

Sponsored research and development projects – A brief analysis

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An analysis is made of Sponsored Research and Development (R&D) projects funded by the Department of Science and Technology (DST) under the Science and Engineering Research Council (SERC) Scheme, in terms of pattern of funding by types of institutions and by broad subject areas, research publications emanated from these projects and the journals where these papers were published.

A strong infrastructure for Science and Technology (S&T) activities has been created in India since independence. There has been a steady increase in the allocation of funds to S&T from the First to Seventh Five-Year Plan. During the Seventh Plan, the total S&T plan allocation was Rs 5087 crores. DST, one of the major central S&T agencies engaged in promoting R&D, accounted for about 12% of this total S&T allocation.

Support to R&D activities in various S&T disciplines has been one of the vital activities of DST. It has the mandate to build-up the general research capability in the country and provide special encouragement to scientists to pursue a research career. This is being achieved by sponsoring R&D projects to individual scientists to carry out specific time-bound research projects of their interest. Such projects are known as sponsored R&D projects or extramural R&D projects. SERC was established in 1974 and is the body through which DST implements its programme of sponsoring R&D projects in newly emerging and frontier areas of science and engineering. A similar scheme called General Research Scheme (GRS) being operated by DST was integrated with the SERC scheme during 1988 and so, the analysis in this paper relates to the projects funded under integrated SERC scheme. Opportunities are also made available to young scientists to pursue a research career through research projects in pure and applied research under the SERC scheme and through the scheme on Opportunities for Young Scientists.

Scope and coverage

The expenditure on R&D incurred by any S&T agency and the research projects sponsored by it to various

academic and other institutions can give an idea of the magnitude and variety of S&T activities carried out by that scientific agency. Keeping this in view, a study has been carried out to analyse the research projects funded by DST during the 7th Five-Year Plan under its SERC scheme (including GRS). The study mainly covers pattern of funding by types of institutions and by broad subject areas, research publications emanated from these projects and the journals where these papers were published. In addition, analysis was done on the Principal Investigators of these projects such as highest qualification(s), prestigious awards received by them and the various positions held by them. Since SERC is the main scheme under DST accounting for almost all the sponsored R&D projects, the present paper deals with the analyses of the parameters relevant to such projects. These are detailed in the ensuing paragraphs.

Analysis of observations

Funding by subject areas

A total of 658 R&D projects costing Rs 5086.62 lakhs were approved during 1985–90 under the SERC scheme. Table 1 gives subject areawise R&D support provided by SERC during 1985–90. It may be seen from Table 1 that among the subject areas listed, biological sciences received maximum support by way of number of projects as well as quantum of support followed by engineering and physical sciences. Projects under mathematics, agriculture and medical sciences received less support. This is because major research support in these areas comes through specialized agencies such as the Department of Atomic Energy (mathematics), the Indian Council of Agricultural Research (agriculture) and the Indian Council of Medical Research (medical sciences).

Further analysis (see Table 2) reveals that the maximum

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GENERAL ARTICLES

Table 1. R&D support during 1985-90

Subject area	Number of projects approved	Total approved cost (rupees lakhs)
Agriculture	11	56.31
Biological sciences	188	1464.19
Chemical sciences	87	587.92
Earth sciences	79	603.75
Engineering	156	1247.72
Mathematics	3	13.94
Medical sciences	12	126.64
Physical sciences	122	986.15
Total	658	5086.62

number of SERC projects approved were costing below Rs 5 lakhs (283 projects or 43%). Only 31 projects (5%) were in the cost range of Rs 20 lakhs and above.

Funding by types of institutions

Table 3 shows that majority of the R&D projects were sanctioned to academic institutions (comprising of Universities/Colleges/Deemed Universities and Institutes of National Importance). Four hundred and seven projects (62%) went to Universities/Colleges/Deemed Universities and 133 projects (20%) to Institutes of National Importance such as Indian Institutes of Technology, All India Institute of Medical Sciences, Post-Graduate Institute of Medical Education and Research (Chandigarh), Sree Chitra Tirunal Institute of Medical Sciences and Technology. In other words, the academic sector received 540 projects (82%) amounting Rs 4054.05 lakhs. National Laboratories received 85 projects and the remaining 33 projects (5%) went to 'other' institutes such as registered bodies, state government organizations, etc.

Publications by subject areas

An effort was made to ascertain the research publications emanated out of the SERC-funded projects. For

this purpose, a questionnaire was designed and the same was sent to all the principal investigators of the 658 projects. Responses were received from 428 projects (response rate 65%). Table 4 gives subject area-wise number of research papers published.

It may be seen from Table 4 that a total of 1293 publications were produced out of 428 projects. Of these, 1029 were published in various Indian and foreign journals and 264 were 'other' publications like conference/workshop/seminar/symposia proceedings, book/book chapter, monograph, etc. Although the number of projects approved in biological sciences and engineering were the highest (refer Table 1), 88 projects of physical sciences contributed 423 journal papers which is 41% of the total journal papers published.

Further analysis of these papers (see Table 5) shows that 214 projects produced journal papers in the range of 1-5 papers per project. Only two projects produced more than 20 papers per project (1 each in biological and physical sciences). It may be seen that 141 projects did not publish any journal paper.

Some of the important journals where these research papers published were: *Nature* (1), *Proceedings of National Academy of Science, USA* (3), *Physical Review Letters* (4), *Journal of Immunology* (1), *Journal of Biological Chemistry* (3), *Biochemistry* (2), *Plant and Molecular Biology* (1), *Journal of American Chemical Society* (2), *Physical Review* (18), *Journal of Physics* (19), *Current Science* (10), *Indian Journal of Biochemistry and Biophysics* (9), *Indian Journal of Technology* (4), *Pramana* (10), *Journal of Biosciences* (8), *Indian Journal of Chemistry* (12), etc. (The figure in bracket indicates the number of Principal Investigators who have published papers in these journals.)

Publications by types of institutions

Table 6 gives the total number of journal papers published out of the SERC-funded projects by selected institutions. The criterion for selection of these institutes was based on the number of SERC-funded projects per institute (above 10).

Table 2. Cost range analysis of SERC projects

Subject area	Number of projects by cost range (range rupees lakhs)					Total
	<5	5-10	10-15	15-20	>=20	
Agriculture	7	4	-	-	-	11
Biological sciences	66	66	43	9	4	188
Chemical sciences	47	27	7	2	4	87
Earth sciences	33	33	6	4	3	79
Engineering	67	36	34	10	9	156
Mathematics	2	1	-	-	-	3
Medical sciences	2	7	1	1	1	12
Physical sciences	59	28	16	9	10	122
Total	283	202	107	35	31	658