What do third world researchers lack? Documenting the peer review data

Daisy Jacobs, Pit. Pichappan and S. Sarasvady

Peer review practices are subjected to 'subjective' evaluation in the past which largely produced inconsistent views among scientists. However, the peer review practices would enable to detect the shortcomings in research papers if documented properly. The review data we have collected do not merely reinforce the faith in the peer review practices but enable to identify the limitations of third world research. The lessons learned from peer review data may help promote science in the third world.

In the world of science, building and sharing of knowledge is highly skewed. Successful researchers continue to increase their record and contribution in science whereas novices face the challenges in developing effective content due to inexperience and lack of exposure to the ways of best practice in producing scientific content.

Reviewing the content promotes the contribution of researchers; hence the science system in order to ensure the incremental process, employs the review practices. In scientific publication system, a research paper has value only when it is published in a peer-reviewed journal and in most research assessment and tenure promotional systems, publications in peer-reviewed journals alone are considered. Hence, we believe that building metrics on peer review enables the scientific public to know the significance of it.

Problems in peer review

Over the recent years, there has been increasing debate in the scientific community about validity of peer review practices. The process of peer review has attracted its share of criticisms from academics over the years[1]. Peer reviews remain vulnerable for many attacks, for example, 'it is unstandardized, and in the absence of clear standards and structure, is idiosyncratic, and open to every sort of bias'[2].

Studies have shown that different reviewers of the same manuscript generally do not agree with each other[3–5]. Only if the reviewers' votes directly decided whether a manuscript should be accepted (which they should not) would lack of agreement among reviewers be a liability[6].

In the wake of debates and distrust about the peer review system, we have documented selected peer review reports.

We do not dwell in depth on the debates on whether peer review practices are reliable and valid, but orient our discussion to identify the shortcomings of third world research using peer review reports. However our data will scrutinize the validity of the peer review process.

The study outlined here is based on reviews of articles published or rejected as related to a peer-reviewed journal, *Journal of Digital Information Management* and a peer reviewed IEEE conference, International Conference on Digital Information Management. Even if the results of study of these reviews are somewhat limited, we believe that the outcome of the reviews is crucial and addresses some core issues in third world research.

Method of reviewing

It is a fact that the assessment of the scientific validity and contribution of a paper is not confined to a standard check list of criteria. The peer review practices of journals vary; however there is some general consensus relating to the perceived quality, originality and level of contribution of the research in the paper. We present below briefly the review system we use. When a manuscript is received, the editors look for the relevance and quality at a broader level. Manuscripts that meet these criteria are sent to a minimum of two reviewers who possess expertise in the given field. The reviewers assess the submission in accordance with the designated criteria. The common criteria that we have are – originality and novelty, method, technical content and accuracy, significance of results, bibliography/related papers, and language and style of presentation. Using this set of criteria as a framework, the reviewers provide their expert professional judg-

ment, based on evidence supplied by the authors in the papers. The reviewers recommend acceptance or revision or rejection. Their recommendations are considered based on the following factors: consensus and consistency among reviewers, level of the confidence of the reviewers in the area of the paper, and 'review of the reviews' by senior editors (if necessary). When the reviews are sent to authors, they are encouraged to respond to the reviews which may range from overall agreement with the reviews to non-acceptance. If the authors do not agree with the reviews, they can argue and discuss the review with evidences and proper claims. The adaptation of such a practice, we believe, ensures objectivity and transparency in the review practice.

Data and discussion

We have analysed review data of 182 rejected third world papers. We do not go in depth to the discussions about the acceptance rate or any comparison with papers from developed countries. However, for a minor discussion we present the data on the collaborative papers written jointly by researchers from the third world and developed countries. The 182 papers are discussed below for specific evaluation criteria.

Scale used for review

Every paper is assessed using some select criteria: Each criterion works at varying levels of detail and we identify the best level for analysis. Reviewers provide the rating for each criterion using a Likert scale that has the range from 0 (very poor) to 5 (excellent). The general instruction to the reviewers is that the papers should score a minimum of three in

all attributes and the mean value should have a considerable score. We provide the mean value for the scales in the discussions below.

Inter-reviewer consistency

A major criticism leveled against the peer review is that opinion varies across reviewers leading to the question of reliability of peer review practices. To test the validity of the criticism, we measure how the reviewers agree with each other in their view. Opinions of two reviewers, even if chosen at random from all possible reviewers, are too few in themselves to yield a statistically stable basis for deciding whether or not the manuscript should be published. However, this criterion reinforces the statistical stability as we have the results of reviews that have four grades such as – clear acceptance, minor revision, major revision and rejection. Such measure of levels of agreement enables us to compute a proper rank order correlation. The difference between the reviewers with respect to the four levels yields data that provide the extent of correlation.

If a manuscript is approved or rejected by all reviewers, peer reviewing is believed to be more objective and acceptable. Accurate measurement (validity) in science depends on reliability (reproducibility), which means multiple measurements agreeing with each other. Table 1 shows the mean attribute score for the studied criteria. Each reviewer assigns the level (the levels 0–5 are converted into score in the table) for each of the attributes employed. For example, if all the rejected papers are given the total scores ts, for one attribute, the mean score is ts/n, where n is the total number of rejected papers.

Reference to earlier studies

The systematic use of published knowledge is an important scientific management tool. We have studied the reports on the extent of the use of public knowledge by third world researchers. Many authors were not so receptive to external public knowledge and hence the reference pattern is not institutionalized. We found that the mean number of references is less for third world researchers than western world and the mean age of

references is found to be higher than their western counterparts.

Many papers are criticized for presenting the content that is already published or known. To compare the problem of access to earlier literature, we took a random sample of 182 accepted papers. We then measured (i) the mean number of references in the rejected papers as well as in the accepted papers, and (ii) the mean age of references in both categories, viz. accepted and rejected. Table 2 shows the distribution of the age of references in accepted papers and rejected papers.

These data show a significant association between less mean age and acceptance rate or in other words more mean age reflects more rejections ($P = 0.0001$). If the failure to cite recent literature can affect the acceptance of papers, it is possible that there is a relative lack of the knowledge of third world researchers and it may exhibit the disadvantage these groups face.

While discussing ways to promote third world science, Garfield[8] in 1987 identified a few difficulties for doing science in these countries. The major one identified by him is access that scientists in the third world have to scientific literature. However, in the recent period due to initiatives on shared and open access, the difficulty in literature access is decreasing. The web resources including the evaluated open resources remain underutilized by a large number of third world researchers. It is hard to find the

reason for the poor information access by a large number of third world scientists.

Collaboration with developed country researchers

We found that the papers, where third world researchers collaborate with colleagues of developed nations are accepted at a higher rate, particularly where the papers have third world authors as primary authors. Among the accepted papers from the developed nations, 22 are co-authored by third world researchers with researchers of developed nations, whereas just 9 are rejected in this category.

Peer in the third world can team with other researchers of developed nations to share ideas. Research collaboration with like-minded researchers from developed nations support benchmarking studies, share expertise, promote the third world researchers to enter international research setting, and assume primary authors' roles to cement the research position. The highest peer review score comes from publications involving collaboration with foreign institutions.

Experiments

The mission of seeking, consuming and applying scientific knowledge contains elements of both purposeful search and serendipitous discovery. Knowledge building in science advocates empirical vali-

Table 1. Mean attribute score

	Conference papers	Journal papers
Technical content and accuracy	NA	1.04
Originality and novelty	1.21	1.09
Significance of the experiment and results	1.44	1.29
Technical features	NA	1.76
Related work and bibliography	0.83	1.09
Language and presentation	0.98	1.37
Methodology	1.75	1.22

NA, The attribute was not employed.
Level, 0, very poor; 1, poor; 2, average; 3, good; 4, very good; 5, excellent.
Total rejected conference papers 86.
Total rejected journal papers 96.

Table 2. Literature use

	Conference papers		Journal papers	
	Accepted	Rejected	Accepted	Rejected
Mean number of papers cited	21.4	8.3	32.46	16.55
Mean age of papers cited	4.2	12.34	3.82	11.42

dation of observed data and phenomena. Experimental validation is crucial in building science. A large number of third world papers fail considerably in conducting proper experiments. Even when emerging concepts and background are presented in the papers, lack of trails and failure to test experimentally lead for rejection. Many reviewers do not favour revision, if the paper lacks experiments. This is a highly significant association suggesting the exclusion from the resource distribution in the experiments ($P < 0.00005$). Many reviewers require the authors to compare the proposed architecture/method/experiment with similar ones. Inconclusive and lack of strong experiments is the major shortcoming of these papers.

Language and style of presentation

Our data indicate that many authors of the rejected papers have fundamental difficulties in their writing and presentation skills. The comments range from identification of simple and common errors to the problems in style of presentation. Surprisingly, we found that at a broader aggregate, many third world papers score behind non-UK European papers in language factor. Three-fourths of rejected Indian and Chinese papers have suffered from language difficulties.

Besides the above parameters, the reviewers provide comments (other than the seven criteria mentioned in Table 1) bout the papers where most of the comments are specific. Some of the crucial views expressed by the reviewers are:

Content is too elementary, papers are not refined (and similar to draft papers as there is no refinement in content), plagiarism, immaturity, lack of correlation between different components of papers and so on. The argument against peer review in detecting duplicate publications is not validated in our data as eleven rejections were due to plagiarism either partial or total.

Conclusion

Young researchers now have more doors to knock on than before. Cross border collaboration and knowledge transfer is quite possible at a large scale. Preparing and sending draft papers to peers and then submission to journals increase the chances of paper acceptance. Entering the circle of invisible colleges promotes the young generation of researchers and keeps them in the mainstream of science.

The evidences we draw from the peer review reports, reinforce our confidence in the peer review system. Alternatives based on open peer commentaries after publication, have a number of drawbacks. Notably, those best qualified to comment on a paper might be too busy to do so, and those who do comment might be ill-informed or prejudiced[8]. We strongly believe that commentaries by experienced experts score over the views of the mediocre. The eminence of editorial board and reviewers determines the validity of peer reviews[9].

Consistent and strong peer review system would promote the quality of the papers and the reviewers are the mentors to

third world science. We also believe that the standard or uniform peer review practice is a complex process which involves many steps. We need to conduct many prototype studies. These kinds of efforts will initiate a lead to document the shortcomings in science production system of third world researchers.

1. Roberts, P., http://www.firstmonday.dk/issues/issues4_4/ proberts/
2. Rennie, D., *J. Am. Med. Assoc.*, 1993, **270**, 2856–2858.
3. Cicchetti, D. V., *Behav. Brain Sci.*, 1991, **14**, 119–186.
4. Ernst, E., Saradeth, T. and Resch, K. L., *Nature*, 1993, **363**, 296.
5. Rubin, H. R., Redelmeier, D. A., Wu, A. W. and Steinberg, E. P., *J. Gen. Intern. Med.*, 1993, **8**, 255–258.
6. Fletcher, R. F. and Fletcher, S. W., *Peer Review in Health Sciences* (eds Godlee, F. and Jefferson, T.), BMJ Books, London, 2003, pp. 62–75.
7. Editorial Peer-Review for Improving the Quality of Reports of Biomedical Studies, Cochrane report, 2006.
8. Garfield, E., *The Scientist*, 1987, **1**, 9.
9. Pichappan, P. and Buchandiran, G., *Curr. Sci.*, 2006, **90**, 615.

Daisy Jacobs is in the Department of Information Science, School of Information Technology, University of Pretoria, Pretoria 002, South Africa; Pit. Pichappan* is in the Department of Information Science, Annamalai University, Annamalainagar 608 002, India; S. Sarasvady is in the Amrita Vishwa Vidyapeetham, Ettimadai, Coimbatore 641 105, India.
*e-mail: ppichappan@gmail.com