

## **Physics Researchers' Perception of Advantages and Disadvantages of Open Access Journals: A study**

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### **ABSTRACT**

*The purpose of this research project is to explore the perception of open access journals among physics researchers. The paper presents the findings of questionnaire survey and interviews to examine perceived advantages and disadvantages of open access journals. Even though Bangalore has a large number of physics researchers spread across various research institutions, this study is limited to physics researchers of Indian Institute of Science and Raman Research Institute, Bangalore, India. We believe that results of this survey will help both libraries and publishers in understanding awareness about open access journals. A structured questionnaire was distributed to 260 physics researchers; 200 responses were obtained. The analysis revealed that researchers give priority to factors like quality of peer review and impact factor before selecting an open access journal for publishing. Further, this study also showed that 80 per cent of researchers agree that there is fundamental benefit in open access publishing.*

**Keywords** – Physics researchers, Impact factor, Article processing charge (APC), Research institutions, Benefits of open access.

### **1. Introduction**

Open access (OA) journals have emerged as an alternative to the subscription model for journals. Researchers need to look at several aspects of OA journals before publishing their work some of the aspects are reputation of the journal, relevance of journal content, quality of peer review and journal's impact factor. In the present study an effort has been made to understand the importance given by physics researchers to these aspects. Physics researcher community has for long followed the convention of self archiving their preprints in the subject repository arXiv. In parallel reputed publishers like American Physical Society (APS), American Institute of Physics (AIP) and Institute of Physics (IOP) and have published a number of OA journals with good impact factor. This study also attempts to probe the advantages and disadvantages of OA journals. We report here the views and perceptions of 200 physics researchers comprising four categories of users namely Junior Research Fellow (JRF), Senior Research Fellow (SRF), postdoc and faculty.

## **2. Open access**

According to the Budapest Open Access Initiative (BOAI 2002) definition, open access means “users can read, download, copy, distribute, print, search or link to the full text of articles, crawl them for indexing, pass them as data to software or use them for any lawful purpose, without financial, legal or technical barriers other than those inseparable from gaining access to the internet itself”. OA facilitated users to access open access journals without library subscription. Further, the emergence of OA journals attracted authors to publish in them as well as to use it them as readers.

Vlachaki & Urquhart, (2010) in their study included the following four modes of open access.

- Author-pays journals,
- Free access to articles after a period of time [or delayed access]
- Self-archiving peer-refereed articles
- Free access articles through databases

Harnad et al (2002) points out that open access to an article may be provided either by publishing in open access journals (Gold route) or by publishing in non-OA journals and self-archive it in an OA archive (Green route). In gold route, authors can choose the following:

- Publishing in OA Journals without article processing charges (APC) e.g. Pramana Journal of Physics
- Publishing in OA Journals with APC charges. e.g. Physical Review X

In green route, some publisher’s allow authors to provide open access to the author version of their publications through their respective Institutional Repository and on their personal web pages. American Physical Society (2014), supporting green rout states that “The author or the author's employer may use all or part of the APS published article, including the APS-prepared version (e.g., the PDF from the online journal) without revision or modification, on the author's or employer's website.”

## **3. Review of Literature.**

The survey results by Kaba and Said (2015) on open access use, awareness and perception at Al Ain University of Science and Technology (AAU), United Arab Emirates on 34 full-time faculties revealed that respondents have positive perceptions of OA resources. Another interesting study by Nicholas et al, (2005) on 3,787 users from 97 different countries showed that respondents self-archiving their publications on their home page or on their website were likely to publish in OA journals. In the same study Nicholas et al (2005), point out that respondents agree that OA journals publishing would result in fewer papers being rejected.

The open access movement lead to lot of initiatives, including Directory of Open Access Journals (DOAJ) . Sarika Sawant (2009) in her study on open access journal initiatives in India states that “India has contributed towards open access growth by publishing 178 Indian open access journals which come to about 21 per cent of total DOAJ journals”. Singh and Kumar (2016) in their study on research impact of OA journals in animal sciences point out that within a short period after origin; more than one third of OA journals listed in DOAJ had impact factor and h-index. They also conclude that in comparison to core journals in animal sciences, the research impact of OA journals is not very impressive. In a study on OA publishing in Indian premier research intuitions Bhat (2009) showed that only standard, peer

reviewed OA journals such as Current Science, Bulletin of Materials Science and Pramana Journal of physics, used by Indian scientific community for dissemination of their research findings.

Harish and Geetha (2013) conducted a study on faculty and research scholars of engineering colleges in Mysore the authors found that a majority of respondents are highly satisfied with the content available in open access journals. Aswathy and Gopikuttan (2013) in their study on OA literature productivity of physics concluded that open access journals are one of the potential solutions to the crisis in serial's pricing, particularly to a country like India, where libraries do not have adequate funds to subscribe to journals. Nagaraj & Bhandi (2016) in their study on use and awareness of open access resources show that physics researchers at Raman Research Institute, Bangalore are satisfied with available OA resources like arXiv and NASA/ADS and they also feel that these resources are useful and trustworthy for their research.

Nature (2015) conducted a survey of 22,000 academic researchers and found that there needs still more education on available funding and open access mandates. A Study by Chen & Due (2016) on status of open access library and information science journals authors recommend further studies in this area such as total citations, bibliographic specification and others aspects of OA journals.

#### **4. Objectives of the Study**

- To explore the factors influencing publications in open access journals
- To ascertain perceived advantages and disadvantages of open access journals by physics researchers.
- The present study looks at the following advantages and disadvantages.
- Advantages include innovative research articles in OA journals, larger readership than non-OA journals, visibility in search engines and more citations.
- Disadvantages are lower impact factor, not having a clear copyright policy, expensive article processing charges and not deriving any benefits in OA publishing.

#### **5. Scope and Limitations of the Study**

This study is limited to physics researchers of Indian Institute of Science (IISc) and Raman Research Institute (RRI) Bangalore, India. We believe implications of this survey will give a better insight in understanding open access journals for both libraries and publishers. Further, this study focuses on full-time research scholars and faculty of these institutions. Open access journals have a number of facets but the present study is limited to selected advantages and disadvantages of OA journals.

#### **6. Research Methodology**

To assess perceived advantages and disadvantages of physics researchers the survey method was used. Keeping in view the objectives of the study, required data were collected through distribution of a structured questionnaire to faculty, research scholars, and postdocs. After conducting pilot study questionnaire was designed using Likert's five-point scale with closed-ended questions. The first part consists of demographic information, second part consists factors influencing publication of open access journals, and last part consists of perceived advantages and disadvantages of open access journals.

The questionnaires were distributed to 260 physics researchers of Indian Institute of science (IISc) and Raman Research Institute (RRI), Bangalore. We received 200 responses from faculty, postdoc and research scholars of the two institutions

### 7. Data Analysis

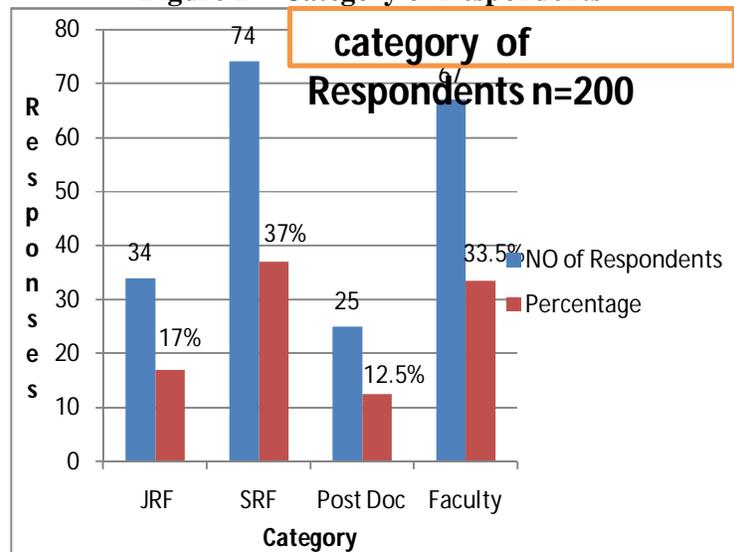
The data collected from the questionnaire were analyzed through Statistical Package for Social Sciences (SPSS). The results are presented in the form of tables and figures. Choices ‘Strongly disagree’ and ‘disagree’ were considered as non-acceptance of the statement and ‘strongly agree’ and ‘agree’ choices were considered as acceptance of statement ; neither agree nor disagree was considered as undecided.

**Table1- Distribution of Questionnaires and Response (N=200)**

SL. No.	Institute	Questionnaires Distributed	Number of Respondents	Percentage
1	RRI	120	102	85
2	IISc	140	98	70
	Total	260	200	76.92

From table one it is evident that 200 completed questionnaires were received which is a response rate of 76.92% with RRI and IISc response at 102 and 98 respectively. Figure one shows category wise respondents out of 200 responses 67 are faculty members and 25 are postdocs among research scholars; 37 are Senior Research Fellow (SRF) and 34 are Junior Research Fellow (JRF).

**Figure 1 - Category of Respondents**



#### 7.1. Factors that influence publication in open access journals

Several factors influence publication in OA journals such as journal impact factor and quality of peer review. Authors consider these factors while deciding to publish their articles in open access journals. Respondents were asked to choose from below four factors that influence the decision to publish in OA journals. They were allowed to select multiple choices.

- Reputation of the journal
- Relevance of journal content
- Quality of peer Review
- Journal’s impact factor.

**Table – 2 Influencing factors to publish in OA journals**

SL No	Factors		No. of respondents	Percentage	Rank
1	Reputation of the Journal	Yes	114	57.0%	3
		No	84	42.0%	
		Don't Know	2	1.0%	
2	Relevance of Journal content	Yes	102	51.0%	4
		No	96	48.0%	
		Don't Know	2	1.0%	
3	Quality of Peer review	Yes	139	69.5%	1
		No	59	29.5%	
		Don't Know	2	1.0%	
4	Journal's Impact Factor	Yes	132	66.0%	2
		No	66	33.0%	
		Don't Know	2	1.0%	
5	Don't Know any of the above	Yes	9	4.5%	5
		No	191	95.5%	

It is evident from table 2 that all the four factors are important for physics researchers, with more than (50%) choosing each of them. Quality of peer review was most important with (69.5%) choosing it at second rank was journal impact factor with (66%) and least was relevance of journal content was at last position. Only nine respondents constituting (4.5%) indicated that they are not familiar with these factors. In a similar study conducted by Nature group (2015) revealed that a decreasing numbers of authors are concerned about perceptions of the quality of open access publications in 2014 and 2015.

## 8. Advantages OA journals

To determine perception of advantages and disadvantages of OA journals based on their usage a set of probable advantages and disadvantages was offered as choices in the questionnaire. Advantages of OA journals include driving innovative research articles, larger readership, higher visibility and more citations. For each choice, respondents were asked to grade on the five point Likert scale namely strongly disagree, disagree, neither agree nor disagree, agree and strongly agree.

### 8.1. OA journals bring innovative research articles-

We wish to find that OA journals are perceived as publishing articles pertaining to recent developments in the subject.

Table 3 shows that out of 200 respondents around 168(84%) chose strongly agree and agree only three (1.5%) disagree the statement. Category wise numbers of JRF, SRF, Postdoc and faculty show the similar pattern.

**Table -3 OA journals bring innovative research article.**

Advantage		Category				Total with Percentage
		JRF	SRF	Postdoc	Faculty	
OA journals bring Innovative research articles	Strongly Disagree	0	0	0	0	0
	Disagree	0	2	0	1	3(1.5)
	Neither agree nor disagree	2	11	5	11	29(14.5)
	Agree	14	25	16	38	93(46.5)
	Strongly Agree	18	36	4	17	75(37.5)
	Total	34	74	25	67	200(100.0)

### 8.2. OA journals have a larger readership of researchers than non-OA Journals –

Toll access journals requires a subscription for full text access. Since OA journals are free to access it is reasonable to believe to have larger readers. To confirm this was questioned to respondents. Table 4 shows out of 200 respondents 79(39.5%) agree and 81(40.5%) strongly agree thus 160(80%) accept that OA journals have larger readership of researchers. Only nine respondents (4.5%) disagreed and 31(15.5%) respondents opted for neither agree nor disagree. More than fifty per cent of JRF, SRF, Postdoc and faculty answered as strongly agree and agree for this statement

**Table -4 OA journals have larger readership**

Advantage	Category					Total with Percentage
	JRF	SRF	Postdoc	Faculty		
OA Journals have larger readership of researchers than non-OA Journals	Strongly Disagree	1	0	0	0	1(.5)
	Disagree	0	5	0	3	8(4.0)
	Neither agree nor disagree	2	12	5	12	31(15.5)
	Agree	11	28	13	27	79(39.5)
	Strongly Agree	20	29	7	25	81(40.5)
	Total	34	74	25	67	200(100.0)

### 8.3. OA Journals have higher visibility in Google search engine. –

Visibility refers to availability of articles in search engines results and DOAJ database. In the pilot study, most the researchers said that they use Google for searchers hence we referred the same in this study. Table 5 shows that out of 200 respondent 62(31%) strongly agree and 74(37%) agree thus (68%) accept this statement. A minority of (9.5%) disagree with this statement and 43(21.5%) were uncertain and they opted for neither agree nor disagree.

Category wise response shows that more than (50%) of JRF, SRF and faculty are in favor of this statement. Around (44%) of postdoc researchers are accepting this statement.

**Table -5 OA journals have higher visibility in Google.**

Advantage	Category					
		JRF	SRF	Postdoc	Faculty	Total with Percentage
OA Journals Provides higher visibility in Google search engine.	Strongly Disagree	0	2	0	0	2(1.0)
	Disagree	1	5	7	6	19(9.5)
	Neither agree nor disagree	4	13	7	19	43(21.5)
	Agree	16	31	4	23	74(37.0)
	Strongly Agree	13	23	7	19	62(31.0)
	Total	34	74	25	67	200(100.0)

**8.4. OA Journals have more citations** – A study conducted by Pandita and Ramesha (2013) on decadal analysis of DOAJ concludes that citation and impact factors of OA journals have increased manifold . On these lines present study showed that out of 200 respondents 30(15%) strongly agree and 67(33.5) agree thus (48.5%) accept this statement and (31.5%) disagree for this statement, remaining (20.0%) respondents are undecided.

Coming to category wise response (55%) of faculty, (56 %) of Postdocs ,(39.18 %) of SRF and (38.23% ) of JRF accept this statement.

**Table -6 OA journals have more citations.**

Advantage	Category					
		JRF	SRF	Post doc	Faculty	Total with Percentage
OA Journals have more citations	Strongly Disagree	1	1	1	1	4(2.0)
	Disagree	11	28	6	14	59(29.5)
	Neither agree nor disagree	5	16	4	15	40(20.0)
	Agree	8	19	10	30	67(33.5)
	Strongly Agree	9	10	4	7	30(15.0)
	Total	34	74	25	67	200(100.0)

## 9 Disadvantages of OA journals

Even though open access journals provide free full-text access to users, they are perceived to have some disadvantages. Some of the factors that constrain authors from publishing in them are studied here.

**9.1. OA journals have lower impact factor** – For any journal, impact factor is considered the important aspect for publishing. Table, 7 shows below that 83 respondents (41.5%) disagree and (4.5%) Strongly disagree total (46%) disagree for this statement only (34.5%) are in favour of this statement.

Among research scholars JRF (47%) strongly disagree and disagree but SRF agree that OA journals have lower impact factor. However (50%) of faculty and postdocs do not agree it has as disadvantage.

**Table – 7 OA journals have lower impact factor**

Disadvantage	Category					
		JRF	SRF	Postdoc	Faculty	Total with Percentage
OA journals have lower impact factor	Strongly Disagree	4	4	1	0	9(4.5)
	Disagree	12	21	13	37	83(41.5)
	Neither agree nor disagree	5	18	3	13	39(19.5)
	Agree	12	28	8	14	62(31.0)
	Strongly Agree	1	3	0	3	7(3.5)
	Total	34	74	25	67	200(100.0)

### 9.2. Article processing charge (APC) for OA journals is highly expensive-

Though OA journals provide several benefits to users, most of OA journals charge APC from authors. In these lines Balaram (2013) states that the emergence of these open access movement allowed publishers to sense a commercial opportunity to bring in ‘author pays’ model of scientific journals This is perceived as expensive. In response to this statement 115 respondents (57.5 %), strongly agree and (21.5%) agree in total (79%) accept this as disadvantage. Only three percent disagree for this statement.. Category wise response also shows that both research scholars and faculty totally accept this statement. The majority of postdocs (72%) also agree with this statement.

**Table – 8 OA journals have expensive APC**

Disadvantage	Category					
		JRF	SRF	Postdoc	Faculty	Total with Percentage
Article processing charge (APC) for OA Journals is highly expensive	Strongly Disagree	0	0	0	0	0
	Disagree	1	3	1	1	6(3.0)
	Neither agree nor disagree	5	18	6	7	36(18.0)
	Agree	10	12	4	17	43(21.5)
	Strongly Agree	18	41	14	42	115(57.5)
	Total	34	74	25	67	200(100.0)

### 9.3. Copyright Policy of OA journals is not clear

Copyright policy of open access journals varies among publishers. The question posed in this was whether publishers copyright policy is comprehensible or not. In response to this, (32%) strongly agree and six percent agree that open access journals do not have a clear copyright policy. Around (27%) disagree and (34.5%) were undecided. It is evident from table -9 that (43%) SRF and (43.28 %) faculty agree with this statement whereas less than (30%) of JRF and postdocs disagree for this.

**Table – 9 OA journals copyright policy is not clear**

Disadvantage	Category					
		JRF	SRF	Postdoc	Faculty	Total with Percentage
Copyright Policy of OA journals is not clear	Strongly Disagree	0	0	0	1	1(.5)
	Disagree	10	16	6	22	54(27.0)
	Neither agree nor disagree	15	26	13	15	69(34.5)
	Agree	7	29	6	22	64(32.0)
	Strongly Agree	2	3	0	7	12(6.0)
	Total	34	74	25	67	200(100.0)

#### 9.4. Not deriving benefits from open access publishing-

Open access publishing comes in two different modes viz. green and gold. Each mode has its own advantages and disadvantages. Authors choose according to their feasibility and derive benefits. To ascertain whether OA journals derive benefits over non-OA journals we posed this question. In response to this as shown in table 10 out of 200 respondents, (74%) disagree and (6%) strongly disagree for this and only (7%) believe that there is no benefit in open access publishing.

It is clear that most of the research scholars, postdoc and faculty disagree with this statement. Since (80%) of respondents disagree for this we conclude users are benefited by publishing in OA journals.

**Table – 10 : Not deriving benefits from OA publishing.**

Disadvantage	Category					
		JRF	SRF	Postdoc	Faculty	Total with Percentage
There are no fundamental benefits in open access publishing	Strongly Disagree	3	6	0	3	12(6.0)
	Disagree	24	53	22	49	148(74.0)
	Neither agree nor disagree	4	10	2	10	26(13.0)
	Agree	2	4	1	4	11(5.5)
	Strongly Agree	1	1	0	1	3(1.5)
	Total	34	74	25	67	200(100.0)

## 10. Findings of the Study

Opinions on advantages and disadvantages of OA journals were collected by a set of questions posed to physics researchers. Respondents were asked to report the extent of agreement or disagreement with statements about OA journals. Major findings are as follows.

- Most of the respondents (84%) strongly agreed or agreed that OA journals bring innovative research articles .
- Around (80%) agreed that OA journals have a larger readership of researchers than non-OA Journals.
- More than fifty per cent (68%) agreed that OA journals provide higher visibility in Google search engine.
- Less than half (48.5%) agreed that OA journals have more citations. This may be due to lack of awareness or not willing to publish in OA journals.

- Nearly (46%) disagree that lower impact factor of OA journals as disadvantage and (34.5%) agree that lower impact factor as a disadvantage.
- The majority (79%) agree that article processing charges for OA journals is a disadvantage for publishing in them.
- In a study by Lwoga (2013) on health sciences faculty awareness, attitudes and use of OA scholarly communication showed that “major barriers to OA usage and publishing were related to ICT infrastructure, awareness, skills, journal author-pays model, and copyright and plagiarism concerns”. In these lines this study also shows that Non-clarity of copyright policy of OA journals is considered as a disadvantage by (38%) percent of respondents around (27.5 %) disagrees for this.
- Most of the physics researchers (80%) accept that there is a fundamental benefit in open access publishing. Even though the majority of OA journals in physics impose APC, ultimate benefits like citation and visibility are important for authors.

## **11. Conclusions and suggestions**

The major findings that emerged from this study are diversity of opinion and practice towards OA journals amongst physics researchers.

- Younger researchers comprising JRF and SRF agree that OA journals have lower impact factor and copyright policy is not clear. Both faculty and research scholars accept that there is benefit in publishing in OA journals. Majority (86%) of young researcher agree that OA journals bring innovation in research articles.
- Older respondents consisting of research faculty (88%) feel that article processing charge of OA journals is expensive. More than 50 percent of faculty accept that OA journals derive more citations and have a higher impact factor. This may be because they publish more and are aware of OA journals benefits.
- More than (70%) of postdoc researchers accept that OA journals bring innovation in research articles and also agree that OA journals have larger readership. Around (56%) of postdoc agree that OA journals have more citations. Coming to disadvantages postdoc disagree with the statements that OA journals have lower impact factor and that there are no fundamental benefits from OA publishing.
- APC and non-clarity of copyright policy of OA journals is considered as a disadvantage by physics researchers.

This study reveals that physics researchers before selecting OA journal for publishing they give priority to factors like quality of peer review and impact factor. Other factors like reputation and content of journals are not ignored.

However, several parameters can be tested as advantages or disadvantages of open access journals; this study is limited to four parameters of advantages namely innovative research, having a larger readership, higher visibility, and more citations. The results show that OA journals are to be adequate with reference to first three parameters but researchers look for higher citations in OA journals.

Disadvantages of OA journals studied include impact factor, APC, clear copyright policy by publishers and benefits of OA publishing. Majority of respondents disagree that lower impact factor of OA journals as disadvantage and they strongly agree that APC is expensive. The interesting outcome of this study is that all respondents including JRF, SRF and faculty accept that OA publishing has fundamental benefits. This may be related to practice of

physics researchers self-archiving their preprints in subject-based repositories like arXiv from which they get motivated to publish in open access journals.

The response shows that most physics researchers are aware of the concept of OA journals and using them. In all the above eight parameters studied around twenty percent of respondents were undecided about factors. The reasons may be their ignorance of OA journals or fear of copyright issues and plagiarism. Therefore, we recommend libraries and publishers to educate users through orientation programmes and workshops about importance of open access publishing. To improve the rigor of selection of OA journals in 2016 DOAJ carried out a procedure that removed around 3300 OA journals from its database that did not meet its criteria of selection. We believe that this study provides an insight to the factors that OA journal publishers should consider to improve their journals.

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