

The vicious circle of poor science, poor journals and poor recognition

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In spite of the very large number of officially recognized 'scientists' and science institutions (including the various university and college departments which are supposedly involved in research) in the country, India's standing in science at the international level is dismally poor. Likewise, very few of the large number of science journals published in India have any standing in the international community. These issues have been debated many a time and diverse views and possible solutions suggested, but without any obvious improvement. Nevertheless, further discussion is desired, at least to keep the issue alive and to hope that the planners, decision makers and some of those actually involved in research and publication would seriously consider and implement steps that may break the vicious circle that grips the scientific research scenario in India and prevents it from attracting global attention. I would like to first discuss some of the factors that adversely affect the 'knowledge-generating institutions' in the country and then consider some possible steps that may help improve the situation.

Repetitive and confirmatory research rather than original and innovative research favours poor journals

Much of the research in the large number of laboratories in teaching and research institutions suffers from lack of originality and innovativeness. Unfortunately, this applies even to the supposedly 'leading' and 'elite' research institutions. We tend to follow Western models of 'modern' research areas and often our 'scientists' continue to work on the systems that they became familiar with during their Ph D or post-doctoral research. Very few Indian scientists choose a topic/area of research which is distinctly different from that during their initial training period. This provides little room for originality and innovativeness, and such research continues to confirm and reconfirm someone else's findings and/or interpretations. Consequently, results of such 'research' do not find a place in quality

journals. This increases the demand for poor journals. In this context, I am reminded of a sincere 'advice' given to me by a senior scientist more than 25 years ago. The occasion was the establishment of a new society and in my intemperance I raised the question, why one more society? I was told, 'Today you are young and enthusiastic, but a day may come when you would need your own society and journal to publish your results'. Luckily for me that 'day' has not yet arrived, but I do realize that a situation like this is not non-existent for many in the profession. And that explains the plethora of 'poor' science journals.

Undue importance given in India to the impact factor discourages publication of good papers in Indian journals

In recent years, the 'impact factor' of a journal has become a fashionable consideration. No doubt, this quantifiable measure has a basis and in the absence of any other better index, helps in the assessment of the possible quality of one's research publication. However, it appears to me that, like many other things that we in India tend to copy without questioning, the impact factor of a journal is being given too much significance. Almost everywhere, one is asked about the impact factor of a journal in which the paper is published, rather than what has been published. It is amusing that many of our scientists have the impact factor of different journals at their fingertips and often without examining the subject matter of research and its quality, the impact factor alone becomes the decisive factor. It has been pointed out that publication of a paper from India in a high impact-factor journal may actually lower the average impact factor of that journal. This is not just because there is a bias against citation of a paper of Indian origin, but also because the paper may not actually be of great significance on its own. We often miss the fact that a rich outer covering does not necessarily certify the quality of the contents inside.

Nevertheless, since the impact factor rating has become a major decisive factor in appointments and promotions/rewards/recognitions, very few of the young and not-so-young researchers submit good quality papers to Indian journals.

The low impact factor of Indian science journals – real and relative

It is a fact that nearly all of the science journals published from India have a low/very low impact factor and many of them do not even qualify for getting a rating by the *SCI*. This low rating is both absolute as well as relative, and can be traced to multiple causes. In the first place, the average quality of research in most establishments in India is not very high, resulting in sub-standard research papers which obviously do not attract much attention. Secondly, the quality of papers published in Indian journals is, in most cases, not the best (from the given lab's point of view), since the papers that are published in these journals are often those that could not be published elsewhere, either due to an inherent weakness in the work or because these were actually rejected by the high impact factor or international journals. Thirdly, not only does the international community tend to ignore research papers of Indian origin (whether published in international or national journals), our own colleagues within the country also prefer to cite a paper from abroad rather than from within India and consequently, the citation rate of Indian journals remains low.

A number of factors add to an author's hesitation to publish papers in Indian journals. Many of the journals published in India do not maintain quality of printing, specially the photographic images and other artwork. The publication schedule is either too infrequent or worse, is not fixed. Most of the Indian journals do not have a regular and stringent peer-review system in place, which detracts serious researchers. Many journals are not indexed by any of the indexing services and thus do not attract good papers. However, even the few Indian journals

that do not suffer from any of these limitations fail to attract the best manuscripts because of the authors' fears about the impact factor or the worry that the paper would not be 'visible' to the international community.

Thus poor science nurtures poor journals, poor recognition and low credibility. These in turn foster poor science, rather than encouraging excellence. Unless we improve the overall quality of science research in the country, little can be done about the quality of science journals and their poor international standing.

Factors that generate poor science

Motivation for research is one of the most important factors. If the research activity stems from compulsion, either because of pressure of promotion or because of the job requirement, it is unlikely that the best efforts are put in. Like any creative activity, research also has to find its motivation in passion.

The originality and relevance of the questions asked are equally important. Our scientists often identify themselves with a research area which is 'fashionable' at a given point of time and thus they jump, like the transposable elements in our genomes, from one area of research to another. Consequently, their creative ability does not get focused and they fail to establish their identity or contribute in depth to any topic. Some years ago we had a spate of activity in super-conductivity and in recent years we have similar waves of research in genomics and proteomics. It is doubtful whether, such waves will ever turn into a tide of original and high quality research.

Infrastructure, institutional support and motivation for quality are other factors that need to be in place for excellence. Many enthusiastic, motivated and capable young persons struggle to carry out meaningful research, but either the infrastructure for a good laboratory does not exist or the surrounding atmosphere (incapable or scheming colleagues and/or insensitive administration) is so vitiated, that much of their creative ability is wasted in firefighting rather than actual research. Some give up in frustration, while many others settle down for less than their best. Only in a few instances, the battle with the irresponsible system is partly won to allow something meaningful and original to be achieved.

It is often claimed that because of the limited resources made available by the government, we do not have adequate infrastructure for front-ranking research. While this may be true in some specific capital-intensive areas, it may not be a major cause for the poor quality of research output from the various establishments. Many of the research institutes and even some university departments are fairly well equipped and many of them also have reasonable support in terms of manpower and recurring costs. This is not to say that the Indian research laboratories do not suffer from lack of adequate material support. As noted above, many desiring and capable persons are suffering because of poor infrastructure and other facilities. However, more serious than the lack of adequate infrastructure, is the under-utilization of the available facilities. Barring a few exceptions, available expensive and sophisticated or even routine facilities are grossly under-utilized. This happens because of the strong tendency to individualize, rather than share the facility. The status of a scientist is often defined in terms of what facilities are available in his/her laboratory/institute, rather than by the actual research contributions. A facility existing at some place and not being utilized or not allowed to be utilized is worse than not having the facility at all. As an example of gross under-utilization and/or irrational establishment of facilities, one may look at the many DNA sequencing, oligonucleotide synthesizing or peptide sequencing facilities available across the country. In spite of the fairly large number of such facilities, most workers are forced to look for commercial facilities rather than make use of these 'national facilities' set up at considerable public cost.

In our 'democratic' set-up, we hesitate to identify any outstanding individual scientist or a group, and create facilities to build the desired set-up for unfettered productivity of such a scientist/group. Although there have been cases when institutions have been built around individuals, in such cases, more often than not, these have been based on matters other than merit alone. This has only tended to further support democratization of all support. A large chunk of money distributed to many not-so-deserving candidates has a more negative than positive impact. In this context, I am not sure if the schemes like FIST of DST or UPE of UGC will have the desired effect of cre-

ating laboratories of excellence. While the government and the funding agencies can claim to have spent large sums on scientific research, there is hardly any detectable gain. At best, many more departments in the universities would have the privilege of showing-off some expensive equipment. I believe that the same amount of money invested on a smaller number of really deserving individuals/groups would have indeed helped improve the quality of research in those chosen laboratories. Creativity is not uniformly and evenly distributed and, therefore, the support to foster creativity has to be selective.

It has been claimed that any individual does not put in his/her best effort on a sustained basis in the absence of suitable 'rewards' and institutional support (like promotions/recognitions, etc.). This may have some element of truth. But a negative aspect is the doling out of a plethora of 'rewards' to not-so-deserving persons. Unfortunately, the latter is not a rare phenomenon in our country. The various awards/recognitions also seem to follow the principle of co-operative binding, displayed by many biological molecules, so that the same person continues to receive one award after the other, even though no outstanding contribution may have actually been made in the interim period. It is frustrating when this happens, at the neglect of someone who has indeed contributed in some positive manner. This frustration, compounded by the already harsh working conditions, may turn into apathy.

How do we improve the quality of science journals?

The contributing authors and the editorial policies together determine the quality of a journal. The published material cannot be better unless the articles that are submitted by the authors themselves are intrinsically of good quality. On the other hand, good editorial policy (stringent, constructive and quick peer-review system, regular publication schedule, quality printing and wider circulation) is essential for any journal to attain and maintain a respectable status. The authors and the editors have to work in synergy to ensure quality.

It will require a strong determination on part of the established scientists to publish some of their best papers in Indian

journals. Publication of not-so-good papers, just for the sake of publishing something in an Indian journal, will in fact continue to have a snowballing effect of perpetuation of mediocrity. The established scientists can take the 'risk' of publishing in journals of so-called lower impact factor. It is ironical that while we feel happy to be on the editorial board of a journal in India, when someone is being considered for appointment/promotion/award and has published in the same journal, we look at that person's credentials with some contempt. Such double standards do no good to the system. Only when we begin to feel as satisfied with a paper in an Indian journal as with a paper in any other better known international journal, can we expect the rest of the world to recognize our journals. There is no point in expecting the West to first recognize our journals so that we also do the same.

To ensure quality of research journals published in the country, we need quality of the indigenous science research to improve significantly. The main determinant of quality of research is the human resource that practices research. It appears rather ironical that everyone complains about the lack of quality in young people available for Ph D or higher level research/teaching, and yet almost every fresh Ph D, or even a fresh graduate, is literally forced to go abroad rather than try working in India. It is extremely rare that someone finds a job in a reasonably good research institution/university without having seen a Western lab. Is it not paradoxical that on one hand, the country boasts of having set-up research institutions of very high standards, and yet we consider the young scientists who earned their Ph D from these 'elite' institutions to be 'worthless' unless they spend several years in a laboratory abroad? If indeed the training received at our own research institutions is not of international quality, what is the justification for their existence and continuance? Most of these elite institutions do not suffer from lack of equipment or other facilities. Rather, as discussed earlier,

sometimes they seem to suffer from an excess of it, which either they do not want to utilize or are actually incapable of utilizing.

What is needed is an honest and realistic reappraisal of the working conditions in our research institutions and university departments and their policy of human-resource recruitment. Most of the elite institutions practice an undeclared ban on recruitment of someone who has not gone abroad for a post-doctoral stint. Such deferential treatment is responsible for the almost complete lack of post-doctoral culture within India. Not only does this thwart challenging and innovative research, it demotes self-reliance and self-confidence. Often, the 'foreign-returned' scientists have not been able to keep up their good work after returning to India. Although the common explanation is that the conditions in India are not conducive to original and quality research, the unstated fact in most cases is that the persons themselves suffer from lack of originality. As postdocs, they were authors in good papers published in high impact factor journals but on their own, they could play only the second or even lower-order fiddle. But because of their names appearing in papers published in high impact factor journals, the selectors fail to objectively assess their personal creative abilities. An additional problem is that persons who have spent some years in Western laboratories find it difficult to come to terms with the working conditions in India and consequently, they either return back or settle down in India to an 'easy' life. Only a small proportion of these has been able to sustain quality productivity after returning to India.

It is high time that we learn to retain our better human-resource material in India. This would require a paradigm shift in our recruitment policies. We need to honestly and objectively identify brighter and capable students at master's and/or doctoral levels, and give them appropriate tenured/contractual positions in our university departments/research

institutions together with the necessary 'start-up' support, so that they can set-up their own laboratories while still young and thus interact with the international community as equals rather than as subordinates. The selection committee members need not be simply awestruck by someone's name appearing in publications in high impact factor journals. In multi-author papers, a common feature in many of the high-profile research laboratories is that it is difficult to assess an individual's contributions, which may indeed be trivial. Compared to this, someone working under Indian conditions on a sustained basis is more likely to perform better, if given the appropriate opportunity.

In summary, the first and foremost requirement to improve the quality of research and its publication in India is to ensure that we develop self-confidence and self-reliance, so that our bright and capable young scientists do not need to necessarily work in a Western laboratory to gain credibility. Similarly, publication of quality research papers in Indian journals should not be taken as a 'disqualification' or an indication of lack of competence. The necessary infrastructure and conducive 'environment' are more likely to develop well around capable individuals, rather than having the infrastructure first and then finding people to make use of it. If we have better quality people, they would further attract better human resource and foster excellence, while mediocrity would only breed mediocrity. The present scenario of the continuing clamour for better material resources rather than making efforts to nurture the indigenous human resource is unlikely to make any improvement in the existing dismal situation of the knowledge-generating institutions in India.

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