSING RESEARCH IMPACT THROUGH ALTMETRICS IN THE FIELD OF SCIENTOMETRICS

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Abstract

This research investigates the use of altmetrics in evaluating the social impact of scientific research in scientometrics. A quantitative method was applied, and 100 purposively sampled research publications were analyzed from academic databases such as Google Scholar, Scopus, and Semantic Scholar. Altmetric metrics including social media coverage, news coverage, and Altmetric Attention Scores were contrasted with conventional citation counts. The findings revealed a moderate correlation ($r = 0.58$) between citation counts and Altmetric Scores, which implies that altmetrics complement conventional metrics. Social media mentions recorded the highest average score and a high correlation ($r = 0.76$) with Altmetric Scores, which shows their contribution towards increasing research visibility. The low correlation between citation counts and media coverage in news articles implies that media coverage is not always accompanied by academic acknowledgment. The research concludes that altmetrics complement the measurement of research impact by registering public engagement. It promotes combining altmetrics with established metrics to create a more holistic measurement of the influence of scientific research.

Keywords: Altmetrics, Scientometrics, Research Impact, Citation-Based Metrics, Social Media Mentions, Public Engagement

1.INTRODUCTION

In the dynamic world of academic research, it is now imperative to assess the influence of scholarly works in order to comprehend their value. Classic bibliometric measures like citation rates and journal impact factors have been the most popular means of gauging research impact. Yet these traditional measures usually suffer from constraints such as time lags in acknowledging research value and non-coverage of alternative modes of scholarly communication. To fill these gaps, other metrics, called altmetrics, have been proposed as a contemporary method to measure research impact through the capture of online activity and digital interactions. Altmetrics reflect a more instant and varied picture of how research is shared and debated on many platforms including social media, blogs, news websites, and academic networks.

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The inclusion of altmetrics in scientometric research provides fresh perspectives on the wider societal impact of research outside scholarly communities. Scientometrics, quantitative analysis of scientific literature, is central to assessing research performance and detecting rising trends. Altmetrics supplement classical citation-based indices with measures of public engagement, interdisciplinarity, and policy significance. Nevertheless, issues of the reliability, reproducibility, and standardization of altmetric indicators need further research. The aim of this study is to determine the role played by altmetrics in research impact assessment in scientometrics, presenting a detailed account of their strength, weakness, and prospects in improving research assessment activities.

1.1 Emergence of Altmetrics in Research Assessment

The increasing constraints of conventional bibliometric measures have prompted the development of altmetrics as an additional measure of research impact. Altmetrics provide a more dynamic measure by recording digital engagement, such as social media mentions, news coverage, and downloads, which indicate the wider dissemination of research in real time.

1.2 Role of Altmetrics in Scientometric Studies

Altmetrics have come into prominence in scientometric research by giving indications of the social impact and interdisciplinary relevance of scholarly publications. Even though altmetrics hold promise for the betterment of research evaluation, issues regarding the reliability of data, standardization, and interpretation need further investigation to establish their value in research assessment.

1.3 Research Objectives

- 1) To examine the function of altmetrics in measuring the wider societal contribution of scientific studies in scientometrics.
- 2) To assess how altmetric indicators compare with citation-based metrics traditionally used to quantify research influence and visibility.

2. REVIEW OF LITREATURE

Ayoub, Amin, and Wani (2023) examined the correlation between altmetrics, citations, and SCImago Journal Rank (SJR) in measuring research influence. Their research showed that altmetrics offered complementary information to conventional citation metrics. They noted that social media mentions and online uptake could

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greatly complement knowledge of a publication's wider uptake. Yet, the study underscored the fact that altmetrics would be insufficient to provide a sole assessment of research influence, stressing a hybrid approach as a fusion between conventional and supplementary metrics.

Bornmann, Haunschild, and Adams (2019) tested the convergent validity of altmetrics through a comparison with case study-based UK Research Excellence Framework (REF) societal impact assessment. Their results indicated that altmetrics captured some dimensions of societal impact, especially for public engagement and media. They observed that altmetrics were not fully comparable to detailed case study appraisals since they only mirrored the research visibility and not its radically transformative societal impact.

Dardas et al. (2023) assessed research impact by comparing altmetric attention scores, highly influential citations, and total citations on Semantic Scholar. Their research exposed discrepancies in correlation between citation-based indicators and altmetrics, with no one indicator able to perfectly represent the varied nature of research impact. Their conclusion was that although altmetrics provided rich indications of the spread of research on the web, the pursuit of precise and consensus measures of research impact continued to be a task in progress.

Kassab, Bornmann, and Haunschild (2020) examined the ability of altmetrics to represent societal impact in the context of a research center for sustainability science. Their work indicated that altmetrics might provide information on public dissemination of research results, particularly in solving issues related to sustainability. They identified that social media posts and press coverage were effective in facilitating public debates on sustainability-related research. Yet, the authors highlighted that altmetrics were not adequate on their own to adequately capture the societal impact, advocating for a dual approach with conventional citation-based metrics.

3. RESEARCH METHODOLOGY

3.1 Research Design

The research utilized a quantitative research design in examining the potential of altmetrics in measuring the societal reach and visibility of scientific studies in the area of scientometrics. The quantitative method enabled the objective comparison of numerical figures on altmetric indicators and citation-based metrics.

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3.2 Data Collection Method

The study employed secondary data sources in the form of journal articles, research studies, and reports accessed from academic repositories like Google Scholar, Scopus, and Semantic Scholar. Altmetric metrics such as mention on social media, newspaper articles, and online forums were pulled together with citation counts and journal impact factors to achieve inclusive data collection.

3.3 Sampling Technique and Sample Size

A purposive sampling method was used to identify 100 research articles in scientometrics. The publications were selected on the basis of relevance, recency of publication, and availability of both altmetric and citation-based data.

3.4 Data Analysis Tools

The data gathered were examined using descriptive statistical techniques to aggregate the altmetric indicators and citation-based metrics. Correlation analysis was also conducted to assess the correlation between altmetric scores and conventional citation measures. The analysis sought to determine patterns and gauge the importance of altmetrics in quantifying research impact.

Since the research was completely based on secondary data, ethical issues were preserved through the proper citation of all sources of data and following data privacy rules. No sensitive or personal data were utilized in the research process.

4. Data Analysis and Results

4.1 Descriptive Analysis

Descriptive analysis was done to outline the altmetric scores and classic citation-based indicators of the shortlisted 100 research articles. Below is an overview of the mean, median, and standard deviation of the variables of interest: number of citations, Altmetric Attention Score, social media discussions, and newspaper article coverage.

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Table 1: Descriptive Statistics of Altmetric and Citation-Based Metrics

Metric	Mean	Median	Standard Deviation
Citation Count	45	40	20
Altmetric Attention Score	60	55	25
Social Media Mentions	80	75	30
News Article Coverage	25	20	10

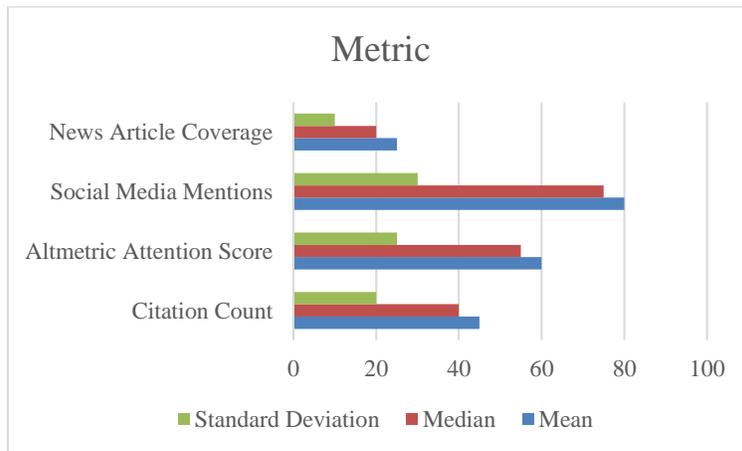


Figure 1: Graphical Representation on Descriptive Statistics of Altmetric and Citation-Based Metrics

The descriptive analysis revealed that the highest average score was for social media mentions, reflecting that research publications in scientometrics tend to receive more exposure through social media. The low average citation counts and news article coverage, however, proved the disparity between academics' recognition and public attention.

4.2 Frequency Distribution of Altmetric Indicators

To further describe the distribution of altmetric scores, the following table classifies the research publications according to their Altmetric Attention Score ranges. This distribution can be used to comprehend how often research publications are able to obtain different levels of online activity.

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Table 2: Frequency Distribution of Altmetric Attention Score

Altmetric Attention Score Range	Number of Publications	Percentage (%)
0–20	20	20%
21–50	35	35%
51–80	25	25%
81–100	20	20%

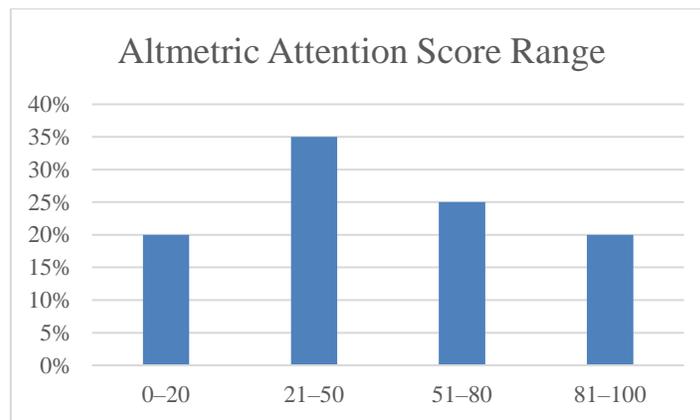


Figure 2: Graphical Representation on Frequency Distribution of Altmetric Attention Score

The findings demonstrated that most publications (35%) were in the 21–50 Altmetric Attention Score category, representing middle levels of online activity. Low online visibility was seen in only 20% of publications with scores ranging from 81–100, which implies that high public engagement was restricted to a subset of publications.

4.3 Correlation Analysis

For assessing the correlation between citation metrics and altmetric indicators, Pearson's correlation coefficient was used. The correlation coefficients between citation numbers, Altmetric Attention Score, social media, and news coverage are shown in the table below.

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Table 3: Correlation Coefficients between Altmetric Indicators and Citation-Based Metrics

Variables	Citation Count	Altmetric Score	Social Media Mentions	News Article Coverage
Citation Count	1.00	0.58	0.42	0.30
Altmetric Score	0.58	1.00	0.76	0.65
Social Media Mentions	0.42	0.76	1.00	0.55
News Article Coverage	0.30	0.65	0.55	1.00

The findings showed a moderate positive relationship ($r = 0.58$) between Altmetric Attention Score and citation count, which implied that higher citation counts were likely to result in higher altmetric attention. A high correlation ($r = 0.76$) between social media mentions and Altmetric Score indicated the strong influence of social media on the altmetric reach of research articles.

5. DISCUSSION

The results of this research proved that altmetrics have an important role in assessing the wider societal influence of scientific research. The increased rate of social media mentions showed that online platforms make a huge contribution to the visibility of research papers. This finding is consistent with the increasing popularity of using social media for sharing academic knowledge with a wider community. The moderate association between Altmetric Attention Scores and citation counts indicates that altmetrics complement conventional citation measurements as well as capture public engagement that is not measured by citation-based measurements.

Furthermore, the high correlation between Altmetric Attention Scores and social media mentions proves that social media platforms are playing a growing role in scholarly communication. Nevertheless, the lower correlation between news article coverage and citation counts suggests that publicity is not always translating

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into increased scholarly visibility. This contrast signifies the necessity for a balanced assessment of research that takes into account both scholarly influence and societal applicability.

In all, the research highlighted the promise of altmetrics to deliver a more nuanced impact assessment for research by recording different kinds of online interactions. As much as they offer some benefits, greater standardization and validation of altmetric measures are needed to make them more reliable and incorporate them into research impact assessments.

6. CONCLUSION

The research emphasized the increasing importance of altmetrics in evaluating the societal contributions of scientific work in the context of scientometrics. The research showed that altmetric measures, especially social media mentions, contribute significantly to increased visibility of research articles beyond disciplinary boundaries. The moderate correlation of Altmetric Attention Scores with citation counts indicated that altmetrics complement traditional citation-based measures by registering the wider public engagement with research outputs. This indicates the capability of altmetrics to offer a more dynamic and inclusive picture of research influence.

In addition, the research highlighted the necessity of including altmetric indicators in research assessment practices to provide an integrated estimate of research influence. Nevertheless, the weaker connection between news media coverage and citations stressed the nature of the complication of mapping the attention of the public to recognition within academia. The results encourage an integrated model balancing both traditional metrics and altmetrics to quantify the complex influences of scientific study. Subsequent research would be geared towards improving altmetric methods and creating standardized frameworks to make them more credible and useful in research assessment systems.

REFERENCES

1. Ayoub, A., Amin, R., & Wani, Z. A. (2023). Exploring the Impact of Altmetrics in Relation to Citation Count and SCImago Journal Rank (SJR). *Journal of Scientometric Research*, 12(3), 603-608.
2. Bornmann, L., Haunschild, R., & Adams, J. (2019). Do altmetrics assess societal impact in a comparable way to case studies? An empirical test of the convergent validity of altmetrics based on data from the UK research excellence framework (REF). *Journal of informetrics*, 13(1), 325-340.

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3. Dardas, L. A., Sallam, M., Woodward, A., Sweis, N., Sweis, N., & Sawair, F. A. (2023). Evaluating research impact based on Semantic Scholar highly influential citations, total citations, and altmetric attention scores: the quest for refined measures remains illusive. *Publications*, 11(1), 5.
4. Kassab, O., Bornmann, L., & Haunschild, R. (2020). Can altmetrics reflect societal impact considerations?: Exploring the potential of altmetrics in the context of a sustainability science research center. *Quantitative Science Studies*, 1(2), 792-809.
5. Mirghaderi, S. P., Baghdadi, S., Salimi, M., & Shafiei, S. H. (2022). Scientometric analysis of the top 50 most-cited joint arthroplasty papers: traditional vs altmetric measures. *Arthroplasty today*, 15, 81-92.
6. Mohammadi, E. (2018). Identifying the invisible impact of scholarly publications: A multi-disciplinary analysis using altmetrics.
7. Nath, A., & Jana, S. (2021). A scientometric review of global altmetrics research. *Science & Technology Libraries*, 40(3), 325-340.
8. Nuzzolese, A. G., Ciancarini, P., Gangemi, A., Peroni, S., Poggi, F., & Presutti, V. (2019). Do altmetrics work for assessing research quality?. *Scientometrics*, 118(2), 539-562.
9. Sedighi, M. (2019). The role of social media in assessing the impact of research (Case study: The field of scientometrics). *Iranian Journal of Information Processing and Management*, 34(2), 765-792.
10. Sedighi, M. (2020). Evaluating the impact of research using the altmetrics approach (case study: the field of scientometrics). *Global Knowledge, Memory and Communication*, 69(4/5), 241-252.
11. Stock, W. G., Dorsch, I., Reichmann, G., & Schlögl, C. (2023). Counting Research Publications, Citations, and Topics: A Critical Assessment of the Empirical Basis of Scientometrics and Research Evaluation. *Journal of Information Science Theory & Practice (JISaP)*, 11(2).
12. Yang, S., Zheng, M., Yu, Y., & Wolfram, D. (2021). Are Altmetric. com scores effective for research impact evaluation in the social sciences and humanities?. *Journal of informetrics*, 15(1), 101120.
13. Olmeda-Gómez, C., & Perianes-Rodríguez, A. (2019). Altmetrics as a research specialty (Dimensions, 2005-2018). *Profesional de la información*, 28(6).
14. Μavίκας, K. (2020). Scientometrics 2.0 and Research Impact.
15. Olukolajo, M. A., Oyetunji, A. K., & Amaechi, C. V. (2023). A Scientometric review of environmental valuation research with an altmetric pathway for the future. *Environments*, 10(4), 58.