

# Measuring scientific value of Indian journals beyond impact factor: a case with physics–chemistry–biology journals

Bhaskar Mukherjee

*Qualitative scientific journals play a vital role in scholarly communication processes. However, during the last few years, there is a mushroom growth of journals in every discipline in India. There has been no single source of systematic advice on how to measure the scientific value of Indian journals. The present study is an attempt to minimize the gap by developing a mechanism for measuring scientific value of Indian journals. Consulting various international databases and their journal inclusion policy, a viable mechanism has been devised and tested with 100+ Indian journals in the fields of physics, chemistry and biology. The results indicate that although the quantity of yearly additions of new journals in each of the three disciplines is quite impressive, the yearly discontinuation is also alarming. Almost 29% of physics journals, 11% of chemistry journals and 21% of biology journals were stopped within a year. Although irregularity in publication, improper execution of review process, non-disclosure of article processing charges, lower percentage of foreign contributors and low citation rate were identified as some drawbacks with Indian physics, chemistry and biology journals. The percentage of predatory journals in these three disciplines is quite less till date. In order to choose a better platform of scholarly publishing, this study suggests some recommendations for prospective authors.*

**Keywords:** Scientific value – Indian journals, scholarly journal publishing – India, status of PCB journal – India.

In the publishing domain, reputed scientific research journals have some common features of reliability. These include a genuine peer review – even with a low rejection rate; an editor and editorial board who acknowledge their association with the journal and work for the journal; encouraging scientific debates, criticisms and comments; permanent visibility – the published work will be permanently available; and clear and transparent pricing (if author is required to pay processing and publication fees or article processing charges (APCs)). Importantly, to be called a journal it must publish regularly, be it print or web publishing. Absence of most of these features indicates that the journal in question is not well recognized in the scholarly communication system<sup>1</sup>.

In the last few years, there is a mushroom growth of journals in every discipline in India. On the other hand, there has been no single source of systematic advice on how to measure the scientific value of Indian journals. The only available indicator is the impact factor, a measure of citation likelihood of journals, persons and institutions

throughout the world. However, such surrogate measures cannot be widely considered for Indian journals because of the fact that most Indian journals are yet to index in the Thompson Reuter's (currently Clarivate Analytics) database. Further, existing literature also reveals that impact factor alone is not the best possible way to measure the impact of scientific research.

## Earlier studies

Since inception in 1665, journals have served as a primary vehicle to share new ideas among peers. By publishing in a journal, scientists establish ownership of their intellectual property<sup>2</sup>, validating the quality of research<sup>3</sup>. Goldreich<sup>4</sup> identified four roles of journals:

- Timely dissemination of scholarly and technical work.
- Evaluation and verification of the contents of such work.
- Archiving such work.
- Serving as basis for scholarly credits.

He adds that the first role of journals has been abolished in the light of conference discussions and new media such as online publication; however, it was the first role that

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made journals central to the scientific process. Gradually the journal's role has shifted from only disseminating knowledge to becoming a source of gaining greater prestige and merit within the scientific community by authors and academics publishing articles in such journals.

The development of the World Wide Web was a boon to the journal project. One of the important breakthroughs of the post-web era is that a large number of journals are also available in open access. Presently, open access (OA) advocates two types of strategies for promoting free availability of scholarly literature: 'Green' and 'Gold' roads to OA<sup>5</sup> respectively. While a green publisher (or journal) has given a green light to its authors to self-archive their papers (i.e make the research output open by depositing the full text on a toll free, publicly accessible web site), gold OA publishers ask for charges from the author instead of users to publish articles.

Considerable literature claims that one of the important criteria to judge the scholarly value of journals, either subscription based or open access, is peer review. At the same time studies also mention that different types of research cannot be validated by a single reviewer. A reviewer can check the accuracy of a paper by reading the text without reviewing external evidence beyond other published sources. For example, a reviewer is unlikely to replicate experimental results to review articles in medical science, computer systems or even pure mathematics<sup>6</sup>. Coley<sup>7</sup> explained that peer review of scholarly publications is a 'broken' system because of (often) lengthy timelines involved between submission, review and publication, but believes that 'like the majority in our field, peer review (even, and especially, blind peer review) provides certain checks and balances, collaboration, and prestige to our publications. 'While selecting where to publish important results, an established researcher is often more interested in establishing primacy through rapid publication than in the imprimatur of peer review'<sup>8</sup>.

### Measuring scientific value of Indian journals

The most pertinent question in this existing situation is how to effectively measure the contribution of Indian science globally. The present study aims at developing precise methods for measuring and evaluating the scientific value of Indian journals in the fields of physics, chemistry and biology (PCB). The specific objectives of the present paper are:

- To trace and track the growth of scientific journals of India under PCB disciplines, and to identify the present status.
- To evaluate the scientific value of PCB journals by developing an alternative mechanism which is not necessarily only by counting citations.

### Methodology developed

In order to fulfil our two-fold objective, we started our study by identifying journals by consulting various print as well as web resources. Since our study started in the last quarter of 2015, we identified journals that were available in December 2014. By consultation, a total of 45 physics journals, 47 chemistry journals and 104 biology journals were identified. Mere criteria of having International Standard Serial Number (ISSN) is not a benchmark of treating a journal as peer-reviewed, referred or scholarly. Therefore, in the next step we attempted to develop a mechanism for evaluating Indian journals. In this stage, we consulted several international databases and studied their policies for inclusion of journals in such databases. Databases like WoS, SCOPUS, Indian Science Abstracts, Directory of Open Access Journals (DOAJ), Scientific Electronic Library Online (SciELO), etc. were consulted for this purpose. The consultation of various databases led to a better understanding the essential issues for evaluation of a journal and helped develop a conceptual framework for measuring quality of Indian journals. Accordingly, a mechanism for journal evaluation that goes beyond the impact factor was developed. In this mechanism, a toolbox consisting of 30 criteria and several sub-criteria was identified and grouped into four categories: (1) basic criteria, (2) essential criteria, (3) subsidiary criteria and (4) publisher criteria. Each criterion was further assigned with a value (positive or negative) ranging from 0.001 to 0.1. The sum of all values indicates the relative score of a journal in our system.

The scoring system we devised is tentative and should never be considered as final; but it is relatively free from bias because it can be applied by anyone. Over time, the experience gathered from actual handling of data may lead to further development of the approach. Among the criteria for measuring quality, there are no neutral criteria. Every criterion has a relative weight, as well as positive and negative values. Just because a publisher or publication has a negative score, it does not necessarily imply that the publisher and publication are poor.

We believe that all the 30 criteria developed are important in thoroughly evaluating the quality of any journal. However, in the present study, we have considered 10 essential criteria and score journals accordingly. The detailed methodology of scoring is explained in Annexure 1. The 10 point criteria are: (a) longevity and availability; (b) promptness and regularity; (c) review policy; (d) editorial quality; (e) internationalization of editorial members and contributors; (f) number of articles per issue; (g) ratio of cited/uncited articles; (h) inclusion of journals in conventional databases; (i) time-delay in publishing, and (j) ethical procedures followed. In order to test our mechanism we have applied these 10 criteria in 60 journals of PCB and calculate journal score. The journals and related score is mentioned in Annexure 1.

**Table 1.** Cumulative growth of PCB journals in India

Cumulative growth	Physics	Chemistry	Biology
No. of journals available up to 1950 (>50 years gap)	3	3	13
No. of journals available during 1951–2000 (50 years gap)	31	21	105
No. of journals available during 2001–2010 (10 years gap)	59	39	178
No. of journals available 2011 onwards (5 years gap)	63	60	236

**Table 2.** Status of PCB journals in India

Status	Physics	Chemistry	Biology
Journals live up to 2013	45	47	104
Journals live up to 2014	32 (71.1%)	43 (89.3%)	83 (79.8%)
Percentage of journals available in open access	71.87%	74.4%	65.0%
Percentage of OA journals follow article processing charges publishing model	74%	68%	72%

## Results and discussion

### *Longevity and availability*

This criterion attempts to examine how long the journal has been published regularly as per the stated frequency and how the journal can be accessed? Table 1 shows the cumulative growth of PCB journals during the last 100 years. Table 2 shows the percentage of journals that stopped publication during this decade.

As indicated in Table 1, there is a phenomenal difference in the quantity of journals published in the last 60 years before the year 2000 and the 15 years after 2000. In the last fifty years or so, before 2000, there were only 31 journals in physics, 21 journals in chemistry and 105 journals in biology. In only 15 year after 2000, it reached 63 journals in physics, 60 journals in chemistry and 236 journals in biology. One possible reason may be technology; another may be the evolving of a new model of publishing, i.e. open access and a new business model of open access (OA), i.e. gold OA.

Although the number of yearly additions of new journals in each of the three disciplines is quite impressive, at the same time the yearly discontinuation is also alarming. Almost 29% of physics journals, 11% of chemistry journals and 21% of biology journals that were live in 2013 stopped publishing by 2014. We observed that most of the terminated journals started their publication only from 2005 onwards. Of the total live journals, 72%, 74% and 65% journals of PCB respectively, are accessible without any subscription fees, i.e. end users can access journals free of cost. It is interesting to note that a majority of chemistry journals in India are now available free of charge, while a majority of biology journals are available on subscription basis.

If anybody publishes an article in a journal that later ceases publishing, the likelihood that other scholars are able to readily access it is indeed very low. This is one of

the risks of scholarly publishing and the risk of such discontinuation is higher with newly established journals. One possible way to overcome such a scenario is to submit articles to only those journals which maintain digital archiving for their back volumes or at least allow authors to submit articles in institutional repositories.

It is true that in India a majority of journals are now available free of charge. Each format has a separate benefit and we believe that open access is a very positive component. At the same time it is also important to note that making journals open access does not mean publishing anything of any quality. Heather Joseph (quoted in Straumsheim)<sup>9</sup> executive director of the Scholarly Publishing and Academic Resources Coalition (SPARC), in her report quoted that ‘The practice of judging authors on where an article is published rather than on the quality of information in the article itself is clearly one that needs to be challenged’. Therefore, format of publication is not as important as the quality of contents.

### *Promptness and regularity*

Under this criterion we have checked in the last five years, how many times various journals of a subject have missed their pre-stated frequency or combine more than one issue in one issue. Table 3 shows the result.

It was observed that of the total 60 biology journals considered, 25 journals did not maintain the frequency stated in their documentation. This was one of the notable drawbacks of the biology journals.

### *Review policy*

The peer review process is most likely the most important quality control aspect of the publishing process, and thus how it is conducted is important. However, it is difficult to ascertain, as the system of peer review of journals is a

**Table 3.** Regularity in publication

Status	Physics	Chemistry	Biology
Percentage of journals maintain regularity	72%	89%	59%
Number of times combined issues came (during last 5 years; irrespective of journals)	6(5)	16(6)	29(11)
Number of times issues missed (irrespective of journals)	14(5)	48(13)	65(12)

human-handled quality control process. Declaring review processes as ‘double blind’ in journal documentation does not prove that the journal seriously follows the process. Similarly, not explaining review processes in detail also does not prove that the journal does not have a proper review policy. In our study we observed that at least 12–18% journals in PCB did not correctly inform as to how the article evaluation process occurs and what criteria are used in the assessment of submitted articles. Furthermore, at least 22–28% of journals did not complete the basic task of review as the reference style differed significantly from article to article.

*Mimicry nomenclature as an indicator of predatory:* Beall<sup>10</sup> explained that ‘many journals and their publishers use adjectives such as “world”, “global” and “international” in the journal title. Some sites appeared amateurish or gave little information about the organization behind them.’ In our study it was observed that 7 physics journals, 15 chemistry journals and 18 biology journals contain terms such as ‘international’, or ‘global’ in the titles and mimic the name of other reputed journals. On analysing the addresses given in the links of these spurious publishers, we noticed that the ‘aim/scope/mission’ of these journals tends to be incredibly broad and the content bridges unrelated domains. These journals do not have appropriate distribution of editorial functions across the globe, contributions from foreign authors, etc. which denotes their false claim as well. It appears that the publisher wants to accept many papers and receive as much publication fees as possible. Interestingly most publishers of such journals were individual publishers. Although this sounds intuitively plausible, Shen *et al.*<sup>11</sup> observed that of the sample 617 journals studied, 34.7% authors from India contributed articles to predatory journals. In our study we are unable to trace other predatory features in the PCB fields.

### *Editorial quality*

How the editor or publisher communicates with the scientific community is important. The use of false names, generic or illusive titles or hidden identities are all perceived as ‘hiding’ something, which are a negative signs. We observed that at least 4% of chemistry journals contained falsified information about their editors. Aggressively campaigning for academics to submit articles or

serve on editorial boards<sup>12</sup> and not allowing academics to resign from editorial boards<sup>13</sup> are uncommon in qualitative journals. Beall<sup>14</sup> explained that listing academics as members of editorial boards without their permission is an indicator of predatory practice. He also pointed out few more issues that are indicators of poor quality journals. They are:

- Enlisting members of editorial boards who are not experts in the field.
- Having board members who are prominent researchers but exempting them from any contributions to the journal, except the use of their names and photographs.
- Providing insufficient contact/affiliation information about board members.
- Do not hold at least Ph D in the subject where s(he) is serving as editor, etc.

Table 4 shows that editors of at least 25% of biology journals and 23% of chemistry journals did not belong to the subject on which they served as editor. Nearly 40% of biology journals did not provide sufficient information about their editors; either their affiliation or contact detail was insufficient to trace their identity.

### *Internationalization of editorial members and contributors*

While the nationality of contributors/editors is not a perfect indicator for measuring quality of articles and journals, it is a reasonable proxy for the type of research and sources of data that are likely to be included. We found 90% of physics journals and almost 75% of biology and chemistry journals and each journal claimed that they have foreign members on the editorial board. However, in 60% of physics journals, 22% of chemistry journals and 37% of biology journals, we were unable to verify such claims because of non-availability of any mail address of the members. On the other hand, of the total published articles in these PCB journals, 41% of articles in biology, 29% of articles in physics and 21% of articles in chemistry have been contributed by foreign authors (Table 5).

### *Number of articles per issue*

A considerable number of studies concluded that there has been consistent growth in the number of articles per

**Table 4.** Editorial quality of PCB journals

Status	Physics	Chemistry	Biology
Percentage of journal editors not belonging to the subject of the journal	12%	23%	25%
Same editor for more than one journal	15%	34%	36%
Common editorial board for more than one journal	3.12	4.33	6.21

**Table 5.** Internationalization of editorial members and contributors

Status	Physics (%)	Chemistry (%)	Biology (%)
Overall percentage of editorial members from foreign	30.38	53	37.85
Percentage of articles contributed by international authors	29	20	43.21

**Table 6.** Quantity of articles in open and non-open access PCB journals

Article status	Physics	Chemistry	Biology
Average yearly production of articles/journal	47	82	62
Average number of articles in open access	14	18	14
Average number of articles in closed access	12	10	18

**Table 7.** Citation pattern and database coverage of PCB journals

Citation and database coverage	Physics	Chemistry	Biology
Ratio of cited/uncited articles	78 : 22	69 : 31	71 : 29
Percentage of journals included in WoS and Scopus	25%	16%	15%

issue in open access journals when compared to non-open access journals. However, in our study such a trend was not seen (Table 6). The average number of articles per issue in open access and non-open access PCB journals in India is almost the same, i.e. 12–18 articles per issue.

#### *Citation pattern and bibliographic database coverage*

In terms of citations received by PCB journals published in India, it has been observed that one article of physics received on an average 1.49 citations, followed by biology with 1.26 citations and chemistry with 0.45 citations. Almost 40% of physics journals, 39% of chemistry journals, and 43% of biology journals did not receive any citations (Table 7). Multiple factors may be responsible for this sorry state. A major cause, as identified by Lakhotia ‘is the official policies that directly or indirectly buttress the common perception that the quality of research reported in papers published in journals from outside India (international journals) is better than that of the papers published in ‘national’ journals’<sup>15</sup> and, therefore, publication of one’s findings in an ‘Indian’ journal is believed to imply poor quality by default. Indian scientists and con-

sequently the quality of journals published in India have thus been trapped in the vicious circle of poor impact factor and, therefore, poor journals which together result in overall poor ranking in science’<sup>16</sup>. Finally, it must be remembered that, while it is true that science that is not visible does not exist, visibility alone is not enough. Effective presence requires being in such a state of visibility that anyone neglecting it will be faulted for carelessness, incompetence or ignorance.

#### *Time delay in publishing*

Regarding the speed of review, from experience, a well-conducted and thorough peer review process can be realistically completed within 2 months and each round of review will take 2 months. Thus, considering the review process of two rounds of peer-review and edit, 4–6 months is considered reasonable. Greater than 6 months is slow; less than 1 month is excessively fast and might reveal either an excellent manuscript, of a fake review, or a rushed job. We observed that almost 50% of journals of physics and chemistry each and 33% of biology took 4–6 months in publishing including submission, review and printing. On the other hand, in almost 10% of journals in the PCB

field, authors can publish their article in a month, which is quite unrealistic (Table 8).

### *Ethical procedures followed*

Under this criterion we examine whether the journal mentions ethical policies of publishing or whether the journal requires authors to sign an ethical policy agreement before publishing articles. We observed that, 31% of physics journals, 28% of biology journals or even less, and only 16% of chemistry journals followed any publication ethics (Table 9).

It is needless to mention that at present almost all highly reputed PCB journals mention publication ethics clearly in their journals. International publishers also appeal to the leaders of academic research groups to inform their students and research associates about the ethical responsibilities of authors of scientific publications and to ensure that when they are given the responsibility for submitting a paper, they are fully aware of the potential consequences, to themselves and to their co-authors, of violations in these ethical guidelines.

### Suggestions and conclusion

Dependence on a single number, i.e. impact factor, to gauge scientists' contribution in a domain and make decisions can affect their career progression or may force people to enhance the quantity of low quality papers instead of focusing on a more important activity – doing good science. Considering the complex issues associated with the calculation of scientific performance metrics, it is clear that a comprehensive approach should be used to evaluate the research worthiness of a scientist. We should not rely excessively on a single metric.

Institutions should insist that their scientists and faculty members opt for publications in peer-reviewed open

access journals. One important feature distinguishing the scientific journal domain of OA from other publishing industries such as books, film, etc. is that scientific knowledge is public good produced mainly with public funding and the author who generates scientific information usually does not get any financial benefit in terms of sales royalty. Hence from an author viewpoint there is no problem with potential piracy; on the contrary, as wide a dissemination of article as possible is desirable. Therefore, prospective authors should choose OA platforms for disseminating their research to global audiences. Furthermore, funding agencies should also ensure that the output funded research must be available in open access repositories.

In a nutshell, we suggest that prospective authors must consider the following points of a journal before submitting articles.

- **Balanced editorial board:** Journals covering overlapping fields of science may provide an excellent platform for publishing articles among diversified audiences. However, it is essential for an author to confirm whether such journals have unique, well-balanced editorial boards. Adhering to a proper review process, identifying proper reviewers, understating the comments and suggestions of reviewers who are experts in their field – such activities, performed by a single person for different subject domains are uninstituted. Therefore, it is essential to check whether the editor of any journal is exclusively the editor of one journal or a group of journals covering different subjects.

- **Clear details of members in editorial board:** The acceptance rates of a quality journal would typically be low and the editorial board would be dominated by leaders in the field from many top institutions. Journals mentioning their editorial board clearly with full detailed information and affiliations of the editors can be considered as a qualitative journal.

- **Realistic peer-review process:** The peer-review process for journal publication is essentially a quality control mechanism. Generally, a minimum of 2 peer reviewers (up to 6) are chosen for the peer review. Peer reviewers are ideally experts in their field. The peer review is complete once all the reviewers send the journal a detailed report with their comments on the manuscript and their recommendations. In practice, peer review is not always ideal, nonetheless, no better or viable alternative exists. Typically, reputed journals ask reviewers to complete their reviews within 6–8 weeks. Therefore the phenomena of 'rapid publication within a week' or by '48 hours of submission' seems an unrealistic process. Prospective authors, therefore, should avoid such journals for publishing articles.

- **Clear-cut article charging policies:** Journals maintaining clear-cut policies of processing charges of articles can be considered as a platform of scholarly publishing.

**Table 8.** Time delay in publishing PCB journals

Time delay	Physics	Chemistry	Biology
Not identified	9	10	18
Rapid/less than one month	3	4	6
1–3 months	3	6	12
4–6 months	16	21	22
>6 months	1	2	2

**Table 9.** Ethical procedure followed in PCB journals

Ethical status	Physics	Chemistry	Biology
Percentage of journals followed ethical standard while publishing articles	31%	16%	28%

Appendix 1. Criteria and scoring techniques of measuring scientific value of Indian journals

Sl no.	Criterion	Explanation	PS	NS	Remarks
A.	Basic criteria				
1	Longevity	Years of existence of a journal since its beginning.	Open		0.5 for 10 years of existence, 1 for 30 years of existence and 1.5 for >50 years of existence.
1.1	Availability	Open or closed access	0.1	-0.1	Positive score for open access and <i>vice versa</i> , a negative score if closed access.
B.	Essential criteria				
2	Regularity and Promptness	Missing issue/combined Issue/late issue?	0.1	-0.01	In case of the publication pattern, over the last 5 years the publication is found to be uninterrupted, 0.1 added. However, if any such case is found in last five volumes of a journal then a negative score of (-0.01) is assigned for each case.
3	Review policy of the journal	Whether the review policy of the journal is mentioned or not?	0.01	-0.1	If the review policy is mentioned in detail then a 0.01 score is added. If review policy of the journal is not mentioned clearly in the documentation of the journal then a negative score of (-0.1) has been assigned, otherwise no score.
		Whether there is any false information about the reviewers?		-0.1	If any falsified information about reviewer is found then negative score of (-0.1) has been assigned.
3.1	Cross checking of review policy?		0.1	-0.01	On checking 20 randomly selected articles, if references are found asymmetrical by each other, either in same article or two different articles of the same journal, then a negative score of (-0.01) has been computed, otherwise if such uniformity found a 0.1 positive score has been assigned.
3.2	Originality in articles? or plagiarized?	If the articles of the journal are original	0.5	-0.1	On checking 20 randomly selected articles through plagiarized software, if the percentage of duplication shows less than 10% then 0.5 is added. However, if such duplication shows more than 30% of an individual article (excluding self-citation, quotations, references), a negative score of (-0.1) has been assigned. If the name of the chief editor is mentioned then no score is given but if the name is unavailable then negative score of (-0.01) has been assigned.
4	Configuration of the editorial board Identity of the chief editor Identity of board members		0.01	-0.01	If the full identity (designation, affiliation and contact details, etc.) of board members is obtainable or searchable, 0.01 is added and if not then a negative score of (-0.01) has been assigned. Further, if any falsified information related to designation, affiliation, etc. about the editorial members is found then a negative score of (-0.01) is augmented.
	Members from same organization?			-0.03 to -0.01	If there are >50% members of editorial board from same organizations then negative score of (-0.03), and if in between 21-50% then 0.02 is assigned, and if <20% but greater than 10% then 0.01 and within 10% then no deduction has been made.
	Whether editor serves as editor in more than two journals			-0.1	If same editor serves as editor of more than two journals negative scoring has been assigned.
	Expertise in year and subject expertise		0.01		If the Editor-in-Chief is qualified (at least a Ph D holder in the concerned subject of the journal) and he/she has sound experience in editing a journal of more than 5 years then a positive score of 0.01 otherwise no score has been assigned.

(Contd)

Appendix 1. (Contd)

Sl no.	Criterion	Explanation	PS	NS	Remarks																																			
5	International members in the editorial board?			-0.01	In case the journal's editorial board consists of members from foreign countries, then 0.01% of the total percentage of the foreign member has been added under positive score. The score has been calculated by taking 0.1% of the average foreign contributors in last five years (total contribution other than India/total contributors × 100).																																			
6	Articles per issue	Verify number of the articles per issue with its stated frequency	Open		Scoring have been performed on the basis of number of articles per issue against the frequency of the journal:  <table border="0" style="margin-left: 20px;"> <tr> <td>Monthly Articles (score)</td> <td>Four issue per year/quarterly Articles (score)</td> <td>Three issues Articles (score)</td> <td>Half-yearly Articles (score)</td> <td>Yearly Articles (score)</td> </tr> <tr> <td>0-4 (0.02)</td> <td>0-4 (0.01)</td> <td>0-4 (0.005)</td> <td>0-4 (0.001)</td> <td>0-4 (0.001)</td> </tr> <tr> <td>4-10 (0.03)</td> <td>5-10 (0.02)</td> <td>5-10 (0.01)</td> <td>5-10 (0.005)</td> <td>5-15 (0.005)</td> </tr> <tr> <td>10-15 (0.01)</td> <td>11-15 (0.03)</td> <td>11-15 (0.02)</td> <td>11-15 (0.01)</td> <td>16-25 (0.01)</td> </tr> <tr> <td>&gt;15 (0)</td> <td>16-25 (0.01)</td> <td>16-25 (0.03)</td> <td>16-25 (0.02)</td> <td>26-40 (0.02)</td> </tr> <tr> <td></td> <td>&gt;25 (0)</td> <td>25-40 (0.01)</td> <td>25-40 (0.03)</td> <td>&gt;40 (0.001)</td> </tr> <tr> <td></td> <td></td> <td>&gt;40-(0)</td> <td>&gt;40 (0)</td> <td>0-4 (0.001)</td> </tr> </table>	Monthly Articles (score)	Four issue per year/quarterly Articles (score)	Three issues Articles (score)	Half-yearly Articles (score)	Yearly Articles (score)	0-4 (0.02)	0-4 (0.01)	0-4 (0.005)	0-4 (0.001)	0-4 (0.001)	4-10 (0.03)	5-10 (0.02)	5-10 (0.01)	5-10 (0.005)	5-15 (0.005)	10-15 (0.01)	11-15 (0.03)	11-15 (0.02)	11-15 (0.01)	16-25 (0.01)	>15 (0)	16-25 (0.01)	16-25 (0.03)	16-25 (0.02)	26-40 (0.02)		>25 (0)	25-40 (0.01)	25-40 (0.03)	>40 (0.001)			>40-(0)	>40 (0)	0-4 (0.001)
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7	Citation impact																																							
	Citation received by the total articles published in journal in last three years?		Open		10% of the average citation received by the articles published in last three years																																			
8	Indexing database coverage																																							
	Conventional Databases included?		0.1-0.3	-0.1	In cross checking if the journal is found included in the databases mentioned in documentation then positive score for indexed in JCR-0.3, scopus -0.2, subject database -0.1 has been assigned. Any falsified information leads to negative score of (-0.1).																																			
	Whether any falsified information is available?			-0.1	If any falsified information found regarding inclusion in database of the journal then negative score is assigned.																																			
C. Subsidiary criteria																																								
9	Article level check-points																																							
	Time lag in publication			-0.01	If the time lag in publication for 20 articles is more than 3 months (for online) and 6 months (for print) then negative score of (-0.01).																																			
	Rapid publication facility available			-0.01	If the journal has a facility of publishing article in less than 4-5 weeks then negative score of (-0.01)																																			
D. Publisher's Criteria																																								
10	Publication ethics		0.1	-0.01	If publication ethics is available in the documentation of the journal and if is a standard code of ethics then 0.1 score, otherwise negative score of (-0.01) is assigned.																																			
	Journal's own ethics or standard code of ethics is followed?																																							
	License agreement of article if the journal is available in OA?		0.01	-0.01	If the journal has an open access license agreement (creative commons) then 0.01 score and if not then negative score of (-0.01) is assigned.																																			

PS, Positive score; NS, Negative score.

Annexure 1. Selected PCB journals and their calculated score

Sl no.	Name of the journal	Publisher	Starting date	Coverage in databases	Score
1	<i>Journal of Biosciences</i>	Indian Academy of Sciences and Springer	1934	W/S/G	5.948
2	<i>Journal of Genetics</i>	Indian Academy of Sciences and Springer	1910	W/S/G	4.222
3	<i>Indian Journal of Experimental Biology</i>	National Institute of Science Communication and Information Resources	1963	W/G	2.636
4	<i>Proceedings of the National Academy of Sciences, India, Section B – Biological Sciences</i>	National Academy of Sciences, India (Allahabad)	1930	W/S/G	2.276
5	<i>Virus Disease (Indian Journal of Virology)</i>	Indian Virological Society (IVS) with Collaboration of Springer	1990	G	2.082
6	<i>The Indian Journal of Genetics and Plant Breeding</i>	The Indian Society of Genetics and Plant Breeding, New Delhi with collaboration of indijournals.com	1942	W/G	2.074
7	<i>Physiology and Molecular Biology of Plants: An International Journal of Functional Plant Biology</i>	Prof. H.S. Srivastava Foundation for Science and Society with Springer India Private Limited	1995	G	2.008
8	<i>Indian Journal of Plant Protection</i>	Plant Protection Association of India with collaboration of indijournals.com	1973	G	1.809
9	<i>Journal of Bombay Natural History Society (JBNHS)</i>	Bombay Natural History Society (JBNHS) Maharashtra, India	1886	G	1.708
10	<i>International journal of ecology and environmental sciences</i>	National Institute of Ecology (Department of Botany, University of Delhi, Delhi)	1974	S/G	1.668
11	<i>Journal of Environmental Biology</i>	Triveni Enterprises	1980	W/S/G	1.612
12	<i>Indian Journal of Plant Genetic Resources</i>	Indian Society of Plant Genetic Resources, New Delhi	1988	N	1.165
13	<i>Journal of Indian Water Resources Society</i>	Indian Water Resources Society (Under Water Resources Development Training Center, IIT Roorkee)	1981	G	1.109
14	<i>Applied Biological Research</i>	Centre for Advancement of Applied Sciences	1998	G	1.032
15	<i>Bulletin of Pure and Applied Sciences – Botany</i>	BPAS Research	1990	G	1.025
16	<i>Indian Journal of Applied and Pure Biology</i>	Indian Journal of Applied and Pure Biology Bhopal	1986	G	1.005
17	<i>Ecology, Environment and Conservation</i>	EM International Pune	1995	S/G	0.982
18	<i>Journal of Biological Control</i>	Society for Biocontrol Advancement, National Bureau of Agriculturally Important Insects Bangalore	1987	G	0.976
19	<i>Biosciences Biotechnology Research Asia</i>	Oriental Scientific Publishing Company	2003	S/G	0.939
20	<i>Indian Journal of Physics</i>	Indian Association for Cultivation of science with Springer	1926	S/G	0.934
21	<i>International Journal of Integrative Biology</i>	International Society for Integrative Biology	2007	S/G	0.918
22	<i>Journal of Insect Sciences</i>	Indian Society for the Advancement of Insect Science (Department of Entomology, Agri. University Ludhiana)	1998	G	0.76
23	<i>The Bioscan</i>	The National Environmentalists Association Ranchi (Jharkhand)	2006	G	0.728
24	<i>GERF Bulletin of Biosciences</i>	Green Earth Research Foundation	2010	N	0.696
25	<i>Indian Journal of Environmental Protection</i>	Kalpna Corporation Banaras	1981	S/G	0.692
26	<i>The IIOAB Journal – Institute of Integrative Omics and Applied Biotechnology (IIOAB)</i>	Institute of Integrative Omics and Applied Biotechnology (IIOAB)	2010	S/G	0.679
27	<i>International Journal of Bioassays</i>	International Journal of Bioassays	2012	G	0.653
28	<i>The Journal of Innovative Biology (JIB)</i>	SKN Online Publishing House	2014	G	0.634
29	<i>Plant Cell Biotechnology and Molecular Biology</i>	Society for Biology and Biotechnology	2000	S/G	0.611
30	<i>Asian Journal of Conservation Biology (AJCB)</i>	Turtle Conservation and Research Programme (TCRP) (Bioinformatics Centre, Gauhati University, Guwahati)	2012	G	0.551

(Contd)

Annexure 1. (Contd)

Sl no.	Name of the journal	Publisher	Starting date	Coverage in databases	Score
31	<i>Bioscience Discovery</i>	Dr Umesh P. Mogle	2011	G	0.55
32	<i>Indian Journal of Plant Sciences</i>	Centre for Info Bio Technology (CIBTech)	2012	G	0.534
33	<i>Indian Journal of Chemistry – Sec A</i>	National Institute of Science Communication and Information Resources	1963	W/G	0.512
34	<i>Der chemical Sinica</i>	Pelagia Research Library	2010	N	0.504
35	<i>CIBTech Journal of Microbiology</i>	Centre for Info Bio Technology (CIBTech)	2012	G	0.48
36	<i>Indian Journal of Fundamental and Applied Life Sciences</i>	Centre for Info Bio Technology (CIBTech)	2011	G	0.457
37	<i>CIBTech Journal of Zoology (CJZ)</i>	Centre for Info Bio Technology (CIBTech)	2012	G	0.421
38	<i>International Journal of Basic and Applied Chemical Sciences (JCS)</i>	Centre for Info Bio Technology (CIBTech)	2011	G	0.395
39	<i>South Asian Journal of Experimental Biology</i>	South Asian Journal of Experimental Biology	2011	G	0.379
40	<i>International Journal of Advanced Life Sciences</i>	Dr G. M. Natarajan	2012	W/G	0.37
41	<i>Journal of Human Ecology</i>	Indian Society for Human Ecology with Kamla-Raj Enterprises New Delhi	1990	G	0.316
42	<i>International Journal of Chemical Sciences</i>	Sadguru Publications	2003	S/G	0.296
43	<i>Asian Journal of Environmental Science</i>	Hind Institute of Science and Technology in Association with Hind Agri-Horticultural Science	2008	G	0.29
44	<i>International Journal of Physics and Mathematical Sciences (JPMS)</i>	Centre for Info Bio Technology (CIBTech)	2011	G	0.278
45	<i>Indian Journal of Advances in Chemical Science</i>	KROS Publication	2012	G	0.208
46	<i>Chemical Biological Letters</i>	Integrated Science Publishing	2014	G	0.189
47	<i>Rasayan Journal of Chemistry</i>	Rasayan Journals	2008	S/G	0.188
48	<i>Asian Journal of Chemistry</i>	Chemical Publishing Co.	1989	S/G	0.149
49	<i>Research Journal of Biology (RJB)</i>	Research Journal of Biology	2013	G	0.147
50	<i>Chemical Science Transactions: An International Research Journal of Chemical Science</i>	World Wide Web Publications (P), India	2012	G	0.145
51	<i>Current Topics in Catalysis</i>	Research Trends	1997	G	0.098
52	<i>Trends in Life Sciences: An International Peer Reviewed Journal</i>	DAMA International Publications Solapur	2012	G	0.091
53	<i>Archives of Physics Research</i>	Scholars Research Library	2010	G	0.086
54	<i>Advances in BioResearch: A Quarterly Peer Reviewed International Journal of Life Sciences</i>	Society of Education, India	2010	G	0.083
55	<i>Journal of Research in Biology</i>	J. Research Biology	2011	G	0.027
56	<i>Asian Journal of Biological and Life sciences</i>	PBS JOURNALS	2012	G	-0.032
57	<i>WIDE SPECTRUM Research Journal</i>	Dr G. R. Damodaran College of Sciences, Coimbatore	2012	G	-0.256
58	<i>The Asian Journal of Animal Science</i>	Hind Institute of Science and Technology in Association with Hind Agri-Horticultural Science	2006	G	-0.28
59	<i>The Asian Journal of Experimental Chemistry</i>	Hind Institute of Science and Technology in Association with Hind Agri-Horticultural Science	2007	N	-0.521
60	<i>Biomirror</i>	Disa Publishing	2010	N	-0.534

W, Web of Science; S, Scopus; G, Google Scholar; N, Not indexed.

However, journals that do not disclose the APC charges or tend to ask for APC changes into private saving accounts should be ignored as a potential platform of publishing.

- Journals must fulfill normal international academic standards, i.e. selection of articles based on objective review policy, use of anti-plagiarism software for checking originality of submitted text, following a common, uniform style pattern for writing references, defined policies on what forms of text are accepted and what are not.

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