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Correlating altmetrics and h5-Index using Google Scholar metrics for journals in Library and Information Science

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Abstract

The purpose of this paper is to correlate altmetrics and h5-index using Google Scholar metrics for journals in Library and Information Science, in order to clarify the relative significance of altmetrics in evaluating research impact. This paper adopted the behavioural bibliometrics to analyse data that was collected from Google Scholar metrics for three systematically selected journals in LIS. We obtained altmetrics scores for selected articles from Altmetrics.com. This paper focuses on: (i) the extent in which altmetrics indicators correlate with the journal's h5-index; (ii) the disproportions amongst altmetrics indicators, and; (iii) the comparison of article altmetrics scores in journals with different h5-index. The results of this paper reveal noteworthy independence of altmetrics from h5-index. Therefore, the journal's h5-index does not impact or reflect on its article altmetrics. Amongst other altmetrics indicators, Mendeley dominates in all articles altmetrics. The results further confirmed the possibility of articles in journals with low h5-index to attained greater social media attention than articles in journals with high h5-index. This paper adds to the body of knowledge in LIS, informetrics in particular. It is hoped that the results of this study will help create better understanding of altmetrics and prevent its misuse.

Keywords: Altmetrics, H5-index, Google Scholar, Library and Information Science, Data Science

Introduction and background

Altmetrics are gaining growing attention in the domains of research evaluation. Bornmann (2014) acknowledges that altmetrics have been proposed as interesting way of assessing the societal impact of research. Alongside, its traditional counterparts, peer review and citation analysis are still relevant and widely used. Citations have been used in conjunction with peer review to evaluate individual academic or department (Sud and Thelwall, 2014; Waltman and Costas, 2014; Altmetrics.com, 2020). The use of various bibliometrics indicators for assessing research has been advocated by many authors (Costas and Bordons, 2007). After a range of critics embedded on Eugene Garfield's impact factor (IF), the h-index was suggested as a better alternative for measuring the journal's quality (Mingers et al., 2012; Mingers & Yang, 2017). On the other hand, the latest branch of informetrics, altmetrics, proves to be useful in measuring public engagement with research outputs. The point of intersection between the h-index and altmetrics has been observed, as Bornmann (2014) recognises that both 5-index and altmetrics are aimed at measuring the impact of research, "with the primary aim of creating productive interaction and successful communication between research and societal stakeholders". However, the correlation between altmetrics and h5-index is partially discussed in literature, and that justifies the significance of this paper.

Rationale of the current study

The figure 1 below illustrates major factors that affect the relationship between altmetrics and citation counts. This study sought to correlate altmetrics and h5-index in order to determine relative strengths of these factors.

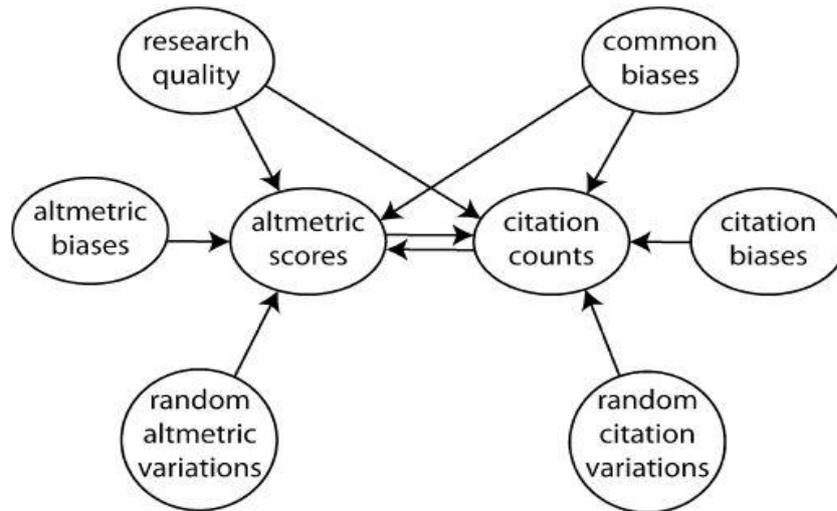


Figure 1: Major factors that affect the relationship between altmetrics and citation counts (Sud and Thelwall, 2014)

For many decades, the research evaluation has been grounded on citation analysis. Eugene Garfield's Science Citation Index (SCI) has been the most known citation indicator, initiated in 1955 (Mingers & Yang, 2017). However, there was a citation tracking indicator before Garfield's SCI. Mingers & Yang (2017) citing (Gross & Gross, 1927) reveal that the first analysis of papers citing a journal's publications started in 1927, and Shepard's Citations is a legal citing service started in 1873. There is a generally accepted assumption that articles with noteworthy contributions to a field of research are most likely to receive greater number of citations. On the other hand, altmetrics have been closely associated with the h-index (Bornmann, 2014). The research quality, biases and random variations have been noted in Sud and Thelwall, (2014) as major factors that affect relationship between altmetrics and citation counts.

The h-index

A scientist has index h if h of his or her N papers have at least h citations each and the other $(N - h)$ papers have $\leq h$ citations each (Mingers & Yang, 2017). Also referred to as Hirsch Index, the h-index is a measure of the quantity and impact of the journals, individual researchers, researchers or department. The h-index was introduced in 2005 (Costas and Bordons,

2007). The h-index has been marked as the preferable measure of journal’s quality (Mingers, Macri, & Petrovici, 2012). The h5-index is the h-index for articles published in the last 5 complete years (Google Scholar, 2019). It combines a measure of quantity and quality (Mingers & Yang, 2017). The current paper adopted journal h5-index provided by Google Scholar Metrics.

Altmetrics

Altmetrics, also known as alternative metrics, is a term to describe web-based metrics to evaluate research impact, with an emphasis on social media platforms as data sources (Bornmann, Haundschild and adams, 2019). The creation and study of new metrics based on the social web for analysing and informing scholarship (Zoller *et al.*, 2016). This latest branch of informetrics, proves to be useful in measuring public engagement with research outputs. However, the usage of altmetrics in similar way as citations has raised controversies, owing the attention of this paper.

Altmetrics indicators

The altmetrics indicators are based on at least four categories: attention score, mentions, citations, and readers.

Altmetrics	
Attention Score	
Mentioned	Tweeters
	Google+
	Policy Sources
	Facebook
	Blog
Citations	Dimensions
Readers	Mendeley
	CiteULike

Table 1: Altmetrics indicators

Problem statement

While altmetrics have served a notable purpose in research evaluation, it remains unclear whether altmetrics have a same practical value as citations. The h5-index on the other hand, has been successfully correlated with other bibliometrics indicators (Costas and Bordons, 2007; Mingers & Yang, 2017), but the evidence of its correlation with altmetrics could not be found. The practice of judging the quality of a research paper by the quality of journal is increasingly customary (Mingers & Yang, 2017). This arises a question on whether all papers in top ranked journals receive greater altmetrics attention than papers in low ranked journals. It is important to identify bibliometrics indicators that complement each other. It is hoped that the current paper will help avoid misuse of altmetrics by clarifying the position and qualities of altmetrics in the domains of research evaluation.

Aim and research questions

The paper sought to correlate altmetrics and h5-index using the Google Scholar metrics for journals in Library and Information Science

This paper seeks to respond to the following questions:

- To what extent does the journal's h5-index correlate with its article altmetrics?
- Which altmetrics indicators are dominant in LIS research?
- Can articles in low ranked journals attain greater altmetrics score than articles in highly ranked journals?

Methodology

This desk research study stemmed on the positivist research paradigm. The quantitative research design was adopted along the deductive research approach. Informetrics methods we employed to analyse research articles

from three selected journals in the field of Library and Information Science. We systematically sampled three LIS journals from Google Scholar metrics based on the Top h5-index, average h5-index, and the lowest h5-index. Respectively, the three LIS journals that were picked were: (i) the journal of the Association for Information Science and Technology (JAIST); (ii) the College and Research Libraries (CRL), and; (iii) the journal of Librarianship and Information Science (JLIS). The correlation analysis at article level was based on three systematically selected articles from each journal: high attention score, average attention score and low attention score. The aim of this systematic selection was ensuring consistency in selecting articles to represent the journal in the analysis. The data was collected, organised and analysed using Microsoft Excel.

Special considerations

A set of considerations had to be taken into account throughout the correlation of altmetrics and h-index. These considerations would help ensure validity and reliability of the findings of this paper.

Firstly, Social web mentions are much faster to appear to academic citations (Sud and Thelwall, 2014). For this reason, we ensured that we select journals that were published in the same year and ranked in the same set of Google Scholar metrics, as shown below:

(i) Top h5-index = 60

Journal of the Association for Information Science and Technology
(JAIST)

Volume.69 Issue. 1

Date: Jan2018

Number of articles= 16

(ii) Average h5-Index= 28

College and Research Libraries (CRL)

Volume.79 Issue. 1

Date: Jan2018

Number of articles= 7

(iii) Low h5-Index= 20

Journal of Librarianship and Information Science (JLIS)

Volume.50 Issue. 1

Date: March 2018

Number of articles= 9

Secondly, the following three weaknesses of h-index addressed in Mingers & Yang (2017) were observed in this study:

a) The h-index cannot be used to compare across disciplines

In order to ensure that the results of this study were not influenced by disciplinary differences, all journals that were sampled were in the field of library and information Science (LIS). Subjects classifications are provided by Google Scholar.

b) The h5-index is strongly affected by the total number of papers

The increase in number of papers increases the chances of the journal attaining higher h-index. In order to avoid such imbalances in the correlation of altmetrics and h-index, the correlation that focuses on articles in one journal as carried out.

c) There are differences in typical values of the h5-index in different field

Since this paper focused on one discipline (Library and Information Science). Therefore, the weakness related to variation of h5-index from field to field was not expected to impact the findings of the current paper.

Results

1. To what extent does the journal's h5-index correlate with its article altmetrics?

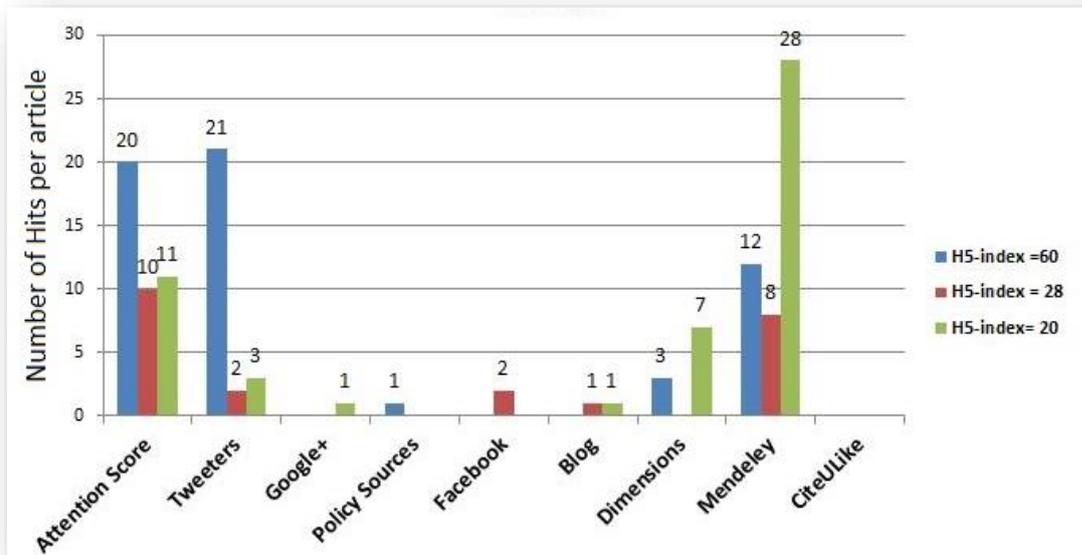


Figure 2: Altmetrics of articles with high attention score in journals with different h5-index

In figure 2 above, each journal is represented by one article (the article with highest attention score). The results show that lowest h5-index (20) has greater altmetrics scores than average h5-index (28) in most indicators. Again, the lowest h5-index (20) has greater Mendeley score than both average and highest h5-index (28 and 60).

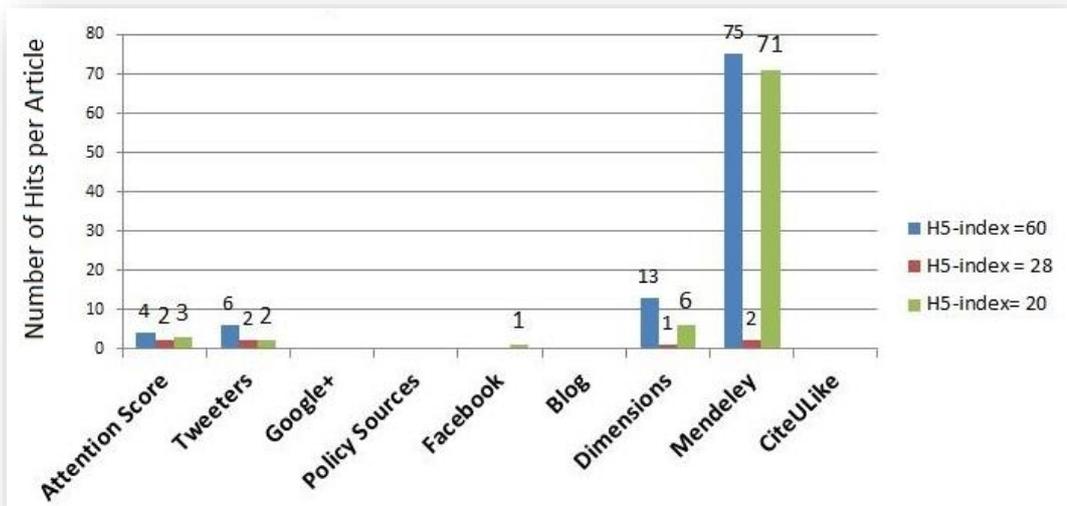


Figure 3: Altmetrics of articles with average attention score in journals with different h5-index

The highest h5-index (60) is at a peak in most indicators. However, lowest h5-index (20) supersedes others indicators on Facebook mentions. This reveals that the altmetrics indicators influences the overall attention score.

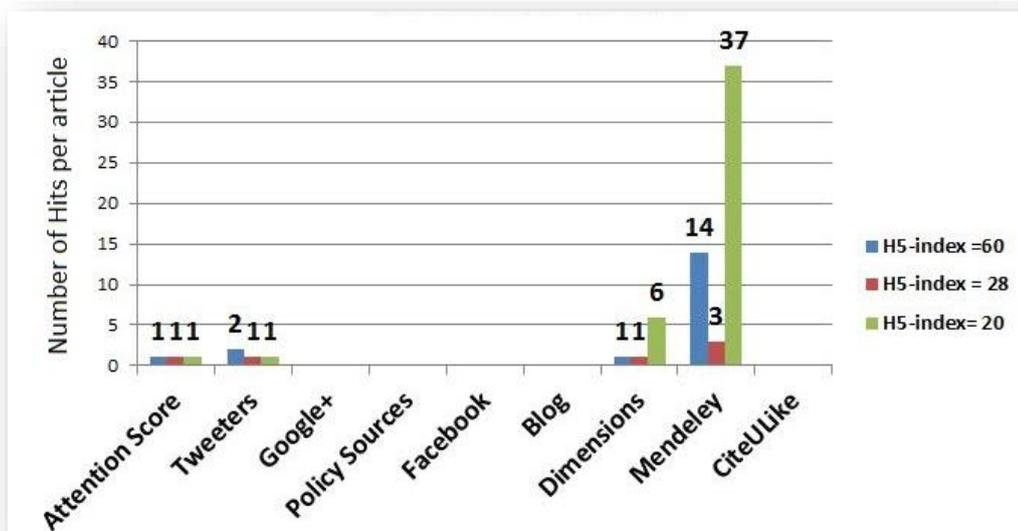


Figure 4: Altmetrics of articles with lowest attention score in journals with different h5-index

In figure 4 above, all three articles have the same attention score, but the lowest h5-index (20) attains greater altmetrics score than both average and higher h5-index in most indicators.

2. Which altmetrics indicators are dominant in LIS research?

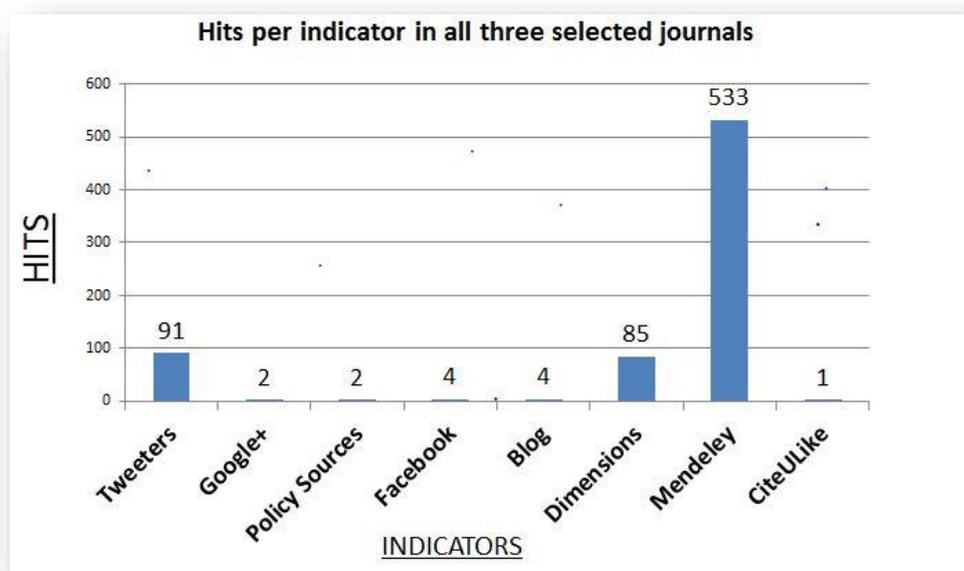


Figure 5: hits per indicator in all tree selected journals

Clearly, Mendeley take a lead in terms of social attention given to LIS research.

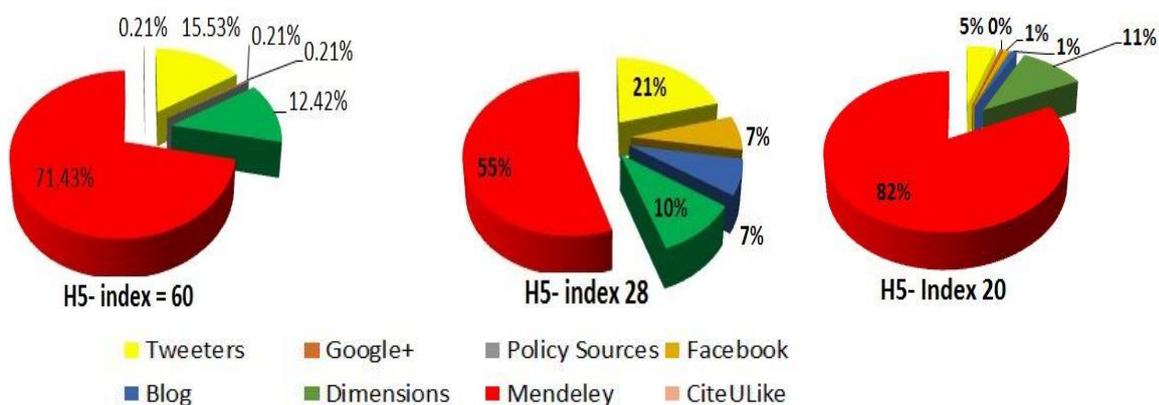


Figure 6: Analysis of altmetrics indicators by journal

The figure 6 shows that Mendeley takes a first place in all journals (h5-index60 = 71%, h5-index28 = 55% and h5-index20 = 82%). Dimensions take a second place (h5-index60 = 12%, h5-index28 = 7% and h5-index20 = 11%). Again, Tweepers take the third place (h5-index60 = 16%, h5-index28 = 21% and h5-index20 = 5%). Other altmetrics indicators follow.

3. Can articles in low ranked journals attain more social media attention than articles in highly ranked journals?

h5-Index 60 (N=16)		h5-Index20 (N=9)	
Number of articles	Altmetrics Attention Score	Number of articles	Altmetrics Attention Score
1	0	1	11
3	1	1	5
4	2	1	4
2	3	1	3
1	4	1	1
3	5	4	0
1	6		
1	20		

Table 2: Comparison of articles altmetrics score in journals with different h5-index

After comparing the article altmetrics attention scores from two journals (h5-index= 60 and h5-index= 20), one article in the low h5-index (20) has greater altmetrics attention score than 15 of 16 articles in high h5-index (60). This implies that articles in low ranked journals have a possibility of attaining altmetrics attention score that is greater than those in highly ranked journals.

Discussion and Conclusion

The arguments on whether altmetrics can be used to assess impact and quality of research have been common in the domains of research

evaluation. The assessment carried through this paper is important as it clarifies the position of altmetrics alongside other techniques (e.g. citation analysis and h-index) for research impact evaluation. Article altmetrics 'Attention Score' is not always proportional to the journal's h5-index. Top Medeley readers do not guarantee top h5-index. Most commonly, the social attention given to research contributions is through Mendeley. While we can conclude Mendeley readers is a leading altmetrics indicator, one may note that strengths amongst altmetrics indicators vary from article to article. Therefore, there is a higher possibility of biases (as shown in the rationale of this paper), when comparing altmetrics of articles using a single altmetrics indicator. Judging the quality of a research paper by social media attention it receives is inadequate, because papers in low ranked journals may attain more social media attention than papers in highly ranked journals, which are commonly considered as having papers of high quality. The factors that have been provided in the rationale of this paper, such as common biases around both citation analysis and altmetrics and research quality may contribute greatly to these differences. Since h5-index combines both quantity and impact of research, altmetrics may not be considered same as h5-index. Altmetrics can be useful in determining the extent in which the social world engages with the scientific community. Therefore, the quality of the journal may not be judged based on the social media attention it receives.

Recommendations

This paper warns of misuse of altmetrics, such as for assessing the research quality. When comparing altmetrics for articles, this paper condemns the use of a single altmetrics indicator to determine the entire social media attention received by compared articles. Since the mismatch between altmetrics and citation counts has been confirmed, altmetrics may not be used to judge the quality of both the journals and articles. The use of social

media for scholarly communication is encouraged, in order to promote the relevance of altmetrics in linking science with the general society.

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