

## Assessment of research of major institutions in engineering during 1987–1989

The contribution of the Indian universities to the mainstream scientific literature for the three-year period 1987–1989 was examined by Nagpaul<sup>1</sup> recently. The quantity (output) of work was determined from the number of articles published in journals covered by *Science Citation Index* during this period. The quality (impact) was assessed using normalized impact factors of the journals in which the articles appeared. It will be helpful here to define the sense in which 'impact' is used here. 'Impact' was computed on the basis of impact factors of journals given in the *Journal Citation Reports*. Impact factors were then normalized to eliminate the confounding effect of variation from one field to another. This aspect has been described at greater length in ref 1.

From the wealth of detail given in ref. 1 it was possible to extract reliable information about how the major engineering/technological institutions in the country performed during the period. Eight institutions were chosen (from the list of thirty-three institutes and universities studied by Nagpaul, which had more than 150 articles in the three-year period) which are arguably the finest schools of engineering studies in the country.

Table 1, which has been extracted from Tables 4 and 5 of ref. 1, shows the publication output of these institutions in the engineering field alone. It is seen that in terms of the total output, IIT/D takes the first rank, ahead of IISc, while IIT/Kh and Roorkee are poor stragglers. Another criterion for assessment that suggests itself is the quality of the work being published. From the total impact of the work published, it is possible to compute the relative impact (impact/paper) of work appearing from each institution. According to this criterion, IISc ranks first, followed very closely by IIT/B. However, IIT/B's total output has been

**Table 1.** Publication output and impact of major institutions in engineering in 1987–1989

Institution	Output	Impact	Rel. imp.	Rank by	
				Output	Rel. imp.
IISc	218	854.71	3.92	2	1
IIT/D	244	769.07	3.15	1	6
IIT/B	98	383.05	3.91	6	2
BHU	107	388.69	3.63	5	3
IIT/K	123	435.83	3.54	4	4
IIT/M	154	487.82	3.17	3	5
IIT/Kh	87	224.03	2.58	7	8
Roorkee	64	165.60	2.59	8	7

comparatively poor (rank 6 in the list) but this has been made up for with papers of relatively superior quality. BHU ranks third in this measure. Again, by this standard, IIT/Kh and Roorkee perform poorly. Overall, IISc's performance is most consistent, commensurate with its general standing in the public eye.

It will be interesting if this study of bibliometric data can be extended to cover a longer time frame, say from the 1960s, when all these institutions were in place, to the early 1990s. This will give an indication of how these institutions have grown (or declined) in terms of output and impact of work. It will also be instructive to compute output on a per head basis (output divided by total number of active researchers, including doctoral and postdoctoral students, research assistants, associates, etc) to see how these institutes are performing. It will also be useful to go into a finer examination of detail, sub-field by sub-field, to reveal each institution's major strengths. The relative strengths and weaknesses of different institutions over this time span will then become clear. If systematically gathered, such information will be very valuable to our science administrators and funding agencies.

A word of caution to the reader is in

order here. So far, this has been a very simplistic analysis of the research performance of our leading institutions. However, it is indicative of what could be done so that a more scientific assessment of our higher educational institutions can be made. One of the tragedies of our scientific life is that world renowned scientists get paid little or no more than their mediocre colleagues, and money for basic research is rarely distributed on recognition of outstanding merit or performance because quantitative measures have rarely been used so far for monitoring performance. There is, therefore, a crying need for such exercises—otherwise, there will be very little incentive for researchers or institutions to make sure that their work stands up to the highest standards of scientific excellence.

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