Science in India – On the comments of Gupta and Garg

From the title of the paper by Gupta and Garg[1] – with a question mark and the words 'A rejoinder' – it appears that they wanted to refute what Arunachalam[2] had said in his short note, and say that 'No, science in India is actually on the rise.' Although they started with a question, they did not give a categorical answer. However, if science in India is characterized, as they point out, by 'ageing and declining scientific population, lack of motivation and incentives for scientists to perform, a feudal work culture, . . ., besides a lack of sufficient encouragement and incentives to bright students to take up science as a career at young age', it cannot but be on the decline. Certainly, it cannot be on the rise. Talking about the current status of science in India, C. N. R. Rao says that 'unless we do something serious, I am afraid that we will soon become a third-rate country in science'. According to Balaram, 'All indicators suggest that scientific output is on the decline'[3]. Gupta and Garg also point out, quoting Kumar, that fresh graduates in science are not keen on pursuing doctoral programmes. Gangan Prathap[4] and Arunachalam and Gunasekaran[5] have written on the actual number of doctorates in S&T awarded in India.

Gupta and Garg argue that one of the reasons for decline in the number of papers indexed in *Science Citation Index* (*SCI*) in the case of India and the rise in the case of China is the change in the number of Indian and Chinese journals indexed in *SCI*. Incidentally, the point that a fall in publications can be either due to a real fall in scientific productivity or because of falling journal coverage is not new[6,7]. Actually, this is another evidence for the decline of science in India and rise of science in China. Many Indian journals which were once indexed in *SCI* are, in the judgment of the editor and the advisory board of *SCI*, no longer above the quality threshold for continued inclusion. Many Chinese journals, on the other hand, were found good enough in recent years to be included! Indeed in 2001, as seen from *Journal Citation Reports*, two Chinese journals have recorded an impact factor of above 1.000, and one of them above 2.000: *Cell Research* (2.012) and *World Journal of Gastroenterology* (1.445).

It is not just *SCI* which shows that the number of papers published by Indian scientists is falling. Arunachalam has shown that in mathematics (as seen from *MathSciNet*)[8] and chemistry (as seen from *Chemical Abstracts*)[9] also, there is a decline.

I am not sure if Gupta and Garg have used the 'activity index' concept in the right way. The use of activity index with respect to years is somewhat meaningless. Look at the vastly different values of the activity index for India and China given in their tables 1 and 2 for the years 1998 and 2000. This is because in table 1, they have considered just two years and in table 2, twenty-one years. Unfortunately, this kind of thing is the bane of scientometrics. Such indiscriminate use of scientometrics is one reason why scientists in India and other developing countries do not take it seriously. The idea of Davidson Frame was to find out the relative emphasis laid on different areas of research in a country compared to the world. The proportions (of different areas) should obviously add up to unity. For example, 55% of research publications from the US is in the large area of life sciences, whereas life sciences may account for less than 35% of publications in India. The activity index for life sciences will be much higher for USA than for India. For the same reason, the activity index for physics may be higher for India than for USA. Incidentally, as pointed out by Godbole[10], high-energy physics is one area in which there is a modest increase in the number of papers published from India.

Gupta and Garg point out that 'Arunachalam is also silent on the quality of research output'. Is it their case that the quality of science performed in India is on the rise? I have elaborated on this issue earlier[9].

1. Gupta, B. M. and Garg, K. C., *Curr. Sci.*, 2002, **83**, 1431–1432.
2. Arunachalam, S., *Curr. Sci.*, 2002, **83**, 107–108.
3. Jayaraman, K. S., *Nature*, 2002, **419**, 100.
4. Gangan Prathap, *Curr. Sci.*, 2002, **83**, 1056.
5. Arunachalam, S. and Gunasekaran, S., *ibid*, 2003, **84**, 9.
6. Basu, Aparna, *Scientometrics*, 1999, **44**, 347–360.
7. Basu, Aparna, Second Brief Report on Bibliometric Indicators of Indian Science, NISSAT–DSIR, New Delhi, 2000.
8. Arunachalam, S., *Curr. Sci.*, 2002, **83**, 353–354.
9. Arunachalam, S., *Curr. Sci.*, 2002, **83**, 195–196.
10. Godbole, R. M., *Curr. Sci.*, 2002, **83**, 1179–1180.

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Research in SCTIMST

Current Science offers a representative forum for discussion on scientific matters in India. This is the reason why I wish that its news item captioned 'Science in Thiruvananthapuram'[1] had been more balanced. For example, it appears from the report that in the hospital campus of Sree Chitra Tirunal Institute for Medical Sciences and Technology, no department other than Cellular and Molecular Cardiology and Neurology is doing any research worth mentioning. In fact, other departments have been making significant contributions in areas such as aneurism, interventional radiology, mucoid vasculopathy, TB, meningitis, lipid peroxidation and autoimmune glycobiology.

1. Sen, Nirupa, *Curr. Sci.*, 2002, **83**, 548–552.

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