



# Comparative Study of Open Access and Non-Open Access Journals in Subject Area Energy

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## Abstract

The purpose of this research is to establish a comparative analysis between open access journals and those open access journals whose sole purpose is to research on energy as a socialized conduit. To achieve such objective three tools will be used, namely: 1) the bibliographic database of abstracts, 2) the citations of articles for scientific journals, including Scopus, and 3) bibliometric analysis. Different studies show research that has been published in non-open access journals is larger in content than those published in open access journals. Non-open access journals establish a trend indicating better SNIP and SJR scores in comparison to their open access journal counterparts. Such trends are considered very atypical, and they certainly cannot be pre-determined in other areas of knowledge which would include: medicine, agronomy, biochemistry, mathematics, and planetary sciences. So far, the United Kingdom has been the leading-edge country which has provided more funding for both non-open access journals and open access journals in terms of energy research.

## Subject Areas

Information Science

## Keywords

Energy, Journals, Citation, Bibliometrics, Open Access, Comparative, Indices

## 1. Introduction

Science operates on the border between the known and the ignored. Scientific practice is defined by an essential set of rules: 1) test ideas through experimentation and observation. 2) Lean on the ideas that passed the tests and reject those

that failed. 3) Follow the evidence to where it is agreed, and question everything. The scientific method is so powerful that in just four centuries it has taken over humanity, from the first glance of Galileo Galilei to the moon through a telescope, to the first step of man on the moon. Scientists are the conduits for knowledge to become both socialized and practiced. Science is a cooperative enterprise that spans generations, which involves the passing of the torch of knowledge from teacher to student; a community of thinkers that today is larger, more connected and more productive than at any other time in human history.

In this context, scientific journals have been and continue to be like the ocean where they navigate the most diverse scientific results generated in the present. Today's society is witnessing a momentous transformation in the field of human communication: the transition from writing on paper to writing in electronic formats, metamorphosis that today, in terms of making science public, has meant that scientific journals have been forced to move from a written communication, typical of a typographic culture, to a cybernetic communication, typical of an electronic culture (Martínez-Nicolás and Carrasco-Campos, 2018 [1], Martin and Chabolle, 2010 [2]). Undoubtedly, this process has also reached those who create the scientific message, that is, the researchers, who know that whatever the means by which science is disseminated, they must be the ones who adopt a looping methodology whereas they initiate, run through, and obtain feedback of the entire process. Thus, enabling scientific information to reach peers and all social sectors.

## 2. Literature Review

The United Nations Educational and Scientific Organization (Noyes Jr, 1947) [3] defines the scientific journal as: periodical publication that especially presents scientific articles, written by different authors, and current information on research and development of any Science area. Such publication has to adhere to the following guidelines: 1) it must have a distinctive name, 2) it must be published at regular intervals, usually several times a year, and 3) each publication delivery is numbered or dated consecutively. Its basic component, the scientific article, is a prose writing, of regular length, published as a contribution to the progress of an area of science.

At present, scientific journals are divided into 2 large groups. On one hand, there are open access journals and on the other, non-open access journals. Open access journals allow their subscribers and readers to have free access to all the scientific contributions published in them. While non-open access journals charge both subscribers and readers in order to access the contributions that they publish. Journals that socialize research in the academic area of Energy are not exempt from such organization.

This research (Calver and Bradley, 2010) [4] compares the number of citations received by articles in open access and non-open access journals whose trajectory is followed in six journals and four books published since 2000. Such research is used to test whether the Open Access journals have increased the total number

of citations in relation to the number of citations made by authors in developing countries. After checking for the type of article (eg., review or research work), extension of the article, citation profiles of the authors, number of authors per work and if the author or publisher released the article to Open Access journals, it was determined that publications in Open Access journals did not have a statistically significant influence on the number of citations per article. Journal articles were cited more frequently if the authors had previously published articles which were cited extensively, where members of large groups of authors or published articles relatively speaking, but such works were not cited more frequently because they were published in Open Access journals.

The publication (Schroter, Tite, and Smith, 2005) [5] aimed to study the attitudes of the authors towards Open Access journals, their perceptions of the journals which were reflected back on the authors, and the willingness of the authors to present their contributions to Open Access journals. The research concluded that many authors believe that the perceived quality of the journal is more important than open access when deciding where to submit their papers. New open-access journals may need to do more to convince authors about the quality of their journals.

The objective of this research provides a comparative stage between open access journals and those open access journals which socialize research in the academic area of Energy. This document includes: 1) bibliometric analysis of the evolution of open access and non-open access journals in the mentioned area of Energy. 2) Statistical analysis of the evolution of open access and non-open access journals in the academic area of Energy. 3) Academic quality of scientific publications and potential of journals.

### 3. Methods

Collection of data and variables considered in the analysis: In the Sources section of the Scopus platform, it was filtered by Subject area with the search criteria “Energy” and the subthematics: Energy (Miscellaneous), Energy Engineering And Power Technology, Fuel Technology, General Energy, Nuclear Energy And Engineering, Renewable Energy, Sustainability And the environment. This process was carried out for both open access and non-open access journals. In this way 89 open access journals and 769 non-open access journals were detected. Of the journals detected, only those that had the variables were processed: CiteScore, Highest percentile, Citations 2018, Documents 2015-17% Cited, SNIP, SJR, Publisher; which were 74 open access journals and 626 non-open access journals.

Definition of the variables: the variables considered for this study are described below. These variables and their values are offered in the Sources section of the Scopus platform.

- CiteScore: calculating CiteScore is simple and is based on the average citations received per document. CiteScore is the number of citations received by a journal in one year in relation to documents published in the three previous

years, divided by the number of documents indexed in Scopus published in those same three years.

- Highest percentile: a percentile is a measure used in statistics indicating the value below which a given percentage of observations in a group of observations falls right into.
- Citations 2018: refers to the quantity of citations showing up in the documents published by a magazine in the last 3 years.
- Documents 2015-17: specifies the quantity of documents published in the period between 2015 and 2017.
- % Cited: describes the proportion of the documents (e.g., 2015-17) that have received at least 1 citation (e.g., 2018).
- SNIP: measures a source's contextual citation impact by weighting citations based on the total number of citations in a subject field. It helps you to make a direct comparison of sources in different subject fields. SNIP takes into account characteristics of the source's subject field, which is the set of documents citing that source. SNIP especially considers: 1) the frequency at which authors cite other papers in their reference lists. 2) The speed at which citation impact matures. 3) The extent to which the database used in the assessment covers the field's literature. SNIP is the ratio of a source's average citation count per paper and the citation potential of its subject field.
- SJR: is weighted by the prestige of a journal. Subject field, quality, and reputation which has a direct effect on the value of a citation. SJR assigns relative scores to all of the sources in a citation network. Its methodology is inspired by the Google PageRank algorithm, in that not all citations are equal. A source transfers its own "prestige", or status, to another source through the act of citing it. A citation from a source with a relatively high SJR is worth more than a citation from a source with a lower SJR. A source's prestige for a particular year is shared equally over all the citations it makes in that year; this is important because it corrects for the fact that typical citation counts vary widely between subject fields.
- Publisher: an organization that publishes books and Journals.

Statistical analysis: for statistical analysis the statistical tools of the MATLAB 2018b software were used. The calculation of the standard deviation is used to characterize continuous variables such as journals indexes. A count is made to characterize nominal variables such as Publisher, open access and non-open access journals. Mann-Whitney tests were performed to analyze and study the discrepancies between the measurements and the status of open access and non-open access journals in the academic area of Energy. In addition, the data is shown as medium (quartiles from 25% to 75%). To analyze the open access and non-open access journals in the academic area of Energy, we use the weighting cases function in MATLAB 2018b and a Chi-square test. A (P) value of 0.05 was considered significant.

## 4. Results

After the text edit has been completed, the paper is ready for the template. Duplicate the template file by using the save as command, and use the naming convention prescribed by your journal for the name of your paper. In this newly created file, highlight all of the contents and import your prepared text file. You are now ready to style your paper.

### 4.1. Bibliometric Analysis of the Evolution of Open Access and Non-Open Access Journals in the Academic Area of Energy

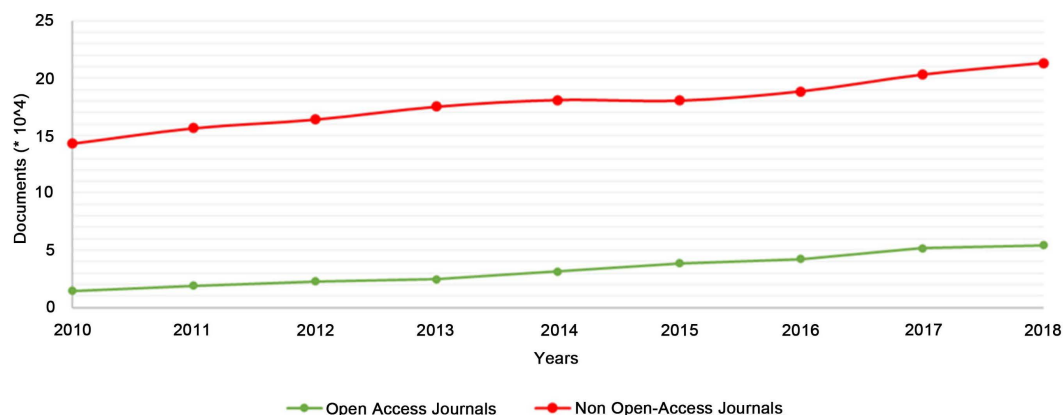
The behavior of the number of publications generated between open access and non-open access journals is remarkably different, in terms of published scientific contributions. **Figure 1** shows the number of documents published per year from 2010 to 2018 among the open access and non-open access journals in the academic area of Energy. Non-open access journals in this arena have published many more articles per year than open access journals. This result is due to the fact that there are many more non-open access journals than open access in the academic area of Energy according to the Scopus directory.

China, the United States of America and India are the nations that present the most scientific contributions on this subject in the Non-open Access Journals; while the United States of America, China and Germany are the nations that contribute the most contributions in the open Access Journals. **Figure 2** shows the amounts of scientific publications in the academic area of Energy, compared by nations between open access and non-open access journals. In this graph, you can appreciate the marked difference in the number of scientific contributions published between open access and non-open access journals. The international scientific community prefers non-open access journals, to publish research in the thematic area of Energy.

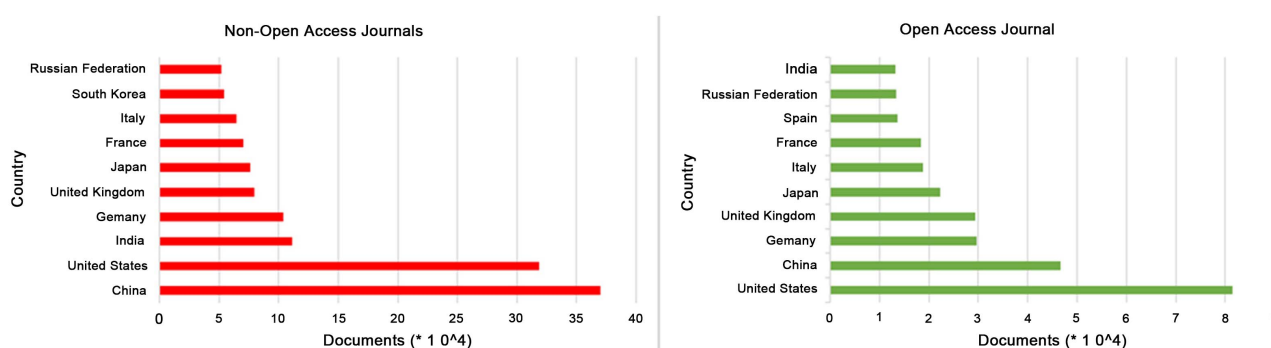
The subject areas of Engineering, Physics, Astronomy, Materials Science, and Chemistry are the most published in open access and non-open access journals. **Figure 3** shows the number of documents published in Scopus, among the open access and non-open access journals related to the thematic area: Energy. Research in Engineering is the most published in both open access journals and non-open access journals.

### 4.2. Statistical Analysis of the Evolution of Open Access and Non-Open Access Journals in the Thematic Area: Energy

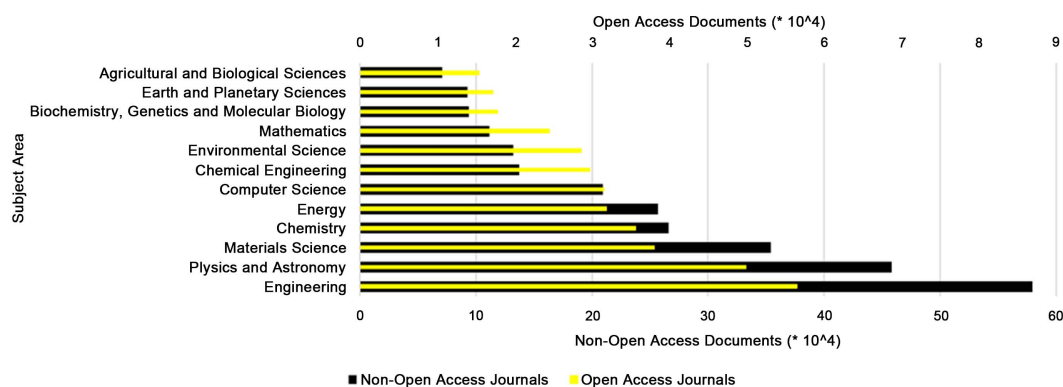
This research shows in **Table 1** that non-open access journals in Scopus for the thematic area: Energy have higher CiteScore, percentage Cited, SNIP, SJR, than open access journals. This result differs from research conducted in other areas of knowledge such as medicine, mathematics, philosophy, political science and agronomy. Some of the similar research in other areas of knowledge that differ from the results obtained in the research presented are (Antelman, 2006 [6], Kousha, Thelwall, and Rezaie, 2010 [7], AlRyalat *et al.*, 2019 [8]).



**Figure 1.** Documents published in Scopus per year, between open access and non-open access journals in the thematic area: Energy.



**Figure 2.** Documents published in Scopus by nations, between open access and non-open access journals in the thematic area: Energy.



**Figure 3.** Number of documents published in Scopus, among open access and non-open access journals related to the thematic area: Energy.

Publishers Elsevier, Springer Nature, Taylor & Francis, Wiley-Blackwell, are the ones that concentrate the largest number of journals in both open access and non-open access. Publishers, who manage open access journals that publish research in the thematic area: Energy, concentrate small numbers of journals, while publishers who manage non-open access journals that publish research in the aforementioned academic area, concentrate many more journals. **Table 2**

**Table 1.** Descriptive statistics for open access and non-open access journals in Scopus for the thematic area: Energy.

	Open Access Journals				Non-Open Access Journals			
	Minimum	Maximum	Median	Standard deviation	Minimum	Maximum	Median	Standard deviation
<b>CiteScore</b>	0.15	6.10	1.80	1.50	0.02	37.75	1.47	4.04
<b>2018 Citations</b>	7.00	13888.00	216.50	2305.77	1.00	81361.00	283.00	7883.82
<b>2015-2017 Documents</b>	10.00	4619.00	122.50	713.62	10.00	9749.00	209.00	1115.09
<b>% Cited</b>	11.00	94.00	65.50	21.57	2.00	99.00	60.00	26.45
<b>SNIP</b>	0.06	3.32	0.85	0.64	0.00	13.96	0.83	1.16
<b>SJR</b>	0.10	2.71	0.44	0.49	0.10	34.17	0.45	2.26

**Table 2.** A comparison in the count and percentage of open access and non-open access journals in Scopus, between the top nine publishers in the thematic area: Energy.

Publishers	Open Access Journals		Non-Open Access Journals		Total
	Count	Percent	Count	Percent	
<b>Elsevier</b>	10.00	12.50%	70.00	87.50%	80
<b>Springer Nature</b>	10.00	23.81%	32.00	76.19%	42
<b>Taylor &amp; Francis</b>	2.00	7.41%	25.00	92.59%	27
<b>Wiley-Blackwell</b>	3.00	13.04%	20.00	86.96%	23
<b>Inderscience</b>	0.00	0.00%	12.00	100.00%	12
<b>IEEE</b>	0.00	0.00%	9.00	100.00%	9
<b>Science Press</b>	0.00	0.00%	8.00	100.00%	8
<b>Pleiades Publishing</b>	0.00	0.00%	6.00	100.00%	6
<b>ASME</b>	0.00	0.00%	5.00	100.00%	5
<b>Others</b>	49.00	21.30%	181.00	78.70%	230

shows the declared trend. From this result, it can be inferred that publishers offer more attention to non-open journals rather than open journals. This trend is inconsistent in other areas of scientific activity.

Below is a ranking of journals by CiteScore from highest to lowest, in **Table 3**. The United Kingdom is the nation that has the most cited journals in the last three years in the thematic area: Energy. This result is because the United Kingdom is a country with a large number of foundations that finance research and scientific publications in the thematic area: Energy. In addition, it can be observed that non-open access journals leave many more citations than open access journals within the Scopus academic directory.

## 5. Discussion

Scientific dissemination has been declared in various ways throughout history. The merit and effectiveness of these forms of popularization of scientific results

**Table 3.** Ranking of the ten journals best positioned by CiteScore in the thematic area: Energy, among the open access and non-open access journals.

Open Access Journals			Non-Open Access Journals		
Title	CiteScore	Country	Title	CiteScore	Country
<b>Environmental Research Letters</b>	6.1	United Kingdom	Nature Reviews Materials	37.75	United Kingdom
<b>Biotechnology for Biofuels</b>	5.84	United Kingdom	Energy and Environmental Science	32.34	United Kingdom
<b>Energy Reports</b>	5.47	United Kingdom	Progress in Energy and Combustion Science	29.72	United Kingdom
<b>GCB Bioenergy</b>	5.11	Germany	Nature Energy	26.88	United States
<b>Food and Energy Security</b>	4.69	United Kingdom	Advanced Energy Materials	21.49	Germany
<b>Journal of Modern Power Systems and Clean Energy</b>	4.64	Germany	Nano Energy	15.46	Netherlands
<b>Biofuel Research Journal</b>	4.3	Canada	Energy Storage Materials	15.09	Netherlands
<b>Egyptian Journal of Petroleum Engineering</b>	4.09	Egypt	ACS Energy Letters	13.92	United States
<b>Engineering</b>	4.05	United States	Joule	12.43	United States
<b>Energy Science and Engineering</b>	4	United Kingdom	Renewable and Sustainable Energy Reviews	12.21	Netherlands

fluctuate depending on the type of information transmitted, the purpose of this, the receiver to which it is focused and the time at which it is carried out. The scientific contributions that are manifested as scientific articles in specialized journals, are the form of scientific dissemination that is most widely accepted (Bravo Hidalgo and León González, 2018 [9], Alonso, Perez, and Hidalgo, 2017 [10]).

(McCabe and Snyder, 2005) [11] It could be expected that new computerized technologies reduce the costs of production and distribution of journal content, and that these reduced costs take into account subscription prices; but these prices remain high (Bergstrom, 2001) [12] and, in fact, have continued to increase faster than inflation (McCabe, 2002) [13]. This fact has led to the proposal of a new business model for academic journals, with open access. Unlike a traditional magazine, which generates most of its revenue with subscription fees, an open access magazine makes its articles available for free on the Internet, generating revenue with author fees. As of October 2004, the Directory of Open Access Journals (DOAJ) listed more than 1300 open access journals in the most diverse areas of knowledge.

Good manuscripts provide a benefit to the reader; Bad articles no (Alonso, Perez, and Hidalgo, 2017) [10]. Readers cannot determine the quality of articles before reading them, and reading an article requires a cost of effort. Magazine



quality differences emerge endogenously through the talent of its publishers, where the most talented publishers can distinguish between good and bad articles with more precision. High quality magazines publish more good articles. This extension is useful because it allows a more realistic representation of Journals. In this context, the question is timely: do open access journals have a better chance of presenting high scientific quality, or not? Several researchers claim that the open access journal has the ability to socialize high-quality scientific contributions. The difference is in the capacity and professionalism of the editors of these magazines (Britain, 2004, 80) [14].

(Wilbanks, 2006) [15] Much of the debate about open access and non-open access journals has focused on the economic aspect. Another aspect should be considered as the great potential of technological approaches, such as text mining, collaborative filtering and semantic indexing. These analyzes are offering novel results on the current destiny of the scientific activity. Despite the real success in the open access movement, most academic research is not available, either for study or for software processing.

A lot of research in this area of social sciences, medical sciences, agronomy are socialized by open access journals. However, as this research shows, scientific contributions in the thematic area: Energy are much more popular among non-open access journals. This is due to the fact that research groups that focus on the thematic area of Energy, for the most part have enough resources to pay for the information contained in non-open access journals and also publish their work in these journals, by paying an author's fee. This reality greatly limits the development of research in this area of knowledge in developing nations, particularly in South American countries.

Open access is important for the advancement of science for several reasons. For the most part, the debate has focused on price and access arguments: Researchers communicate only with those of their colleagues who are fortunate enough to be in an institution that can afford to treat information contained in non-open access journals. Many researchers only have access to a tiny fraction of the relevant scientific contributions, and potentially missing vital documents in their fields (Bravo Hidalgo and Leon Gonzalez, 2018) [16]. Price and access barriers have a particular impact on researchers in developing countries and less rich institutions in developed countries. The impact of this is obvious: given the complexity of modern science, whether it is to understand the physical phenomena that define existence itself or extend the quality of life of humanity, our scientific community needs to be larger, connected and supportive.

## 6. Conclusion

Articles in the thematic area: Energy is more published in non-open access journals than in open access journals. There are many more non-open access journals than open access journals, specialized in the field of energetics. These trends differ from those in other areas of knowledge such as medicine, agronomy, biochemistry, planetary sciences and mathematics. In the academic area of

energy, non-open access journals receive many more appointments than open access journals. Non-open access journals have better SNIP and SJR scores than non-open access journals. United Kingdom is the country that provides more funding for both non-open access journals and open access journals.

## Conflicts of Interest

The authors declare no conflicts of interest.

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