

EXECUTIVE SUMMARY

R&D endeavours in the area of S&T constitute the national lifeline of the development of science & technology, be they in the institutions of higher learning, public sector research organizations, or the industry – private or public sector. The institutions of higher learning are also the major performers of research, but output in terms of R&D manpower has eluded the national effort. Efforts were made by DST in the past, to collect the required data in order to provide a national data-base on R&D in S&T without any special inputs. Teaching being the primary concern of universities, institutes and colleges, the teachers involved in research activities are to be evaluated by a set of unique *science indicators* side by side with the conventional measures used to assess the outcome of research inputs poured in by the national funding agencies as well as the industry. To evaluate and develop such science indicators four Brain-Storming Sessions (BSS) were sponsored by DST and held at Thanjavur (S), Pune (W), Guwahati (E) and Lucknow (N); the last event was organized under the aegis of Indian Geological Congress, at Lucknow in March, 1998.

These brain-storming sessions highlighted the relevance of such science data-base and enabled to design a set of three basic questionnaires for inviting responses from universities and institutes of higher learning, S&T Departments and teaching faculty. Being the nodal national repository of R&D data on science and technology, the DST decided thereupon, to entrust the responsibility of conducting this survey to the very people who were involved at the BSS stage and that is how the present investigating-

team came to be offered this job for the north zone, with enough financial sponsorship and timely release of grants.

After the pilot survey, covering 21 institutions – universities, institutes and PG Colleges, an inter-zonal meeting reviewed the responses and made few modifications in the contents of questionnaires as well as in the methodology which was to be adopted. Software developed at north zone for data entry and data retrieval were largely accepted for all the zones. The reluctance to supply data-base by teaching community was overcome, partly by persuasion, and partly by using annual reports and budget papers to provide a data-base from 47 out of 58 S&T universities/institutes, and 17 out of the contacted 121 colleges, including engineering and medical colleges.

The data has been presented in 55 tables in the form of appendices, covering the universities/institutes and 13 appendices related to the colleges and is illustrated by 35 figures with 7 summary tables in the text. On special demand of DST, attempts were made to assess the full-time equivalent (FTE) faculty and ancillary staff to facilitate apportioning of the manpower and expenditure towards R&D. Low-level of response (21.46% of faculty) inhibits recommendations for free use of the results. Therefore, and a modified FTE(t) has been suggested in this report.

The total reported income of 47 universities/institutes of North Zone is around Rs.1805 crores. Out of which Rs.487 crores belongs to four reported institutes of national importance and Rs.582 crores belongs to 11 centrally-supported institutions. This forms 59.22% of the total for all the

universities. Among the State-supported universities, the support by Uttar Pradesh is comparatively less. Out of this total income, 62.83% is spent on S&T sector, out of which 31.64% goes towards R&D. The R&D expenditure, thus, comes out to Rs. 359/- crores in North Zone institutions covered in this report on the basis of FTE. About Rs.321 crore, almost 89%, goes to recurring expenses and a little over 10.5% towards non-recurring expenditure, which takes care of physical and instrumental requirement and innovation. Seventeen of the 47 universities/institutions attract sufficient extramural funds for R&D, although mostly it comes from R&D funding agencies of the Union Government, such as DST, CSIR, UGC, AICTE, etc.

Within the limitations of data-base, it can be safely concluded that around 42% of total R&D expenditure in north zone is carried out by agricultural and allied institutes, about 27% by medical institutes, and about 6% by engineering institutes, leaving a quarter for all the remaining multi-faculty and natural science-based universities. This is reflected in the R&D objective scenario for UNESCO requirement also.

Computations for FTE on R&D manpower is constrained by poor response status by teaching community as a whole. Use of FTE(t), which is derived by integrating the FTE per faculty value obtained from responses over the total staff (instead of only the responded staff). The total staff in the universities/institutes covered in this report is 10,054. The number of responding faculty is 2158 (21.46% of the total). The calculated FTE comes to 848 and the FTE(t) comes to 4415, forming 8.43% and 43.91%,

respectively, of the total faculty. Range-wise distribution of FTE becomes uniform if one uses FTE(t), rather than FTE. One cannot use FTE(t), however, where issues like gender are considered.

The estimated percentage of time devoted to research and extension is maximum in agricultural sector, followed by medical sector. Similarly, S&T expenditure on *applied research* is almost one-third of the total, being minimum *for experimental development*. This may be partly due to lack of facilities and interest in this sector and partly due to very heavy infrastructure demand for this type of research.

Amongst the R&D FTE, the percentage of female FTE works out to 14.6%. This percentage is in inverse proportion of age and experience (in years), indicating that many female researchers opt out in later years for family reasons or otherwise. As for the qualifications, such as doctorate degree, 44.26% females have the doctorate degree as compared to 50.96% in males. As such the women researchers are not found far behind their male counterparts.

Just as faculty members are apportioned to R&D [and called FTE & FTE(t)], the auxiliary and administrative staff have also to be apportioned towards R&D activity. It came out that such deduced supporting staff correlate better with FTE(t).

The whole project emanated from an exercise of developing science indicators. Due to poor response, however, the ratios, or percentages, will not be nearer reality, as some of the known prestigious research institutions, such as AIIMS, Delhi Univ. IARI, JNU, IIT, Delhi, IIT (K), IIT (R),

Allahabad (U), and PU (Chandigarh) have poor staff response. But this does not absolve us to write off these well-thought-out science indicators. Efforts should, therefore, be directed towards getting the details from individuals in the institutions of higher learning as regulated routines and possibly, the DST, in collaboration with UGC, AICTE, MCI, IARI, etc., design a common questionnaire, based on the questionnaire III developed for this National Survey. This approach would not upset the faculty members, who currently receive a variety of questionnaires from a plethora of organizations – Government, semi-government, or non-government, throughout the year. A common strategy to develop the data-base will lead to a stronger and more complete national data-bank which can be used profitably by the user agencies.