J Data Sci. Info. Citation Studies., 2024; 3(1):35-41.
https://www.jcitation.org

Research Article

Assessing the Presence of Library and Information Science Outputs on Social Media Platforms Using Altmetrics

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ABSTRACT

The present study is carried out to measure the altmetric presence of Library and Information Science outputs on various social media platforms. Furthermore, the study aimed to determine the correlation between citations and altmetric attention scores. Data for the study were extracted from the Altmetric Explorer. The study findings reported that a total of 31867 LIS outputs were indexed and tracked by Explorer and a total of 24869 (78.03%) outputs were mentioned on various social media platforms. Moreover, LIS outputs were present on 17 major social media platforms with the highest mentions recorded from Mendeley, Twitter and blogs. The journal-wise distribution of attention revealed that outputs published in Scientometrics journal attracted more digital reach as compared to other LIS journals. The highest number of Twitter mentions for the outputs were from the United States with 24420 (15.81%) posts from 10143 (16.93%) profiles followed by the United Kingdom with 16131 (10.45%) posts from 6151 (10.27%) profiles. The study result showed a significant weak positive correlation between citations and altmetric score (rho=0.18, $p \leq 0.001$). This is the first of its kind study to explore the altmetrics of LIS in-depth especially with regards to the Dimensions.ai database and the findings of the study give insights to the LIS research community on using altmetrics at par with classic metrics for measuring the instantaneous impact of their research.

Keywords: Library and Information Science, Altmetrics, Social media, Social media metrics, Altmetric attention score.

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Received: 05-01-2024;
Revised: 26-01-2024;
Accepted: 20-02-2024.

INTRODUCTION

Research, primarily scientific, is an activity in quest of truth and its results impact society in a great way (Pulido *et al.*, 2018). How the results of research activity help in the development of a community and nation is critically evaluated by various stakeholders for varied reasons (Caminiti *et al.*, 2015). Measuring 'scientific output' is the most sought-after aspect among the research community. They later gave birth to various thrust areas of science in general and Library and information science in particular, ranging from Ranganathan's 'librametrics' to Jason Priem's 'altmetrics' (Curty and Delbianco, 2020; Maltseva and Batagelj, 2020). The discernible categorisation of these metrics is 'classic or traditional citation metrics' and 'altmetrics or social media metrics' (Murray *et al.*, 2020). While the first measures the scientific impact, the latter sketches the social or societal impact.

Altmetrics primarily tracks the buzz happening on the research output on the social web (Thelwall, 2020). The social web is not only limited to social networking sites but also extends to reference managers, the press, mainstream media and other non-traditional venues (Sutton *et al.*, 2018). Wilsdon *et al.*(2015) defined altmetrics as "alternative metrics' or 'article-level metrics', which encompass cyber metrics or webometrics, which measure the features and relationships of online items, such as websites and log files". Though altmetric studies have been carried out largely by the research community in different domains, there is a dearth of exploring the same in Library and Information Science (LIS), especially with a large dataset. Many previous altmetric studies carried out in the LIS domain justified that altmetric indicators can be supplemental to citation metrics in measuring the impact of the research (Ali and Richardson, 2017; Araujo *et al.*, 2015; Wang *et al.*, 2020). Even though the available previous studies were conducted with a smaller dataset, and thus cannot conclude whether altmetrics can complement to classic metrics in measuring the impact. Adding to this, no studies hitherto tried to validate whether the altmetrics can predict citations for LIS outputs, which would be beneficial for the entire LIS research community to know the scientific impact of their research in advance since citation takes time to accrue (Akella *et al.*, 2021). Thus, the present study has been undertaken to bridge these gaps.

DOI: 10.5530/jcitation.3.1.5

Publishing Partner : EManuscript Tech. [www.emanuscript.in]

Objectives of the study

- To measure the source-wise distribution of altmetric attention to LIS outputs.
- To know the journal-wise distribution of altmetric attention to LIS research outputs.
- To map the geographical-wise tweet mentions for the LIS research outputs.
- To measure the correlation between Dimensions citations with altmetric attention scores.
- To assess whether the altmetric score can predict later citations for the LIS outputs.

Past studies

The altmetrics of LIS journals have been explored by Erfanmanesh (2017) to determine to what extent the Scopus-indexed LIS articles are mentioned on social platforms. The sample consisted of 193 journals indexed in Scopus in 2015. The result reported that 28.8 per cent of the total publications indexed in Scopus mentioned at least once in social media tools with the highest mention on Twitter (33.1%), Mendeley (30.4%) and Facebook (5.9%). Similar to this study, Htoo and Na (2017) measured the disciplinary differences in altmetrics for research output in nine social science sub-disciplines, including library and information science. The sample consisted of 19580 SSCI-indexed LIS articles published from 2008 to 2013. The findings outlined that 4122 (21%) articles got at least one mention. As per the highest altmetric coverage, Mendeley holds the first position with 94% coverage, followed by Twitter with 88% mentions. The Pearson correlation result showed that altmetric scores were positively correlated (r=0.49) with the Journal Impact Factor.

Verma and Madhusudhan (2019) compared Indian and China articles based on altmetric attention to 'digital library' articles published in each county from 1989 to 2017. Articles with high citations were collected from the Web of Science and further searched on Altmetric.com to find how they were attracted to social platforms. A total of 10 articles from each country were analysed, and it was discovered that Indian publications received 70 citations and 146 for Chinese publications. Only two articles from each country attracted altmetric attention, with significant activities happening in Mendeley.

Saberi and Ekhtiyari (2019) measured how well highly cited classic LIS articles introduced by Google Scholar perform on social platforms by analyzing their usage, captures, mentions and social media metrics. After excluding articles with no citations, highly cited LIS articles (n=10) were extracted from Google Scholar and corresponding altmetrics indicators were taken from Plum Analytics. Further, the data sets were subjected to Spearman's non-parametric test and reported a negative correlation between usage metrics and Google Scholar citations (rho= 0.450, p-value=0.224).

Cho (2021) by analysing highly cited 1000 LIS papers indexed in WoS reported that 63% of the papers had a presence on Mendeley, 36% had views, 17% had tweeted, 3% had blogged and 4% had wiki references. The study flagged a significant association between Mendeley readers with citations (r=.29). The study reported a negative association between social media tweets with citations (r=-.04), and no association between blog mentions with citations (r=-.00). The sub-field analysis in LIS showed that articles related to "information technology" and "knowledge management" attracted more citations and readers. In contrast, "public libraries" and "websites" related articles marked high usage.

METHODOLOGY

To get the required data for the analysis, Altmetric Explorer was accessed. Altmeric Explorer is a service offered by Altmetric.com which can be used for conducting large-scale metric studies (Altmetric.com, 2021). An advanced search was performed during the first week of March 2022. The subject category "0807" for the Library and Information Studies was selected and later in the language refinement "English" was chosen. Finally, the search was executed and the results were produced. The results showed total mentions, output with attention, and total outcome tracked. A total of 31867 results were tracked and a total of 24869 (78.03%) were mentioned on various social media platforms for the query that we executed. The search results were further exported to Excel for the subsequent analysis. The data was subjected to descriptive statistics including Frequency and percentage. To measure the association between citations and altmetric attention score, the Spearman correlation was applied due to the non-normal distribution of data. Linear regression was applied to assess whether altmetric is a predictor of future citations for the LIS outputs.

Analysis and interpretation of data

Distribution of altmetric events as per the source of attention

Data in Table 1 exhibits the distribution of altmetric events according to the source of attention. LIS outputs were present on seventeen platforms. The topmost events were recorded for Mendeley with 1510620 for 29695 outputs with 50.87 mean events per article. The highest event was 6841. Twitter stood as the second source with the highest number of events with 154514 events and 8.12 mean events per article for a total of 19025 articles. The utmost event logged was 1199. A total of 3610 articles were mentioned on blogs and the total altmetric events accounted for 5503 with 1.52 mean events per article. The lowest mentions for LIS output were recorded from two sources, i.e. LinkedIn and Pinterest with an aggregate of 3 altmetric activities. The mean

event per article and the highest event recorded were 1 for both sources and ranked 16th respectively for both sources.

Top ten journals with the highest mentions

The top 10 journals with the highest number of mentions are portrayed in Table 2. The journal "Scientometrics" with 1504 mentioned output was the leading journal with a total mention of 18279. The topmost mentions to the journal were from Twitter with 16385 tweetations. The journal "Information, Communication and Society" held the second position with 16546 mentions for 1027 research outputs. These mentions comprised 15126 from Twitter, 629 from news, 218 from policy, 220 from blogs and 163 from Facebook. The journal "BMC Health Services Research" stood in the ninth position with 3690 mentions for its 486 output and the tenth position was held by Computers, Informatics and Nursing with 2139 mentions for its 540 outputs.

Top ten articles with the highest altmetric attention score

Data in Table 3 shows the top ten articles in the LIS domain per the highest social media attention received. Two articles viz. "Attention decay in science", authored by Pietro Della Briotta Parolo published in the Journal of Informetrics in 2015 and "Mapping the anti-vaccination movement on Facebook" by Naomi Smith, published in Information, Communication and Society in 2017 got the highest number of social media attention with a score of 707. With a 676 altmetric score, the article titled "Prevalence of Prejudice-Denoting Words in News Media Discourse: A Chronological Analysis", written by David Rozardo in 2021 in the Social Science Computer Review journal held the third position. The 10th position was held by the article titled "Social Media Use and Participation: A Meta-analysis of Current Research" with a 415 total attention score. It can be deduced from the Table that the highest socially mentioned articles are the not ones with the highest citations.

Country-wise distribution of Twitter mentions

Figure 1 and Appendix 1 depicts the top ten countries where the highest Twitter discussions were recorded for the LIS outputs. The highest numbers of Twitter mentions were from the United States with 24420 (15.81%) posts from 10143 (16.93%) profiles, followed by the United Kingdom with 16131 (10.45%) posts from 6151 (10.27%) profiles. Spain and Canada occupied the third and fourth positions with 8811 (5.71%) and 5869 (3.80%) posts, respectively. A total of 4999 (3.24%) mentions were recorded from Australia and 3248 (2.10%) from Germany. From 923 profiles, 2623 (1.70%) posts came from the Netherlands. According to the chief activities on Twitter, the tenth country was India with 1912 (1.23%) posts originating from 543 profiles.

Table 1: Distribution of altmetric events as per the source of attention.

Source of attention	Number of articles with attention	Total altmetric events	Mean event per article	Highest event	Event Rank
Number of Mendeley readers	29695	1510620	50.87	6841	1
Twitter	19025	154514	8.12	1199	2
Blogs	3610	5503	1.52	53	3
Wikipedia	2701	4093	1.51	16	4
Facebook	2844	3973	1.39	19	5
Policy	2600	3739	1.43	15	6
News	1037	3620	3.49	56	7
Patent	690	3170	4.59	361	8
G+	553	853	1.54	20	9
Peer review	136	348	2.55	18	10
Reddit	200	242	1.21	4	11
Video	77	91	1.18	5	12
QandA	37	39	1.05	2	13
F1000	15	15	1	1	14
Weibo	12	12	1	1	15
LinkedIn	3	3	1	1	16
Pinterest	3	3	1	1	16

Figure 1: Country-wise distribution of Twitter mentions.

Table 2: Top 10 journals with the highest mentions.

Journal title	N	News	Blog	Policy	Patent	Twitter	Peer review	Weibo	Facebook	Wikipedia	Google+	Reddit	F1000	QandA	Video	Total
Scientometrics.	1504	344	651	333	17	16385	8	0	225	211	77	4	1	10	12	18278
Information, Communication and Society.	1027	629	220	218	1	15126	0	2	163	120	25	28	0	0	14	16546
Journal of the Medical Library Association.	754	81	170	42	9	4636	5	0	175	99	12	1	1	6	3	5240
Journal of Academic Librarianship.	746	46	215	71	18	3276	1	0	99	54	15	10	0	0	4	3809
El Profesional de la Información.	659	54	46	12	1	6891	0	0	396	42	3	1	0	0	2	7448
College and Research Libraries.	613	27	256	100	5	4272	2	0	410	68	71	0	0	0	1	5212
First Monday.	604	183	108	75	6	3654	0	0	86	149	51	4	0	0	4	4320
Computers, informatics, nursing.	540	3	0	10	1	1525	0	0	596	1	3	0	0	0	0	2139
Learned Publishing.	515	79	375	109	5	11449	23	0	80	111	51	46	0	2	0	12330
BMC Health Services Research.	486	78	60	145	0	3304	1	0	66	14	16	4	1	0	1	3690
Total	7448	1524	2101	1115	63	70518	40	2	2296	869	324	98	3	18	41	79012

Table 3: **Top 10 articles with the highest altmetric attention score.**

Title	First Author	Year	Journal	Access type	DC	AAS
Attention decay in science	Pietro Della Briotta Parolo	2015	Journal of Informetrics	Green	83	
Mapping the anti-vaccination movement on Facebook	Naomi Smith	2017	Information, Communication and Society	Closed	125	
Prevalence of Prejudice-Denoting Words in News Media Discourse: A Chronological Analysis	David Rozardo	2021	Social Science Computer Review	Closed	2	
Objectivity and realms of explanation in academic journal articles concerning sex/gender: a comparison of Gender studies and the other social sciences	Therese Soderlund	2017	Scientometrics	Hybrid	3	
The Sci-Hub effect on papers' citations	Juan C. Correa	2021	Scientometrics	Closed	5	
Journal citation reports and the definition of a predatory journal: The case of the Multidisciplinary Digital Publishing Institute(MDPI)	M Angeles Oviedo-Garcia	2021	Research Evaluation	Hybrid	6	
The Brexit Botnet and User-Generated Hyperpartisan News	MT Bastos	2017	Social Science Computer Review	Bronze	132	
Retracted article: Predatory publishing in Scopus: evidence on cross-country differences	V Machacek	2021	Scientometrics	Bronze	30	
The echo chamber is overstated: the moderating effect of political interest and diverse media	E Dubois	2018	Information, Communication and Society	Bronze	259	
Social media use and participation: a meta-analysis of current research	Shelley Boulianne	2015	Information, Communication and Society	Closed	568	

DC=Dimensions citations, AAS=Altmetric Attention Score.

Table 4: **Prediction of citations through altmetric attention score.**

Model		Unstandardized Coefficients		Standardized Coefficients	t	p	r	r^2	F	p
		B	Std. Error	β						
1	(Constant)	0.530	0.005		113.7	0.000	0.219[a]	0.048	1606.672	0.000[b]
	AAS	0.301	0.008	0.219	40.09	0.000				

Dependent Variable: DC; Predictors: AAS.

Correlation between altmetric attention score and Dimensions citations

Figure 2 shows the results of the Spearman correlation applied between citations and altmetric attention sore. The result showed a significant weak positive correlation between these two metrics with a correlation coefficient value of .18 (rho=0.18, $p \leq 0.001$) (See Appendix 2).

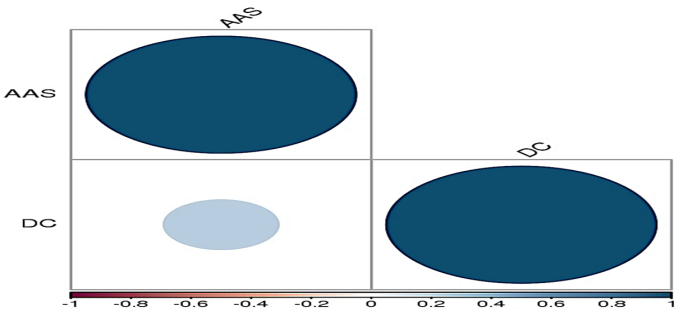

Figure 2: Correlation between altmetric attention score and Dimensions citations.

Prediction of citations through altmetric attention score

The result as shown in Table 4 shows that the altmetric score is a significant predictor of citations (β=0.219, p<0.01). Coefficient of determination (r^2=0.048) showed that variation of altmetric score could explain 4.8% variation in citations.

FINDINGS AND DISCUSSION

The present study has been carried out to measure the social media presence of LIS research outputs. The study findings reported that the sampled outputs were majorly present on 17 different platforms with a higher intake on Mendeley. This finding is consistent with the findings of many previous studies that Mendeley was the major carrier of LIS output (Bar-Ilan, 2014; Erfanmanesh, 2017). The little mentions were recorded from Linkdelen and Pinterest. It may be because since LinkedIn is a business and job-focused social media platform, researchers may not be using this to promote their scholarly output. Similarly, Pinterest is mainly used for sharing and categorizing images online rather than for scholarly output. The journal-wise distribution of altmetrics showed that open-access journals are getting more social attention than subscription-based ones which corresponds to the study findings of many previous studies that open access always attracts more digital reach (Holmberg *et al.*, 2020; Vadhera *et al.*, 2022). Another trend observed from the analyis is that top socially cited articles were published recently i.e. after 2015 onwards and the one which got higher digital reach was not the one with the highest citation and vice versa.

Concerning the Twitter mentions for the LIS outputs, it was found that English-speaking countries were mentioning the LIS outputs more as compared to other countries. It was revealed from a previous study that English was the most popular language to tweet across the world (Poblete *et al.*, 2011). Concerning the association between the classic metrics and altmetrics, the study reported that Dimensions citations were weakly positively correlated with altmetric attention scores. The positive associations were flagged by many other studies also (Costas *et al.*, 2015; Parabhoi *et al.*, 2023; Zhao and Wolfram, 2015). So, it can be justified that altmetrics can be used along with classic metrics for measuring the social impact of the LIS research. It was also found that altmetrics can predict future citations for the LIS outputs. The possibility of altmetrics in predicting future citations was confirmed by Lehane and Black (2020a). So, academicians, publishers and other stakeholders can make use of altmetrics to get to know the future citations to their work through the altmetric indicators.

CONCLUSION

Through this quantitative investigation, we conclude that assessing of social impact of the LIS research through the social network indicators along with citation-based metrics would be helpful for the entire scholarly community. Rather than a stand-alone indicator, altmetric should use as a complementary component along with citation-based metrics for measuring the social instantaneous impact of the LIS literature.

ACKNOWLEDGEMENT

The authors would like to thank Altmetric.com for giving access to the Altmeric Explorer which has been used extensively for collecting data for the current investigation.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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Cite this article: Vysakh C, Babu RH. Assessing the Presence of Library and Information Science (LIS) Outputs on Social Media Platforms Using Altmetrics. Journal of Data Science, Informetrics, and Citation Studies. 2024;3(1):35-41.

Appendix 1: Country-wise distribution of Twitter mentions.

Country name	Number of posts	%	Number of profiles	%
United States	24420	15.81	10143	16.93
United Kingdom	16131	10.45	6151	10.27
Spain	8811	5.71	2477	4.13
Canada	5869	3.80	2112	3.52
Australia	4999	3.24	1810	3.02
Germany	3248	2.10	1305	2.18
France	3181	2.06	1168	1.95
Netherlands	2623	1.70	923	1.54
Ireland	2445	1.58	587	0.98
India	1912	1.23	543	0.90
Unknown	57205	37.04	22730	37.93
Aggregate	154428	100	59920	100

Appendix 2: Correlation between altmetric attention score and Dimensions citations.

		AAS	DC
AAS	Spearman's rho	-	
	p-value	-	
	N	-	
DC	Spearman's rho	0.18***	-
	p-value	<0.001	-
	N	31867	-

Note. * $p<0.05$, ** $p<0.01$, *** $p<0.001$.