

Altmetrics analysis of selected articles in the field of social sciences

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Abstract

Purpose – This study aims to measure the impact of the selected papers in the field of social sciences indexed in Scopus using altmetrics tools.

Design/methodology/approach – The research community consists of the articles of the Iranian researchers in the field of social sciences indexed in the Scopus database in 2014–2018. Some of the most important altmetric service providers have been used to assess the presence of the research outputs in the social media and their impact assessment. Also, the relationship between variables such as scientific collaboration of researchers, open access journals and the quality of research journals with altmetric activity have been investigated through appropriate correlation tests.

Findings – The findings indicated that the most important social media publishing Iranian articles are Mendeley, Twitter and Facebook. The results of the correlation test showed a statistically significant positive and weak relationship between the scientific collaboration of researchers and their altmetric activity. Also, there is a significant and weak statistical relation between journal openness and the altmetric scores. In this study, the findings suggest that the published articles in the journals with higher quality indicators have higher altmetric scores and are more likely to be present in social media.

Research implications – In this study, the social network indicators have been introduced as a solution to examine the effectiveness of research activities on social media. These indicators can be used to evaluate the impact and usefulness of the articles and other scientific outputs with the aim of completing and eliminating the shortcomings of traditional scientometrics indicators. What distinguishes altmetric criteria from other criteria related to the scientometric studies is the speed, ease and transparency of these scales. This allows the publications to be evaluated regardless of their formal form and in the shortest possible time, and in addition to the scientific impact, the social impact of the works is also measured.

Originality/value – The results of these studies show that using altmetric service providers not only reflects the social impact of publications on authors in different subject areas but also helps libraries, universities, research organizations and politicians in planning, budgeting and allocating resources.

Keywords Altmetrics explorer, PlumX, Scopus, Social media, Social sciences, Research impact

Paper type Research paper

1. Introduction

Because of the widespread use of social media in the scientific fields, new indicators called altmetrics indices along with the traditional scientometrics concepts (citation analysis) have been created to investigate the impact of research activities on social media (Priem

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et al., 2010). Altmetrics indicators measure the attention paid to research outputs in the social Web environment, highlight the media used to publish research findings and are used as a symbol of the scientific and social impact of research (Holmberg *et al.*, 2014).

Altmetrics stands for “alternative metrics.” Altmetrics are meant to compliment, not totally replace, these traditional measures. Altmetrics can be gathered and calculated immediately, compared with traditional citations that accumulate slowly. Altmetrics capture data from a variety of sources, not just the traditional academic publishing setting and thus may reflect the broader impact of research beyond the scholarly community. Additionally, altmetrics can be captured for research outputs beyond articles, like data sets, software, molecular structures, etc. Since the publication of the Altmetrics Manifesto (Priem *et al.*, 2010), a huge number of academic publications have been released around the world on alternative metrics (Holmberg, 2015; Tattersall, 2017; Roemer and Borchardt, 2012). The main objective of these altmetric studies has been to understand the meaning of these metrics and their possible application to research evaluation (Erdt *et al.*, 2016; Sugimoto *et al.*, 2017). In this form, a first step has been to compare and put into context these metrics with regard to bibliometric indicators (Thelwall *et al.*, 2013; Costas *et al.*, 2014). The poor correlations found lead us to think, for now, that these metrics express a new dimension of the academic impact, which is closer to the popularization of science, societal impact and research dissemination (Ortega, 2016).

Altmetric studies have been supported by data produced by a wide scope of services that track the use, mention, sharing and citation of research papers in social networks, publisher platforms, repositories, etc. Faced with this great amount of metrics and sources, altmetrics providers have been a key element in the consolidation of this young research field, gathering alternative metrics on a single platform. These databases have made easier the comparison and study of different metrics, putting them in relation to each other and to the citation impact. Based on Web syndication and open data, events on the Web about academic outputs are collected by these aggregators using several identifiers (digital object identifiers (DOIs), ISBN, URLs, etc.). (Ortega, 2018). The Altmetric Attention Score and PlumX Metrics are algorithms used to measure the impact of published research through online platforms. These scoring systems aggregate data on online engagement, incorporating metrics such as number of downloads and social media shares by researchers and the general public (Jia *et al.*, 2020).

A review of the theoretical and specialized literature in the field of altmetrics showed that since the introduction of the concept of altmetrics until today, several studies have been conducted on the concepts, features, service providers, attention to research outputs on social media and the relationship between citation and altmetrics indicators. In this section, we refer to some of the previous studies that are related to the subject of this research.

Robinson-García *et al.* (2014) in an study showed that the Altmetric Explorer database takes altmetric data from 16 different social media sources that five sources collect 95.5% of the total data. Twitter and Mendeley have the highest coverage, especial Mendeley, which is more widespread in the scientific community.

It is worth mentioning the studies of Champieux (2015) and Lindsay (2016) about PlumX, who make a descriptive analysis of its functionalities; the analyses performed by Adie and Roe (2013) and Trueger *et al.* (2015) about Altmetric.com; and the serious criticisms of Gumpenberger *et al.* (2016) about the altmetric score.

Sud and Thelwall (2014) in an article examined the validity of alternative indicators and compared them with citation indicators. They argue that if altmetrics claims to provide a reliable evaluation of research, it should evaluate itself. Discussing altmetrics evaluation strategies, they emphasize the need for a range of methods that can focus on identifying altmetrics relative strengths. They suggest several steps for evaluating altmetrics: 1 –

correlation tests; 2 – content analysis of resources; 3 – surveying the motivations of authors and users; and 4 – practical analyses and evaluations.

In a study, [Sotoudeh et al. \(2015\)](#) studied the relationship between scientometrics indices in the published articles in the *Library and Information Science* journals and the CiteULike bookmarks from 2004 to 2012. The results of this study showed that there is a statistically significant, positive and weak relationship between the number of citations of articles in Web of Science and the number of bookmarks of articles in CiteULike.

[Lahikainen \(2016\)](#) in a study on altmetrics in the social sciences and humanities, using PlumX software, examined the results of the altmetrics project at the University of Helsinki Library. The results of this study show that because many of the important topics in the social sciences and humanities are local and their articles are published in non-English languages, altmetrics tools do not cover these two areas well, unlike areas such as medicine and natural science. Therefore, university libraries should participate in the development and use of altmetrics tools in collaboration with other libraries and researchers.

Much fewer papers have carried out comparative studies between data providers. [Jobmann et al. \(2014\)](#) were the first ones to compare the altmetric coverage and counts of ImpactStory, Altmetric Explorer, Plum Analytics and Webometric Analyst by research areas. Their results show important divergences between services. Plum Analytics is the platform that better covers Mendeley and Facebook data, while Altmetric.com stands out gathering blogs, news and CiteULike data.

[Zahedi et al. \(2014\)](#) explored the consistency of data across three altmetric aggregators: Altmetric.com, Mendeley and Lagotto. They also detected significant differences, finding that Altmetric.com gathers more tweets, but it is less accurate collecting Mendeley readers. [Baessa et al. \(2015\)](#) evaluated several altmetrics providers for their institutional repository and they recognized that Altmetric.com has a better coverage of blogs, news and government documents, while PlumX is most exhaustive covering different formats.

[Kraker et al. \(2015\)](#) studied the collection of research data in three data sources: Figshare, Reliability and accuracy of altmetrics providers PlumX and ImpactStory. They observed that PlumX detects considerably more items in social media and also finds higher altmetric scores than ImpactStory. [Peters et al. \(2016\)](#) extended their former study with the inclusion of Altmetric.com. Their results confirmed that PlumX is the best provider for covering non published materials such as research data.

The most recent comparative approach was performed by [Meschede and Siebenlist \(2018\)](#), who compared Altmetric.com and PlumX, finding that less than half of the publications analyzed are included in Altmetric.com, while PlumX covers almost the totality (99%).

[Zahedi and Costas \(2018\)](#) performed the most exhaustive comparison between data providers, finding substantial differences in the metrics offered by these platforms.

[Sedighi \(2020\)](#) studied the association between the number of citations of the studies published in the field of scientometrics and the altmetric scores of these studies. The findings indicated a significant, positive and weak statistical relationship between altmetric scores and citation indicators. In sum, the findings suggested that some social networks and their indices can be representations of the impact of scientific papers and similar citations. However, owing to the weakness of the correlation coefficients, the replacement of these two categories of indicators is not recommended, but it is possible to use the altmetrics indicators as complementary scientometrics indicators in evaluating the impact of research.

In another study, [Sedighi \(2021\)](#), using a measurement approach based on social networks, examined the impact of the selected articles of Iranian researchers. The question of this research was how can the impactful of the research articles be evaluated using altmetrics indicators? The results of these studies show that using altmetric data providers,

one can evaluate the impact of research in different subject areas and compare them. Science and technology policymakers can consider the presence of articles in social media and altmetrics indices in scientific policy along with traditional research evaluation indicators.

A review of various studies and research related to altmetrics shows that decision-making on the performance of altmetrics tools requires more extensive research studies. Therefore, in the present study, using the information of some of the most important altmetric service providers such as Altmetrics Explorer and Plum Analytics, the impact of Iranian researchers' articles in the field of social sciences indexed in the Scopus database has been evaluated over a period of five years (2014–2018). Also, in addition to identifying the most impactful studies based on altmetrics indicators, the presence of Iranian researchers' articles on social media and how factors such as scientific cooperation and open access of journals affect the altmetric score of articles have been analyzed. The relationship between altmetric activity and citation quality of research journals has also been investigated.

2. Research questions

- RQ1.* How many articles of Iranian researchers in the field of Social Sciences, which were indexed in Scopus, are present on the social media?
- RQ2.* What are the most impactful articles in the field of Social Sciences based on the altmetrics indicators?
- RQ3.* Is there a statistically significant relationship between researchers' scientific collaboration, open access journals and the quality of journals that publish articles with altmetric scores of the studied articles?

3. Methodology

This is an applied research using documentary (library) method and altmetrics and scientometrics indicators. The Research community consists of the articles indexed in the Scopus citation database in a period of five years (2014–2018), and due to having a DOI, it is possible to observe their altmetric activity.

In Step 1, to extract data from the Scopus after searching for the name of Iran and limiting the results based on the year of publication and then limiting the results to the field of social sciences, bibliographic information of these documents is extracted. To evaluate the presence of these articles on social media and also to measure their impact, metrics based on social networks and data of some of the most important providers of altmetrics services such as Altmetrics Explorer and PlumX were used.

To retrieve data related to altmetric activity of the articles, each article was manually searched using the altmetric bookmarklet. This tool is a service provided by altmetric institute and was used for data collection. This tool stores as a bookmark in Web browsers and provides altmetrics data. To use this tool, we need to select the article's DOI on the homepage of the article and click on the bookmark stored on the Web browser. The research articles with the highest altmetric scores were identified. In Step 2, the research questions were answered by summarizing and analyzing the data and using descriptive statistical methods. To determine the citation quality of the journals publishing the studied articles, a list of these journals was prepared and stored. To study the quality of these journals, two citation indices, SJR and Quartile (Q), were used. The values of these indicators were extracted and stored from the Scimago website.

Finally, to investigate the relationship between various factors such as scientific collaboration and open access of journals, with the altmetric score of articles and also the relationship between altmetric activity and citation quality of research journals, appropriate correlation tests have been used.

4. Data analysis

In this section, to answer the research questions, the results of the analysis of the retrieved data are presented. To answer *RQ1*, the survey revealed that of a total of 3,853 articles retrieved from Scopus database for the period 2014–2018, 2,941 articles (76%) have DOI and 712 articles (24%) do not have them and, therefore, it is not possible to monitor their altmetric activity. Among these, 450 papers (47.4%) have been shared at least once in the social media and have an altmetric score (Table 1).

Findings show that in general, among the main social media covered by Altmetric Explorer (Mendeley, Twitter and Facebook), Mendeley had the largest share in sharing the articles studied. Out of 450 articles with altmetrics indices, 425 articles (94%) had at least one reader in Mendeley. After that, Twitter with 402 articles (89%) and Facebook with 76 articles (17%) were the most common social tools (Table 2).

The results of the data extracted using Plum Analytics show that out of 450 articles with altmetric score, 409 articles (90%) have been read at least once, 338 articles (75%) and 75 full articles (16%) have been viewed; 361 articles (80%) have been cited at least once in citation indices. The status of other altmetrics metrics for articles are as follows: Links, Tweets, Saved, Shares, Blog Posts, Uploads, News Posts, References, Clicks and Comments (Figure 1).

To answer *RQ2*, the altmetric scores of the studied articles were extracted from the altmetric database. The results are summarized in Table 3.

Table 4 shows the most impactful articles of Iranian researchers in the field of social sciences (with the highest altmetric score) indexed in Scopus in the period 2014–2018.

To answer *RQ3*, data related to the impact of the articles (altmetric score) and the number of authors of each article were entered into SPSS software and then the Spearman rank correlation test was performed. The results of this analysis are presented in Table 5. As can be seen, the results of the correlation test show a statistically significant positive and weak correlation between the studied variables ($p = 0.003$ and $r = 0.047$). These findings indicate that because of the low correlation coefficient of the two variables, there is not much relationship between the scientific cooperation of the authors of the articles and the impact of the articles based on altmetrics indicators.

To answer the second part of *RQ3*, open and non-open access journals in the field of social sciences were first identified using the Scopus database. To examine the relationship between

Table 1.
Presence rate of the articles of Iranian researchers in the field of social sciences in social media (using the Scopus database)

Publication year	No. of articles	No. of cited articles	No. of citations	No. of articles with the altmetrics indicators	% of articles with the altmetrics indicators	No. of articles without the altmetrics indicators
2014	797	436	2,089	81	28/10	715
2015	776	345	1,320	67	63/8	278
2016	949	366	1,217	100	53/10	849
2017	844	235	563	130	40/15	740
2018	487	61	82	72	78/14	383
Total	3,853	1,443	5,271	450	–	2,965

open access to the journals and the impact of the articles based on altmetrics indices, because of the non-normality of the distribution of data, Spearman rank correlation test was used. For this purpose, data related to the impact of articles (altmetric score) and openness status of journals were entered into SPSS software and Spearman rank correlation test was performed. To quantify the data related to open access to the journals, this data was coded, so that code 1 was assigned to open access journals and zero code was considered for non-open access journals. There was a statistically significant and weak relationship between open access journals and altmetric scores of the articles ($p = 0/000$; $r = -0/068$). The results of this analysis are presented in Table 6. The

Publication year	No. of articles	No. of articles with altmetrics indicators	No. of articles with reader in Mendeley	No. of articles with reader in Twitter	No. of articles with reader in Facebook
2014	797	81	77	69	17
2015	776	67	66	61	11
2016	949	100	97	94	11
2017	844	130	123	119	25
2018	487	72	62	59	12
Total	3,853	450	425	402	76
Percentage	—	12%	94%	89%	17%

Table 2.
Share of social media
in sharing of the
studied articles
(using Altmetric
Explorer database)

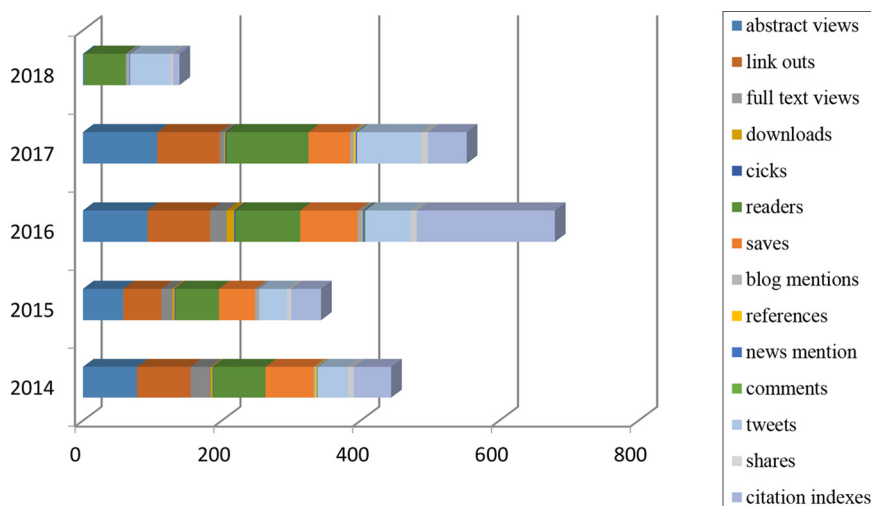


Figure 1.
Share of social media
and altmetrics
metrics in sharing of
the studied articles
(using Plum
Analytics database)

Publication year	Maximum of altmetric score	Minimum of altmetric score	Average of altmetric scores
2014	79	1	37/3
2015	52	1	47/3
2016	25	1	6/2
2017	196	1	8/3
2018	18	1	26/3

Table 3.
Status of altmetric
scores of the studied
articles by
publication year
(using Altmetric
Explorer database)

Table 4.
Most impactful
articles based on the
highest altmetric
score

Rows	Title of article	Authors	Title of journal	Publication year	Altmetric score
1	Preferred interpersonal distances: a global comparison	Sorokowska <i>et al.</i>	<i>Journal of Cross-Cultural Psychology</i>	2017	196
2	The influence of social networking technologies on female religious veil-wearing behavior in Iran	Young <i>et al.</i>	<i>Cyberpsychology, Behavior and Social Networking</i>	2014	79
3	Open access and sources of full-text articles in Google Scholar in different subject fields	Jamali and Nabavi	<i>Scientometrics</i>	2015	52
4	Major trends in knowledge management research: a bibliometric study	Akhavan <i>et al.</i>	<i>Scientometrics</i>	2016	25
5	Monotone measures for non-local correlations	Beigi and Gohari	<i>IEEE Transactions on Information Theory</i>	2015	23

Table 5.
Results of the
correlation test
between the scientific
cooperation of
researchers and the
altmetric scores of
the articles

Control variables			No. of authors	Altmetric score
Spearman's rho	Number of authors	Correlation coefficient	1.000	0.047**
		Sig. (two-tailed)	.	0.003
		<i>N</i>	3,853	3,853
	Altmetric score	Correlation coefficient	0.047**	1.000
		Sig. (two-tailed)	0.003	.
		<i>N</i>	3,853	3,853
Note: **Correlation is significant at the 0.01 level (two-tailed)				

Table 6.
Results of the
correlation test
between the open
access to the journals
and the altmetric
scores of the articles

Control variables			Open access to journals	Altmetric score
Spearman's rho	Open access to journals	Correlation coefficient	1.000	−0.068**
		Sig. (two-tailed)	.	0.000
		N	3,853	3,853
	Altmetric score	Correlation coefficient	−0.068	1.000
		Sig. (two-tailed)	0.000	.
		N	3,853	3,853
Note: **Correlation is significant at the 0.01 level (two-tailed)				

above findings indicate that open access journals do not play a significant role in the altmetric performance of the articles. Because the degree of scientific impact of articles based on altmetric scores in each subject group can be largely related to the quality of articles, it seems that the quality of the articles published especially in open access journals, due to their low presence on social media, is not so desirable. Another logical possibility that may be one of the reasons for the low altmetric performance of articles published in open access journals is that these articles are available to the public through the journals themselves. Therefore, first of all, the readers of these articles find them directly through the journals. And secondly, their authors are less likely to feel the need to republish them through social media.

Finally, to answer the third part of *RQ3*, the following measures were taken:

- A list of journals publishing the articles, indexed in the Scopus database, was prepared. A total of 3,853 articles by Iranian researchers in the field of social sciences indexed in the Scopus database have been published in a total of 782 journals.
- To study the quality of the journals publishing the articles, SJR citation index and Q index were used. By referring to Scimago website, the values of each of the above indicators for the studied journals were extracted and stored.
- As in the previous stages of the research, SPSS software was used to investigate the relationship between the altmetric performance variables of the studied articles and the quality of the journals that published these articles. Owing to the abnormal distribution of the mentioned indicators, Spearman rank correlation test was used to study the relationship between variables. The results of the correlation test between the above two variables for the studied articles show a statistically significant and weak-to-moderate relationship. The results of this analysis are presented in [Tables 7](#) and [8](#). These findings indicate that in total, the articles published in the

Table 7.
Results of the
altmetric
performance test of
the studied articles
and Q index of their
journals

Control variables			Altmetric score	Q index
Spearman's rho	Altmetric score	Correlation coefficient	1.000	−0.242**
		Sig. (two-tailed)	.	0.000
		N	3,853	3,853
	Q index	Correlation coefficient	−0.242	1.000
		Sig. (two-tailed)	0.000	.
		N	3,853	3,853

Note: **Correlation is significant at the 0.01 level (two-tailed)

Table 8.
Results of the
altmetric
performance test of
the studied articles
and SJR index of
their journals

Control variables			Altmetric score	SJR index
Spearman's rho	Altmetric score	Correlation coefficient	1.000	0.340**
		Sig. (two-tailed)	.	0.000
		N	3,853	3,853
	SJR index	Correlation coefficient	0.340	1.000
		Sig. (two-tailed)	0.000	.
		N	3,853	3,853

Note: **Correlation is significant at the 0.01 level (two-tailed)

5. Discussion

The summary of results obtained from data analysis in this study is described below:

- The presence rate of the studied articles in social media is about 12% of the total number of retrieved articles. It was also possible to observe altmetric activity in about 76% of recovered articles (because of the presence of a DOI) (Table 1). Costas *et al.* (2014) point to the limited coverage of altmetric service providers, including the altmetric institute. However, a review of the results of the previous studies suggests that the altmetric coverage of research outputs has been different based on the type and nature of the studied subject area, the type of social media and the database used to collect altmetric data (Holmberg, 2015).
- The most important social media publishers of Iranian researchers in the field of social sciences are Mendeley, Twitter and Facebook, respectively (Table 2). Among these, Mendeley has good coverage of the articles in the field of social sciences and can be used in future research. Previous research studies (Zahedi *et al.*, 2014; Priem *et al.*, 2012; Li and Thelwall, 2012) also referred to Mendeley and Twitter as one of the most important tools for providing article-level data and altmetric information.
- The maximum and minimum altmetric scores of articles of Iranian researchers in the field of social sciences in the study period are 196 and 1, respectively (Table 3). Based on the extracted altmetric scores, the most impactful studies were identified (Table 4).
- There is a statistically significant positive and weak relationship between researchers' scientific collaboration and the impact of their articles. Owing to the low correlation coefficient of the two variables, it seems that increasing the number of authors does not have a significant effect on the altmetric score of these articles (Table 5). However, some studies have shown that as the number of authors of an article increases, so does the number of citations to an article and, consequently, its scientific impact (Wykes *et al.*, 2013). However, despite the significant relationship between the two co-authorship indices and the impact of the articles, but because of the weak correlation coefficient between these two indicators, it is necessary to examine the lack of significant effect of scientific cooperation on the altmetric performance of articles in a separate study.
- The results of the correlation test show a statistically significant and weak relationship between the open access to journals and the impact of their articles (Table 6). Electronic publication of scientific journals and their open access, in addition to making them accessible to the general public, also increases the likelihood that they will be cited by other authors and can increase their scientific and citation impact (Harnad and Brody, 2004). Therefore, in most studies, more citation effect has been reported for open access articles and journals compared to non-open access journals and articles. By increasing the accessibility of an article through a search engine, the number of citations to that article can be increased. Also, even if an article is not of high quality, increasing accessibility helps to increase the citation of that article (Ale Ebrahim *et al.*, 2014).

- There is a significant and weak-to-moderate relationship between the quality of journals publishing articles and their altmetric performance (Tables 7 and 8). These findings indicate that in total, the articles published in the journals with higher quality indicators have higher altmetric scores and have a higher presence on social media.

The findings of this study are somewhat in line with the results of the study of [Haustein et al. \(2014\)](#) who presented a statistically significant and positive relationship between the altmetric activity of biomedical journals on Twitter and their performance indicators in the citation report database. This finding can be justified considering that the top scientific journals are popular among researchers from all over the world and the articles published in them are widely studied, considered and cited. Certainly, the publication of research outputs in the social Web environment, as it increases the visibility of these documents, is also effective in the amount of future citations of these outputs and causes the quality performance indicators of relevant journals to increase in the future by receiving more citations. Therefore, it can be stated that there is a two-way relationship between altmetric activity and the quality indicators of scientific journals such that the increase of each can be effective in increasing the other.

6. Conclusions

In this study, the impact of the selected papers of Iranian researchers in the field of social sciences (indexed in the Scopus database) were measured using altmetrics tools. The most impactful articles of Iranian researchers were identified based on altmetrics indicators. The presence rate of these articles in social media was specified. Finally, the effect of various factors such as scientific collaboration, free access to articles and the quality of journals were examined and analyzed.

In this study, the Iranian aspect could be mentioned as a case study to illustrate a more general approach and the results of the project can be generalized to other geographical situations.

Using the results of such studies, science and technology policymakers can, in addition to the traditional indicators of research evaluation, consider the presence of articles on social media and altmetrics indicators in scientific policy-making. Thus, in addition to being aware of the importance of the presence and membership of researchers and sharing their work on social media, such indicators will be used as a criterion for scientific evaluation of researchers in science policy-making.

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