

Executive Summary

The quantification process for any kind of resources basically starts with identification of various properties associated with the given resources and translation of these into numeric language. In the present study the resources under consideration are 'manpower' and 'finances'. While most of the information on 'finances' is in numeric language for manpower resources it is necessary to identify various properties pertaining to the activity in which the manpower is to be quantified. The scope of this study is well defined in the sense that it attempts quantification of manpower and financial resources devoted to R & D activity in Science and Technology from Higher Education Sector. The quantification of manpower has been achieved through collection of data – predominantly primary data – from a large number of faculty members from different institutes of higher education. The data collection was carried out through questionnaire survey. Most of the information sought relates to input-output indicators of R & D activity. The quantification of financial resources has been attempted mainly on the basis of data supplied by institutes through the budget documents. The data on manpower relates to the period of three years extending from 1995-1998 and that of financial resources relates to 1997-98 fiscal year. Some of the major findings of the study are as follows.

Manpower resources: Information from as many as 35 universities / institutes and 13 colleges was collected for this at three different levels such as institute – department and individual. These institutes and department belong to four different field of sciences such as Agriculture – Engineering – Medicine and Natural Sciences. By and large the response from institutes from Medical sciences was not satisfactory.

Financial Resources

It is observed that in the Western Zone (Gujarat, Maharashtra, Madhya Pradesh, Rajasthan, and Goa) as a whole the annual total expenditure on higher education sector is of the order of Rs. 907.17 Crores. However, this value relates to estimation obtained on the basis of 35 universities and 13 colleges. While we have taken colleges on sample basis, we had planned for census survey for universities. If we

consider only university level institution then for 35 institutes we have total expenditure on higher education of the order of Rs. 799 Crores.

The expenditures on S & T amounts to Rs. 536.46 Crores which is 67% of the total expenditure. The expenditure of the university/institutes belonging to Natural sciences has been apportioned on the basis of S & T and Non S & T departments in different universities. If we add the available data from colleges the component of S & T expenditure in the total amounts to 70%.

The R & D expenditure is arrived at by apportioning part of S & T expenditure on the basis of ratio of research scholars to the total students. This for university level institutions is 38.1% of S & T expenditure and 25.6% of total expenditure. For the West Zone considering the available data these proportions are 27.35% of total expenditure and 38.56% of S & T expenditure.

Of the total expenditure the share by State and Central Government is to the tune of 72% on an average. This is much higher in case of institutes of Agriculture Science (around 80%). The institutes own contribution ranges from 6.6% (Medical Sciences) to 66.3% (Engineering Sciences). However, this higher value of Engineering is due to the unique case of BITS Pilani, which is managed solely as a self-supporting institute. Generally, institute's own share ranges around 25%. This is mainly contributed by the student population basically in the form of fees paid. The attempt by institutes to raise funds by way of donations, contribution from industries etc. independently appears to yield a very small proportion of about 3% (in most cases less than 3%). This clearly indicates a low level of interaction between industries and academic institutes.

Manpower

The manpower data are available for 3,622 individual faculty members. One of the major tasks in the present exercise was to arrive at Full Time Equivalent for research of this number. This was ascertained on the basis of time spent on research by faculty members. However, this value varies according to the field of science and also per se that senior faculty members spend more time on research – despite the fact that they also have to shoulder the administrative responsibilities. If one considers the field of

sciences it is the agriculture that tops the list with an average of around 40% and personnel from field of Medical Sciences have a score around 30% out of 3622 respondent we get about 1277 R & D personnel amounting to little over 1/3rd of total respondents. The R & D personnel or FTE calculated according to designation reveals that these with designation of professors add up to 44.5% and for lecturers this value is about 34%.

As far as the time spent of various activities is concerned it may be observed that about 350 respondents spent more than 60% of time on research whereas about 170 respondents required to devote more than half of the time on administration.

Analysis of R & D activity

In order to analyse the R & D activity in higher education sector the weightages based on certain input - output indicators were assigned to the institutes. Details of these are given in tables 24-41. Some of the salient features are spelled out in this summary. All the indicators are placed on % scale to make them comparable. The % of respondents involved in the activity to total respondents was used for output indicators.

It may be observed that the range of R & D expenditure as % of the total (or S & T) expenditure spreads from 5% to around 55%. Participation of faculty in activities like research supervision, publication, participation in Research For a shows fairly well conditions. However, the participation in some of the activities leaves much room for improvement. These include indicators like Awards, Patents and Participation in advisory committees and development of technologies.