

1-1-2013

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S, Aswathy Mrs. and A, Gopikuttan, "Open Access literature productivity of Physics: A DOAJ Perspective" (2013). *Library Philosophy and Practice (e-journal)*. Paper 971.

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# Open Access literature productivity of Physics: A DOAJ Perspective

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## **Abstract:**

*The World Wide Web has introduced new vistas for scholarly publishing which can be accessed online via internet. DOAJ is the most accepted and authoritative list of scholarly, peer-reviewed, fully Open Access journals. This study aims to analyze the contribution of open access literature in the subject physics through DOAJ. Directory of Open Access Journals covers literature contribution of a wide variety of subjects, countries and also different languages. Study analyses Indian contribution to DOAJ, institution-wise categorization, language-wise distribution.*

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**Keywords:** Open Access; Productivity; DOAJ

## **1. Introduction**

The web has introduced new opportunities for academic publishing online that can also be used to access research results. Open Access (OA) publishing (e.g. OA journals, preprints, post prints and digital repositories) has rapidly turned into a global platform for dissemination of scientific literature. A survey conducted in 1995 discovered only about 100 OA and peer-reviewed journals in the areas of science, technology and medicine (Hitchcock et al., 1996). In 2004, a study reported that there were 24,000 peer-reviewed research journals worldwide, but that only 5 per cent (1,200 titles) were OA (Harnad...et al., 2008). More recently, we can see an astonishing increase in the number of OA journals. Currently, the Directory of Open Access Journals (DOAJ) covers around 9490 journals in which 4819 journals are searchable at article level from 120 countries and includes 1112507 articles as on June 2013(DOAJ, 2013). Now DOAJ has got a new avatar with the introduction of second phase which provides article level search. It includes full-text and quality controlled scholarly journals, covering various subject areas.

## **2. Open Access: a new pathway to knowledge access**

BOAI definition of Open Access is the free availability of peer-reviewed literature on the public internet, permitting any user to read, download, copy, distribute, print, search, or link to the full texts of the articles. According to Krishnamurthy, M (2007), one of the major

barriers for scholars and researchers in universities is the lack of access to the current literature in their subject, much of which may be published in journals that have high annual subscription rates and too expensive for many libraries. The open access movement addresses this barrier by arguing for the “free availability of literature on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself” ([www.soros.org/openaccess/](http://www.soros.org/openaccess/)).

### **3. DOAJ: new means for publishing and archiving**

DOAJ (Directory of Open Access Journals) is the most recognized and most authoritative list of scholarly, peer-reviewed, fully Open Access journals and is hosted by Lund University Libraries, Sweden but is externally funded by sponsors and members. The initiative to start the project Directory of Open Access Journals (DOAJ) was taken in 2002 at the first Nordic Conference on Scholarly Communication (NCSC). The idea was to develop a one stop shop service which made it easier for libraries and aggregators to integrate OA-journals data in their services, for OA-publishers to get their journals visible and for readers to find OA-material (Johansson, Anna-Lena and Wahlgren, Ingela, 2008). This directory aims to provide a service by maintaining an inventory of scientific, quality controlled, full text open access journals to amplify the visibility and ease of use of open access journals and thereby promoting their augmented usage and impact. DOAJ has 9490 journals in which India’s contribution as on May 2013 is 551 journals. At article level DOAJ contains 4819 articles. Open access journals do have costs but changing how the service is paid for and publication fee is a very small fraction of the cost of doing research. Article Processing Charge (APC) covers the publishers cost for: Editorial i.e. handling of manuscripts, Technical i.e. development, maintenance and operation of online journal system, Production i.e. Formatting and mark up of articles and inclusion in indexing services. DOAJ has more than 10 percent of the world’s peer-reviewed journals, making this directory among the world’s largest collections of peer-reviewed scholarly journals.

### **4. Review of literature**

Agashe Ajay T, Lihitkar Shalini and Lihitkar Ramdas (2010) studied about the DOAJ, which lists open access journals, scientific and scholarly journals that meet high quality standards by exercising peer-review or editorial quality control and are free to all

from the time of publication based on the Budapest Open Access Initiative. Altogether 48 Business and Management E-journals were analyzed based on Country, Languages, Subject Headings and Accessibility of Archives of E-journals. Rafiq Rather and Shah Geelani (2008) attempts to evaluate the initiatives taken by India to make the intellectual output accessible for all by publishing them in Open Access resources like Open Access journals and archiving them in Open Access archives or repositories. The results revealed that India is continuously contributing in Open Access literature as some of the premier institutions, particularly in the science and technology area, are providing Open Access to their research publications. Kumar G. H., Hemantha...et al. (2012) attempt to evaluate the initiatives taken by India in contributing to open access repositories and journals with special reference to agricultural sciences. The results revealed that India is continuously contributing in open access literature as some of the premier institutions, particularly in the agriculture sciences. The position of India in terms of number of journals in the Directory of Open Access Journals (DOAJ) is 5th and in Directory of Open Access Repositories (OpenDOAR) India has 11th place in the world repository. Chauhan, Kaushal (2012) studied and evaluated open access e-journals in LIS available on Directory of Open Access Journals (DOAJ) which provides access to quality controlled Open access journals. The paper also provides guidance to students, researchers, scholars about free, full-text, quality-controlled scientific and scholarly journals in Library and information science available on DOAJ.

## **5. Objectives**

- 5.1 To study the subject-wise distribution
- 5.2 To analyse country-wise distribution
- 5.3 To study the contribution of Indian Journals
- 5.4 To find the journal having print as well as electronic version
- 5.5 To find out the distribution of priced vs. open access journals
- 5.6 To categorize language-wise distribution

## **6. Scope and Methodology**

The data has been collected from DOAJ from the subject category including Physics in General as well as astronomy and other subjects including acoustics and heat. The relevant details regarding the name of journal, publisher, country, language, keyword index etc have been collected and tabulated using MS Excel.

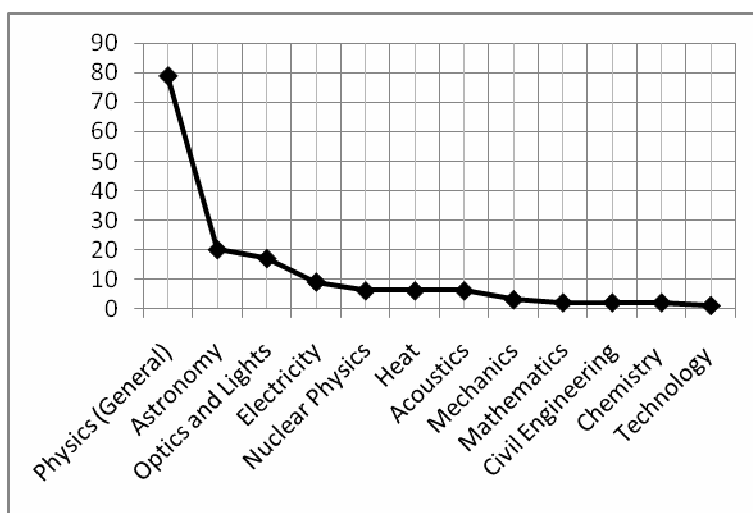
## 7. Data analysis and interpretation

### 7.1 Subject-wise distribution

There are 153 journals in the category physics which is published in DOAJ. Major subject categorization of physics journals are listed in table-1. There are twelve divisions in which there are 79 journals in general physics i.e. 5.63%. In the subject astronomy there are 20 journals which is in the second position i.e. 13.07%. There are 17 journals (11.11%) in the subject “optics and lights”. The subjects nuclear physics, heat and acoustics has got 6 journals each while in the subject mechanics there are 3 journals.

**Table – 1 Subject-wise distribution of journals**

SI No	Subject Name	Count	%	Cum %
1	Physics (General)	79	51.63	51.63
2	Astronomy	20	13.07	64.71
3	Optics and Lights	17	11.11	75.82
4	Electricity	9	5.88	81.70
5	Nuclear Physics	6	3.92	85.62
6	Heat	6	3.92	89.54
7	Acoustics	6	3.92	93.46
8	Mechanics	3	1.96	95.42
9	Mathematics --- Physics (General)	2	1.31	96.73
10	General and Civil Engineering --- Electricity	2	1.31	98.04
11	Chemistry (General) --- Physics (General)	2	1.31	99.35
12	Technology (General) --- Physics (General) --- Statistics	1	0.65	100
	Total	153	100	



**Figure-1 Subject vs Number of Journals**

### 7.2 Country-wise distribution of journals

Here countries in which the journals in physics published through DOAJ are analysed. There are 38 countries who contributed journals in DOAJ in physics subject. USA is the top

most country with 34 (22.22%) journals published. Second position is for Egypt with 24 (15.69%) journals. Third, fourth and fifth positions are for Germany, Ukraine and Poland with 11 (7.19%), 7(4.58%) and 6 (3.92%) journals respectively. For the countries like Brazil, India, Singapore and UK there are 5 (3.27%) journals at their credit. Even though India is in fourth position in journal contribution in DOAJ, in the subject physics India possess 6<sup>th</sup> position only.

**Table-2 Country-wise distribution of journals**

Sl No	Name of Country	Count	%	Cum %
1	United States	34	22.22	22.22
2	Egypt	24	15.69	37.91
3	Germany	11	7.19	45.10
4	Ukraine	7	4.58	49.67
5	Poland	6	3.92	53.59
6	Brazil	5	3.27	56.86
7	India	5	3.27	60.13
8	Singapore	5	3.27	63.40
9	United Kingdom	5	3.27	66.67
10	France	4	2.61	69.28
11	Mexico	4	2.61	71.90
12	Russia	4	2.61	74.51
13	Croatia	3	1.96	76.47
14	Italy	3	1.96	78.43
15	Japan	3	1.96	80.39
16	South Korea	3	1.96	82.35
17	Argentina	2	1.31	83.66
18	Armenia	2	1.31	84.97
19	Bulgaria	2	1.31	86.27
20	Canada	2	1.31	87.58
21	Switzerland	2	1.31	88.89
22	Bolivia	1	0.65	89.54
23	China	1	0.65	90.20
24	Colombia	1	0.65	90.85
25	Cuba	1	0.65	91.50
26	Czech Republic	1	0.65	92.16
27	Iran	1	0.65	92.81
28	Nigeria	1	0.65	93.46
29	Romania	1	0.65	94.12
30	Spain	1	0.65	94.77
31	Taiwan	1	0.65	95.42
32	Thailand	1	0.65	96.08
33	Turkey	1	0.65	96.73
34	United Arab Emirates	1	0.65	97.39
35	Venezuela	1	0.65	98.04
36	Hungary	1	0.65	98.69
37	Serbia	1	0.65	99.35
38	Slovenia	1	0.65	100
	Total	153	100.00	

### 7.3 Indian contribution

Among the physics journals in DOAJ, only 5 journal contributions from India in which 4 are in general physics category and one in Astronomy. Publisher-wise categorization shows that among these journals two journals are contributed by NISCAIR and Indian Academy of Sciences contributes two journals. Among these journals from India, Pramana: journal of physics is the oldest journal started in 1973. All these journals are in English Language and excluding the NISCAIR publications other journal charges a publication fees from the author.

**Table- 4 Journals published from India**

<b>Name of Journal</b>	<b>Subject</b>	<b>Publisher</b>	<b>Language</b>	<b>Starting year</b>	<b>Publishing Fees</b>
Indian Journal of Pure & Applied Physics	Physics (General)	NISCAIR	English	2007	No
Indian Journal of Radio & Space Physics	Physics (General)	NISCAIR	English	2006	No
Pramana : Journal of Physics	Physics (General)	Indian Academy of Sciences	English	1973	Yes
Physical Review & Research International	Physics (General)	SCIENCEDOMAIN International	English	2011	Yes
Journal of Astrophysics and Astronomy	Astronomy (General)	Indian Academy of Sciences	English	2001	Yes

### 7.4 Print vs. electronic

It is found that those journals which are born-digital are not maintaining the p-version of the journal. Those journals started with p-version and with the developments in open access movements transformed to fee-based to open access are maintaining p versions as a counterpart to e version which is available on subscription basis. Mostly the journals of Indian Academy of Sciences, National Institute of Science Communication and Research are having p and e version both. By the analysis, it is found that out of the 153 journals, 69 journals are having both p and e versions, while 84 journals are having only the e versions.

**Table – 5 Type of journals**

<b>Type</b>	<b>Count</b>	<b>%</b>
Electronic Journals	84	63.16
Print and Electronic	69	45.09
Total	153	100

## 7.5 Language-wise distribution

According to the table-, English is the most common language in which most of the journals publish the issues, i.e. 142 (73.96%) journals. Russian and Spanish language possess equal share of articles i.e. 10 (5.21%). Chinese, French and Ukrainian languages possess 6, 5 and 4 journals while 4 languages such as Armenian, Czech, Italian, Persian and Polish possess only one journal each.

**Table – 6 Language vs. No. of Journals**

<b>Language</b>	<b>Count</b>	<b>%</b>	<b>Cum %</b>
English	142	73.96	73.96
Russian	10	5.21	79.17
Spanish	10	5.21	84.38
Chinese	6	3.13	87.50
French	5	2.60	90.10
Ukrainian	4	2.08	92.19
German	3	1.56	93.75
Portuguese	3	1.56	95.31
Japanese	2	1.04	96.35
Slovak	2	1.04	97.40
Armenian	1	0.52	97.92
Czech	1	0.52	98.44
Italian	1	0.52	98.96
Persian	1	0.52	99.48
Polish	1	0.52	100
Total	192	100	

## 7.6 More than one language

It is found that, some of the journals publish in more than one language. Here table-7 reveals that the journals which publish in 2 languages are 21 (15.79%) in number while the journal published in three languages are 7 in number. Only 2 journals publish in 4 languages.

**Table – 7 More than one language**

<b>No. of Languages</b>	<b>No. of Journals</b>	<b>%</b>
2	21	15.79
3	7	5.26
4	2	1.50
Total	30	22.56



## 7.7 Publisher-wise distribution of journals

**Table – 8 Publisher vs No. of journals**

Sl No	No. of Journals	Cum	Cum %	Publisher	Cum	Cum %
1	1	1	1.75	70	70	78.65
2	2	3	5.26	12	82	92.13
3	3	6	10.53	1	83	93.26
4	4	10	17.54	1	84	94.38
5	5	15	26.32	2	86	96.63
6	8	23	40.35	1	87	97.75
7	10	33	57.89	1	88	98.88
8	24	57	100	1	89	100
Total	57			89		

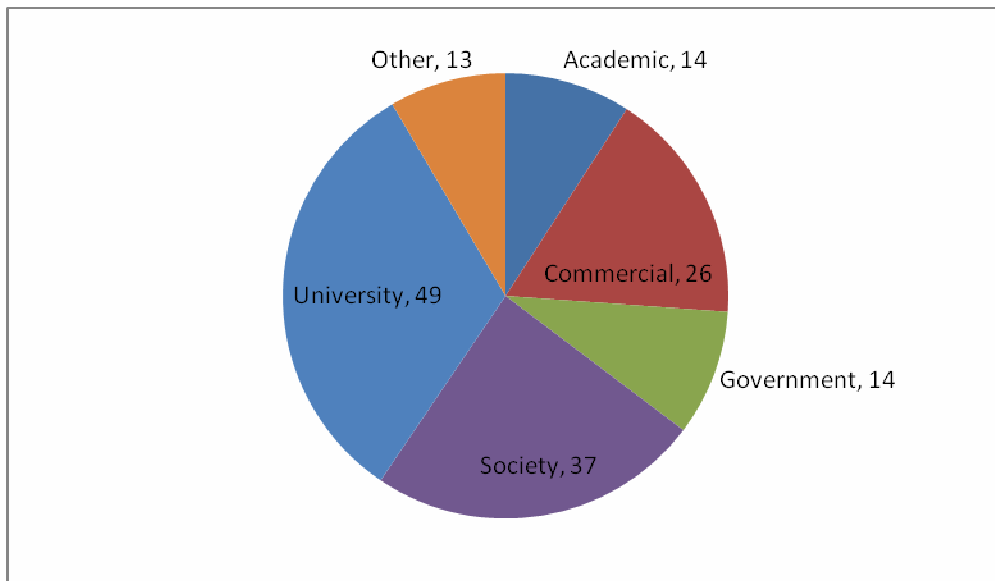
According to the table, 70 publishers contribute only one journal while one publisher contributes 24 journals i.e. Hindawi Publishing Corporation. Only 2 publishers contribute 12 journals. Next comes Bentham Open which publishes 10 journals in the field of Physics and Scientific Research Publishing publishes 8 journals. The publisher EMW Publishing has 5 journals at their credit. Among these journals, two Indian publishers – NISCAIR and Indian Academy of Sciences publishes 2 journals each.

## 7.8 Institution wise distribution of journals

The contributing organization were categorized into five categories such as Academic, Government Organizations, University, Society and Commercial Publishers and those agencies which does not come under these purviews are considered as others. It is evident from the table-9 that Universities are the major contributors to OA in DOAJ in Physics and second position is owned by learned societies. The commercial publishers contribute about 16 journals. Many R & D organizations and Institutes are contributing to OA journals. Here 13 journals are contributed by Government Organizations which is less compared to others.

**Table-9 Organization vs. No. of journals**

Type of Institute	No. of Publishers	%	Cum%	No. of Journals	%	Cum%
Academic	10	11.2	11.2	14	9.2	9.2
Commercial	16	18.0	29.2	26	17.0	26.1
Government	13	14.6	43.8	14	9.2	35.3
Society	26	29.2	73.0	37	24.2	59.5
University	14	15.7	88.8	49	32.0	91.5
Other	10	11.2	100	13	8.5	100
Total	89	100		153	100	



**Figure-2 Organisation vs. No. of Journals**

### 7.9 Categorization with publishing fee from author

Here from table-9 it is clear that almost half of the journals are charging an author fee for publishing an article. Under the subject category physics 75 journals are charging an author fee while 60 journals are not charging any fee. Eight journals are charging a conditional fee from authors while the details regarding the publishing fee is missing for 10 journals. Due to high maintenance cost and to maintain the standard of the journal the host publishers are charging fee from authors and it is made open to public. This fee amount collected as author fee is mainly utilized for editing and peer review of the journal.

**Table – 9 Author Publishing fee vs. Journals**

Publication Fee	Count	%
Conditional	8	5.23
Information missing	10	6.54
No	60	39.22
Yes	75	49.02
Total	153	100

## 8. Findings

In DOAJ, under the category Physics, there are twelve divisions in which journals in general physics possess top position and only a small number of journals are in the subject category Mechanics along with Mathematics, Chemistry and Technology. Country-wise analysis indicates that among 38 countries, who contributed journals in DOAJ in Physics subject, USA is the top most country and second position is for Egypt. There are only 5 journals in Physics category published from India and possess 6<sup>th</sup>

position only. All the journals from India in Physics subjects are in English language. Among the 153 journals, 30 journals are published in multiple languages. Most of the publishers contribute single journal while only a few publishers contribute more journals in DOAJ. Learned Societies contribute more in Open Access in Physics subject which is followed by commercial publishers and universities. In DOAJ under the subject category physics only 5 journals had changed their titles till date which is comparatively less. Some of the publishers charge fee from author mainly for meeting the expenses of editing, reviewing and to maintain the archive which is then made open to the public.

## **9. Conclusion**

Open access to scientific journals is beneficial to scholars and has wide support as a concept, but it needs viable revenue models and great commitment among its promoters. Open Access journals are one of the potential solutions to the crisis in serial's pricing, particularly for a country like India, where most of the government academic libraries do not have adequate funds to keep the subscription of these journals by paying huge amounts. In short, we can conclude that OA movement made available the research output from academic and research institutions to the public for free. Society as a whole benefits from an expanded and accelerated research cycle in which research can advance more effectively because researcher have immediate access to all the information they need.

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