Supporting science

Apropos the editorial (*Curr. Sci.*, 2003, **84**, 1495–1496): I [dream] that I am Oliver Twist and I tremble as I shuffle down the aisle of the NSF [National Science Foundation] orphanage, my empty soup bowl uplifted. The youngest orphans stare at me. They have no bowls, for they have never received NSF support. Among the throng I spy the shocked and bewildered faces of scientific luminaries, prizewinners, even Nobel laureates. I raise my bowl to the Director and in a trembling voice ask, 'Please, sir, one little laser'.

'What,' he thunders, 'You have already had more than your share. Out!'

– Daniel Kleppner, Night Thoughts on the NSF (*Phys. Today*, April 1990) as quoted in Greenberg, Daniel S., *Science, Money and Politics*, University of Chicago Press, 2001.

Please, sir, one good word for DRDO's funding of basic research in academia.

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Iraq war

This has reference to the editorial by Balaram[1] referring to the war in Iraq. The US-led war against Iraq, ignoring world opinion and without UN sanction, is a war against humanity in the so-called modern civilized world. There is a general trend of deterioration of moral values/ethics, more so in the American Presidents. This has marginalized the UN, a world peace-keeping international body, by those who were once known as caretakers of world peace. The UN Secretary-General and Chief Weapon Inspector Hans Blix are as responsible for the war on Iraq as the US.

It is about time that Arab nations and the entire world come forward, raise their voices and stop all kind of cooperation – military, industrial, agricultural, and cultural. A kind of Gandhi's non-cooperation movement should be launched against such arrogant countries. Even other powers like Russia, France, China, Germany and smaller countries can join hands for regional stability and for multipolar world to fight against atrocities and such US-led unilateral actions.

The enormous heat generated during the two wars by continuous bombardment of thousands of explosives by the US and its allies has resulted in the disturbance of air currents in South Asia. This is possibly the cause of the altered rains in India and many other countries in recent times; only time and further studies will tell.

US attacked Iraq under the pretext that the country had 'weapons of mass destruction'. US used the atomic bomb in the past in World War II on Hiroshima and Nagasaki. In Vietnam, 72 million litres of herbicide (Agent Orange) and animal poison (DIOXIN) were used during the 1961–75 war. Depleted uranium in weapons was used in the 1991 Iraq war under UN cover. Indiscriminate bombing on civilians, hospitals, palaces resulted in killing of thousands. It also resulted in loss of property including priceless national heritage in the form of museums, libraries and monuments in Iraq. Westing[2] has published a series of papers disclosing how US has used chemicals against plants/animals.

1. Balaram, P., *Curr. Sci.*, 2003, **84**, 859–860.
2. Westing, Arthur. H., *Environmental Awareness,* 2002, **25**, 51–58.

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Indian science and Indian journals

The status of the productivity in Indian science is reportedly in 'crisis' in the face of an estimated and measured (?) shortfall that concerns the science circle in the country.

Decisions based on one or two parameters alone would not present the reality. In many issues of *Current Science*, the concern for decreasing Indian science productivity in relation to that of other countries – particularly with respect to those of South Korea and China – is widely addressed and discussed. The data presented are partial, leading to conclude that Indian scientists are doing badly. It seems that we draw the data that would support our preconceived attitude and belief.

It is not my intention to state that India is doing well in science; I also accept most of the arguments posted; however,

we should be cautious to arrive at very generalized and critical comments.

The performance of South Korea and China is remarkable; no one would have a second thought about it. Before we compare India with China and South Korea, we should compare the input for S&T in India, South Korea and China. The amount of money spent for R&D, infrastructure and equipment facility available, etc, need to be studied before making criticisms. In India, much of the money for R&D comes from Government whereas in South Korea, industry contributes substantively for R&D. India is affected by 'brain-drain', whereas in South Korea, it is not an issue at all.

The reward system in India is inevitably restrictive. Institutional recognition is not operative and esteem is not ensured to those who have fulfilled the role of addition to the stock of knowledge. In China and South Korea, the reward system operates to accord greater recognition to the quality of research than to its sheer bulk. In China every *Science Citation Index* (*SCI*)-covered journal paper counts and has unlimited value[1].

Many science productivity evaluation studies consider the ISI databases, particularly the *SCI* as a tool to measure the volume of scientific research output and its impact. Based on the *SCI* data set, the number of scientific papers produced in India is on the decline! Excerpts of the number of papers indexed in *SCI* for selected countries[2] are given in Table 1.

The number of papers published in Asia, South Korea and China are increasing whereas those in India and US are on decline! Would anyone accept that the science productivity in South Korea has increased in the last decade by 663%, while in US it has declined by 8.96%? Is it reliable and acceptable? Will the above data permit comparative assessment?

The fact is that the coverage of Chinese and South Korean journals has increased in ISI databases in the last ten years while the number of Indian journals covered has decreased considerably, from 30 in 1970 to 10 in 2000. The data given by ISI reflects the database coverage rather than reality.

Another set of data, the 'relative citedness' (popularly called as the measure of impact of scientific publications) of the same countries[2] is given in Table 2.

The percentage of relative increase over the decade is remarkable for South Korea and China; it is a moderate increase or constant for India and it is on decline for US in the last decade. Again these data are influenced by database coverage.

The sample data presented above indicate that more Chinese and South Korean journals are entering into ISI databases, whereas the number of Indian journals covered by ISI is decreasing. The ISI has a journal selection policy that consists of both qualitative and quantitative parameters such as the journal's basic publishing standards, its editorial content, the international diversity of authorship, and the citation data of the journal, timeliness of publication, peer review process, etc.[3] Many Indian journals fail to meet these criteria and consequently become the 'left journals' of ISI. The quality of the Indian science journals should be made good, or it can even be 'optimized' for quality.

The number of S&T journals published in India is currently more than 2000. However, just 10 of them have been accounted for by *SCI*. It is of prime importance for the Indian journals to get international recognition if they are keen on increasing their standing in relation to the global level. This is essential not just to 'inflate' productivity and citation record, but to get more visibility for Indian journals that would ultimately lead the Indian scientists (who are the authors of most of the Indian journal papers) to have more exposure, technology, quality and knowledge transfer, etc.

There are certain facts that we need to investigate. One is the peer review system. Unfortunately most of the Indian journals have poor reviewing process and they ignore review by international peers. The review, particularly by international peers would increase quality of papers. Should an Indian journal be serious in international visibility, it must opt for international peer review for all its papers.

Quality of scientific papers is a major dimension to the issue of measuring S&T of a country. While peer review is mooted as the best practice, measuring the quality of all scientific papers is an impossible exercise. A viable alternative proposed to measure the quality or impact of a paper is through the impact factor of the journals. While the data on scientific productivity in India is discussed, there was a view that *the frequency of papers published in high impact factor journals seems to have significantly increased, if not in Science and Nature. This may account for the small decrease in the total number of publications, since the tendency to publish a large number of small papers in inconsequential journals is probably giving way to publishing complete studies in good journals*[4]. Why would not we test this view?

Science auditing is so complex; it needs to be carried out regularly as by National Science Foundation (NSF), USA, Centre for Science and Technology Studies (CWTS), Netherlands, etc. Decision based on a single parameter would be misleading. Priorities need to be set: rise in research investment level, creating a stronger public research base,

Table 1. S&T publication output

Country	*SCI* indexed publications		
	1989	1999	% of increase
India	9,410	9,217	.2.05
China	4,325	11,675	269.94
South Korea	1,006	6,675	663.51
Asia	54,178	86,405	159.48
US	179,637	163,526	.8.96
World	478,300	528,643	9.52

Table 2. Relative citedness of selected countries

Cited region/ country	1990 Number	1990 World share (%)	1994 Number	1994 World share (%)	1999 Number	1999 World share (%)
India	12,046	0.57	15,179	0.60	16,928	0.62
China	4,666	0.22	8,660	0.34	15,846	0.58
South Korea	1,335	0.06	3,462	0.14	11,271	0.41
United States	1,093,156	52.10	1,261,797	50.10	1,249,419	45.45
Asia	153,294	7.31	208.603	8.28	263,941	9.60
Total	2,098,342	100.0	2,518,783	100.00	2,749,022	100.00

improving private investment in research, increasing R&D investment, creating R&D intensiveness and many other factors are in the agenda for Indian science. Before we arrive at a conclusion, all contributing factors require scanning.

1. Gu, Yinian, pers. commun., 9 April 2003.
2. Science and Engineering Indicators of NSF, 2002.
3. http: //www.isinet.com/isi/hot/essays/selectionofmaterialforcoverage/199701.html
4. Padmanaban, G., *Curr. Sci.*, 2002, **83**, 1055.

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Measuring and assessing science beyond *SCI*

N. C. Jain[1] makes a sweeping generalization when he states that '…the scientific community is not satisfied with the existing quantitative indices like the *SCI* and its twin publication, the *JCR*…' I question the basis of the assertion.

While any knowledgeable bibliometrician knows there are a variety of ways that impact data can be calculated, it does not follow that these thirty-year old indices are not accepted by a large percentage of the scientific community. We all know differences arise when numbers are used promiscuously but it is not productive to dismiss a huge database, whose main purpose is information retrieval, just because it does not satisfy some particular slant that one group may desire. Anyone can establish new categories of journals and my colleagues and I have been the first to recognize this for many years. Recently Alexander Pudovkin and I published a paper on how to establish even more precise journal categories and I am sure that in the future *JCR* will evolve to deal with many of the objections that one can cite[2].

1. Jain, N. C., *Curr. Sci.*, 2003, **84**, 863.
2. Pudovkin, A. I. and Garfield, E., *J. Am. Soc. Inf. Sci. Technol.*, 2002, **53**, 1113–1119.

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Revamping of the education system

The long-pending revamping of the current 10 + 2 + 3 system of education, is once again set for a sea change. After a long debate, in 1987 the 10 + 2 + 2 system was replaced by the present system, which saw the introduction of an extra year of curriculum at the bachelor's level. This system put into place, about sixteen years ago, seems to have not yielded the desired results. The idea then, to introduce an extra year at the bachelor's level, was possibly to lend some respectability to the bachelor's degree, and making it a bit more tedious to obtain. On the flip slide, it also halted, although temporarily, the growth of graduate unemployed youth, to be registered at various employment exchanges, across the country.

The population growth-rate, coupled with the successful pro-literacy programmes of the government, made sure that there is no dearth of the graduate work force, waiting for employment in the country. The lack of suitable jobs meant that the quest for specialization and super specialization, has to be tougher and that was exactly what happened. With a highly pyramidal structure of our education system the competition for admissions into postgraduate, professional, and value-added programmes, is becoming all the more nail-biting.

In order to obtain a degree capable enough to provide, preferably a government job, the graduate student is finding himself in a piquant situation. He is frantically evaluating options open before him, including MBA, MCA, B Ed, etc. apart from pursuing his masters in one of his bachelor-level subjects.

The mushrooming of one-flat or 'garage-based' institutes, with affiliations with some university or the other, has added another dimension to the already gaping problem. Reports and cases of students regularly being duped by such 'institutes', charging hefty amounts from the hapless mortals, are very common in the media.

To address these problems effectively, an idea of an alternative 10 + 2 + 4 system of education has been mooted recently. An expert committee has also given its recommendations in its favour. This system is successfully in place in the USA, for the past several years. The basic idea is to equate the B Sc, B A and B Com degrees with B Pharm, B E and B Tech. The graduate, especially in the stream of pure science is to be made more job-market friendly, and more employment-oriented. A national debate is on over this alternative system of education and views are being aired from various sections of the society. This when enforced, will reduce the number of students competing for PG and value-addition courses, at least for some period of time. The corporate sector must be made keener and the students well equipped, to suit each other's require-