

Chapter 1

About the Study

Introduction

Science and Technology have always been an integral part of Indian culture. Natural philosophy, as it was termed in those ancient times, was pursued vigorously at institutions of higher learning. The Indian Renaissance, which coincided with our independence struggle, at the dawn of 1900s witnessed great strides made by Indian scientists. This innate ability to perform creatively in science came to be backed with an institutional setup and strong state support after the country's independence in 1947. Since then, the Government of India has spared no effort to establish a modern S&T infrastructure in the country. One mode of making this investment is by providing funding support to S&T research.

A large number of scientific agencies/departments/ministries of the central government provide funding support to S&T research in the form of extramural or sponsored R&D projects, with the aim of building research capability and S&T infrastructure in the country.

The National Science & Technology Management Information System (NSTMIS) division of Department of Science & Technology (DST), GoI has been continuously compiling the outcome of extramural research to assess and disseminate the output of these projects supported by various public funding agencies. The division is compiling information on extramural R&D projects annually and also published a 5-year analysis of the funding pattern to study the trend and understanding the dynamic S&T landscape of extramural R&D. With the cooperation of all the R&D funding agencies/departments/organizations, NSTMIS division has already published six reports on the funding pattern of the sponsored research by scientific agencies for the periods 1985-90, 1990-95, 1995-2000, 2000-2005, 2005-2010 and 2010-15. The division has also analysed the outcome of R&D projects funded during 1995-2000, 2000-2005, & 2005-2010 and published the reports. Taking it further, the present study analyses outcome of the extramural R&D projects funded during the period 2010-2015.

Scope and Coverage

The support to extramural R&D projects is based upon the information collected from the annual EMR directories published for the five years period. During the period 2010-2015, total amount of Rs. 10,504.27 crore was approved for funding of 27900 projects sanctioned by 21 central government departments and agencies. During this period, major sponsors of R&D projects were DST (9808), UGC (8175), DBT (2921), ICMR (1913) and CSIR (1778). These together accounted for more than 88% of the total number of sponsored projects. In terms of funding support, DST was at top (Rs. 3591.53 crore), followed by DBT (Rs. 2671.79 crore), MOCIT (Rs. 1188.55 crore) and ICMR (Rs. 658.92 crore).

Objectives

The main objectives of the study are:

1. Collection of information on the outcome of extramural R&D projects from principal investigators for the period 2010-2015.
2. Compilation of information/achievements in database form and their analysis/assessment.
3. Publication of findings for wider use among policy and decision makers.

Methodology

The target group for data collection in the study was principal investigators who had undertaken extramural R&D projects with funding support from various central government departments/agencies during 2010-2015. All the 27900 projects were approached for this study.

- **Structuring of questionnaire** - The questionnaire was designed keeping in view the objectives and focus of the project. It had direct questions seeking information on the project supported by the funding agency like project title, duration, major achievements in the form of products, processes, instruments, prototypes developed, research papers published, scientific manpower produced and employed, patents filed & granted etc. The questionnaire was finalized in consultation with the Local Project Advisory Committee (LPAC) constituted for this project.
- **Data collection** - Data was collected from all the principal investigators through a well-designed questionnaire covering various outcome parameters. A reminder was sent to those principal investigators, who did not respond within stipulated time limits. Then,

second reminder was also sent to the non-responding PIs. Questionnaire was also made available on the web-site of the Society for Environment & Development (SED), Delhi. A number of PIs utilized this facility and sent duly filled in questionnaires through email. Every effort was made to get information from the maximum number of PIs.

All questionnaires received were entered manually in the register and also in computer. All the information received through questionnaires was entered in Microsoft Access format for further use and analysis.

- **Processing & analysis of data** - The collected data were stored in physical form in the files. Structured programming was done for entering the data. The information was divided into a number of fields as per requirements of the study. All the information received through questionnaires was stored in the specially designed HTML enabled database. Codes were developed to analyse the data directly through software, as per the following parameters:

- Department/agency-wise outcome
- Subject area-wise outcome
- Year-wise outcome
- Types of institutes-wise outcome
- State-wise outcome
- City-wise outcome
- Project cost range-wise outcome
- Gender-wise outcome
- PIs Age group-wise outcome

Each of the above parameters were analysed in terms of the following outcomes:

- > No. of projects and amount sanctioned
- > Research papers published/presented in Indian and foreign journals/conferences
- > New products/processes developed
- > New instruments developed
- > New prototypes, principles/theories & varieties (crop) developed
- > Number of intellectual property rights (IPRs) obtained includes copyright, patents

filed/granted, trademarks, designs etc.

- > Number of human resources developed
 - > Manpower employed
- **Publication of report** – Based on the data collected, the present report provides an analysis of outcome of the extramural R&D projects supported during the period 2010-2015 by 21 central government funding agencies.

Limitations of the Study

The following points may be kept in view while going through this report on analysis of extramural R&D projects;

- Despite making all efforts to cover all the extramural R&D projects sanctioned (27900) during the period 2010-2015 by the funding agencies, the analysis is based on the 10950 projects, who responded to the questionnaire or data collected from Project Completion Reports (PCR) available with the funding agencies and provided access to these PCRs.
- Since the period under report was from 2010-2015, the PIs of some projects, which were more than 5 years old, had retired/transferred/changed job/expired. This affected the response received.
- Since the projects have been classified into eight broad subject areas (agricultural sciences, biological sciences, chemical sciences, earth sciences, engineering & technology, mathematics, medical sciences and physical sciences), some interdisciplinary projects might have been classified as per their major bias.
- The data mentioned in the report indicates the actual number of different outcomes of a project at the time of submitting the questionnaire by the PIs.