STI 2018 Conference Proceedings

Proceedings of the 23rd International Conference on Science and Technology Indicators

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The articles of this collection can be accessed at https://hdl.handle.net/1887/64521

ISBN: 978-90-9031204-0

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Academic impact and social media presence in *Green and Sustainable Science and Technology* publications

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Introduction

Sustainability is one of the topics that has aroused most interest in recent years. The economic, social, environmental and political impact of this field makes it a central area for the development of countries. Since the proposal of the Sustainable Development Goals in 2012, the issue has burst onto the top of the international agenda and, since their implementation in 2015, has become a privileged topic for analysis from various perspectives.

In the scientific field, interest in the subject is evident in the growing number of R&D&i programmes funded by international organizations as the European Union's Framework Programmes (European Commission, 2018). The same is true for scientific publications in Web of Science, which have grown exponentially over the last five years (Clarivate Analytics, 2018).

Another indicator of the relevance of the topic to the scientific community is the creation, in 2015, of a new subject category in the Journal Citation Report (JCR): Green and Sustainable Science and Technology, comprising 37 journals (Clarivate Analytics, 2017).

Considering the interest in sustainability issues, this paper analyses whether there is a relationship between the academic impact and the social impact of research in this field. This relationship has been explored in different scientific fields (Aharony et al, 2017; Thelwall & Nevill, 2018) but its particularities have not been analyzed in the case of this new WoS category.

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1 This work was supported by Spain’s Ministry of the Economy and Competition under the project ‘Detection of new research and innovation fronts in energy efficiency. Analysis of knowledge flows in the scientific domain, industry and society’ (ref.: CSO2014-51916-C2-1-R).
Methodology

The Core Collection of Web of Science database - including SCI, SSCI and A&HCI - has been used to collect the publications in Green and Sustainable Science & Technology subject category. The papers downloaded were arranged in a relational database and, main uni- and multidimensional bibliometric indicators (Van Raan, 1992; Noyons and Van Raan, 1994; Bordons, 1999) and subject-specialised indicators were obtained.

To find out the impact on social media, an R script was programmed to query the Altmetric.com API, using the DOI as a query element. Through this system, were obtained the altmetric indicators of each publication (mentions on Twitter, Wikipedia, Facebook, Mainstream media, Google plus, video sources, posts).

Next, the bibliometric indicators (Impact Factor, EigenFactor, Immediateness Index) were correlated with the altmetric indicators. To perform the correlation, the data obtained were grouped by journal and year and linked to the data from the JCR. This has resulted in a matrix composed of 288 records and 17 fields. The Pearson correlation coefficient was used to determine the degree of linear correlation, with values ranging from -1 (perfect negative correlation) to 1 (perfect positive correlation). To make the correlation matrix, the value of the correlation coefficient for each variable has been calculated against all the others.

Results

Between 1994 and 2016, 49,641 documents were collected in Green and Sustainable Science and Technology WoS category, 66% of which were published since 2012. The subject categories that concentrate the greatest production are Energy Fuels; Engeenering Environmental and Environmental Studies (Fig 1).

Figure 1: Distribution of documents by year and thematic category.

97% of documents have DOIs and, of these, 20.15% have been mentioned in social media (Table 1).
Table 1. Distribution of mentions on social media

<table>
<thead>
<tr>
<th>Cited by</th>
<th>Nº of documents with mentions</th>
<th>Total nº of mention</th>
<th>% docs with mentions / total docs.</th>
<th>Mentions / doc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook</td>
<td>1674</td>
<td>2284</td>
<td>3,12</td>
<td>1,36</td>
</tr>
<tr>
<td>Twitter</td>
<td>8160</td>
<td>24691</td>
<td>15,22</td>
<td>3,03</td>
</tr>
<tr>
<td>Feeds</td>
<td>888</td>
<td>1115</td>
<td>1,66</td>
<td>1,26</td>
</tr>
<tr>
<td>Reddit (rdts)</td>
<td>43</td>
<td>51</td>
<td>0,08</td>
<td>1,19</td>
</tr>
<tr>
<td>Mainstream Media (msm)</td>
<td>775</td>
<td>2021</td>
<td>1,45</td>
<td>2,61</td>
</tr>
<tr>
<td>Wikipedia</td>
<td>454</td>
<td>573</td>
<td>0,85</td>
<td>1,26</td>
</tr>
<tr>
<td>Videos</td>
<td>28</td>
<td>31</td>
<td>0,05</td>
<td>1,11</td>
</tr>
<tr>
<td>Gplus</td>
<td>225</td>
<td>310</td>
<td>0,42</td>
<td>1,38</td>
</tr>
</tbody>
</table>

Table 2 shows that the documents with altmetric indicators have received, on average, more citations than the publications without mentions in the social media.

Table 2. Academic impact vs social media presence

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Publications on Green &amp; Sustainable Sci &amp; Technol. (without atmetric indicators)</th>
<th>Publications on Green &amp; Sustainable Sci &amp; Technol. (with atmetric indicators)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nº cited documents</td>
<td>N doc 34854 % 80,85</td>
<td>N doc 8094 % 76,70</td>
</tr>
<tr>
<td>Nº docs. without citations</td>
<td>8257 % 19,15</td>
<td>2459 % 23,30</td>
</tr>
<tr>
<td>Total citations</td>
<td>596285</td>
<td>169772</td>
</tr>
<tr>
<td>Citations/docs.</td>
<td>13,83</td>
<td>16,09</td>
</tr>
</tbody>
</table>

Figure 2 shows the correlation of bibliometric and altmetric indicators. The coefficients obtained are remarkable, especially those that reach correlation coefficients > 0.6 when comparing the EigenFactor values of the journal with the number of posts, Twitter and Facebook users, as well as with the number of mentions in the mass media (Mainstream media). Likewise, the number of mentions in this type of media reaches significant correlation values compared to most of the variables related to the impact of journals.
Discussion

When analyzing the scientific activity of Green and Sustainable Science and Technology, from a bibliometric and altmetric approach, it was detected that there is a recent interest in the topic with a high concentration of documents in the last 5 years. About 20% of the documents have altmetric indicators - 25% considering the most recent five-year, with values somewhat higher than those detected in previous studies (Costas et al, 2015). There is a significant correlation between academic impact and social media presence; in particular, variables such as the Eigen Factor and the Impact Factor show positive and statistically significant correlations with the mentions in social networks. Likewise, the number of mentions in the mass media also correlates with the traditional impact indicators, so that those journals with the greatest impact on the scientific community also have the greatest impact from the media point of view.

References


Bordons, María. (1999). Evaluación de la actividad científica a través de indicadores bibliométricos. Revista española de cardiología, 52(10), 790-800.

Clarivate Analytics (2018) Web of Science

