

A Survey of Extramural Research and Development Projects and funding agencies in India

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ABSTRACT

Research & Development seeks to achieve an advance in science or technology. The activities which directly contribute to achieve advance in science or technology through the resolution of scientific or technological is being considered as R&D. Government of India is funding Research and Development projects through its various agencies to encourage citizens and agencies to work on projects which helps the society a better place to live. In every budget certain percentage of funds were exclusively reserved for R&D projects. Each funding agency is concentrating on one or more domains specifically for allocation of funds. The list of domains includes agriculture, education, medicine, defence, bio-diversity, space, communications, information technology etc. Knowledge on various funding agencies is very much essential to the individuals and institutions who are involved in active research for various purposes so as to approach the relevant agency for funds. In this context the paper will list various funding agencies and their schemes under which the agency is allocating the funds towards extramural R&D projects in India and its progress over the years.

Keywords: Extramural R&D, R&D in India, Funding agencies in India, R&D Projects funding in India.

1. INTRODUCTION

Research and Development (R&D), also known as research and technical or technological development (RTD), is a general term for activities in connection with corporate or governmental innovation. [1] Research and Development (R&D), includes all activities which directly contribute to achieve advance in

science or technology through the resolution of scientific or technological. [2] Every countries progress is directly or indirectly dependent on the volume of R&D happening in that country. GOI is also allocating significant amount of funds towards R&D projects through its agencies/departments. The paper will provide an overview of various funding agencies and its allocated funds during the period between 2000-2001 and 2009-2010. The rest of the paper is organized in the following manner: Section 2 discusses on various funding agencies in India and various schemes under which the agency/department allocate funds for extramural R&D projects. Section 3 concentrates on the progress of R&D projects in terms of funds and growth in the number of projects. The paper ends with Section 4, which is conclusion.

2. FUNDING AGENCIES/DEPARTMENTS IN INDIA

There are more than 30 agencies/departments which are granting funds under several schemes to various extramural R&D projects. Table 1 and Table 2, lists the central government funding agencies/departments along with the schemes. Each Agency / Department releases funds under various schemes under its purview for example, Department of Science and Technology (DST) grants its funds under around 39 such schemes namely, Deep Continental Studies (DCS), Drugs & Pharmaceutical Research Programme (DPRP), Himalayan Glaciology (HG), Indian Climate Research Programme (ICRP), Instrument Development Programme (IDP), Intensification of Research in High Priority Area (IRPHA), Joint Technology Programme (JTP), Monsoon and Tropical Climate Studies (MONTCLIM), National Resources Data Management System (NRDMS), Science & Engineering Research Council Fast Track (SERC FT), Science & Engineering Research

Council (SERC), Seismicity Programme (SP), Utilisation of Scientific Expertise of Retired Scientists (USERS) and Young Scientists & Technologists (YST). Similarly, Ministry of Environment and Forests (MOEF) grants its funds under around 10+ schemes. Only eleven agency/department schemes were shown in the

table, other funding agencies also have several such schemes which were not shown in the table. It is clear that most number of schemes are under Department of Science and Technology (DST) which is granting more funds under its schemes.

Table 1. List of funding Agencies/Department along with the schemes under which funds were released

S. No.	Agency/Department	Scheme
1	All India Council for Technical Education (AICTE)	1. Research & Development (R&D) 2. Research Programme (RP) 3. Thrust Area Programme in Technical Education (TAPTEC)
2	Coal India Ltd. (CIL)	1. Research & Development Board Grant (R&D)
3	Council of Scientific and Industrial Research (CSIR)	1. Emeritus Scientist (ES) 2. Extramural Research Scheme (EXTRM) 3. General Scheme (GS) 4. Sponsored Scheme (SS)
4	Defence Research and Development Organisation (DRDO)	1. Aeronautical Research & Development Board (ARDB) 2. Grants-in-aid Scheme (GIA) 3. Life Science Research Board (LSRB) 4. Naval Research Board (NRB)
5	Department of Atomic Energy (DAE)	1. Board for Research in Nuclear Sciences (BRNS)
6	Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha & Homoeopathy (AYUSH)	1. Extra Mural Research (EMR) 2. Research & Development (R&D)
7	Department of Bio-Technology (DBT)	1. Research & Development (R&D)
8	Department of Coal (DOC)	1. Research & Development (R&D)
9	Department of Ocean Development (DOD)	1. Marine Research and Capacity Building(MRCB) 2. Marine Research Development Fund (MRDF)
10	Department of Scientific and Industrial Research (DSIR)	1. National Information System for Science & Technology (NISSAT) 2. Programme Aimed at Technological Self Reliance(PATSER) 3. Technology Development & Demonstration Programme (TDDP) 4. Technopreneur Promotion Programme (TEPP)
11	Department of Science and Technology (DST) 1. Agro-Meteorology Programme (AMP) 2. Atmospheric Sciences (AS) 3. Deep Continental Studies (DCS) 4. Drugs & Pharmaceutical Research Programme (DPRP) 5. Himalayan Glaciology (HG) 6. Indian Climate Research Programme (ICRP) 7. Instrument Development	20. Science and Engineering Research Council - Fast Track (SERC FT) 21. Science and Engineering Research Council - Science (SERC SC) 22. Science and Engineering Research Council - Women Scientists (WOS) 23. Science and Engineering Research Council (SERC) 24. Science and Engineering Research Council- Nanomaterial's Science & Technology Initiative (SERC NSTI) 25. Science and Engineering Research Council(SERC)

Programme (IDP) 8.Intensification of Research in High Priority Areas (IRHPA) 9.International Division (ID) 10.International S&T Cooperation Programme (ICO) 11. Joint Technology Programme (JTP) 12. Monsoon and Tropical Climate Studies (MONTCLIM) 13.Nano - Mission (N-M) 14.Natural Resources Data Management System (NRDMS) 15.PAC-Earth Science (PAC-ES) 16.Science & Engineering Research Council Fast Track (SERC FT) 17.Science & Engineering Research Council(SERC) 18.Science and Engineering Research Council – Basic Science (SERC-BS) 19.Science and Engineering Research Council – Engineering Projects (SERC EP)	26.Science and Engineering Research Council-Project Advisory Committee(SERC PAC) 27.Science and Technology for Women (WS) 28.Seismicity Programme(SP) 29.Severe Thunder Storms Observations & Regional Modelling (STORM) 30.Shallow Sub-Surface Programme (SSSP) 31.State Science & Technology Programme (SSTP) 32.Technical System Development Group (TSD) 33.Technology Interventions for Addressing Societal Needs (TIASN) 34.Technology System Programme(TSP) 35.Technology Systems Development Programme (TSD) 36.Utilisation of Scientific Expertise of Retired Scientists (USERS) 37.Young Scientists & Technologists (YST) 38.Young Scientists Scheme (YSS) 39. Young Scientists Scheme Societal(YSS)
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Table 2. List of Central Government funding Agencies/Departments in India

S.No.	Agency / Department
1	All India Council for Technical Education (AICTE)
2	Coal India Ltd. (CIL)
3	Council of Scientific and Industrial Research (CSIR)
4	Defence Research & Development Organisation (DRDO)
5	Department of Atomic Energy (DAE)
6	Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha & Homoeopathy (AYUSH)
7	Department of Bio-Technology (DBT)
8	Department of Coal (DOC)
9	Department of Ocean Development (DOD)
10	Department of Science and Technology (DST)
11	Department of Scientific and Industrial Research (DSIR)
12	Department of Secondary and Higher Education (DOSHE)
13	Indian Council of Agricultural Research (ICAR)
14	Indian Council of Medical Research (ICMR)
15	Indian Space Research Organisation (ISRO)
16	Ministry of Communications & Information

	Technology (MOCIT)
17	Ministry of Earth Sciences (MOES)
18	Ministry of Environment and Forests (MOEF)
19	Ministry of Food Processing Industries (MFPI)
20	Ministry of New & Renewable Energy (MNRE)
21	Ministry of Non-Conventional Energy Sources (MNES)
22	Ministry of Power (MOP)
23	Ministry of Social Justice and Empowerment (MOSJE)
24	Ministry of Steel (MOS)
25	Ministry of Water Resources (MOWR)
26	Petroleum Conservation Research Association (PCRA)
27	University Grants Commission (UGC)

3. PROGRESS OF RESEARCH AND DEVELOPMENT PROJECTS

3.1 Progress in the total funded R&D projects

The funding agencies allocate funds in regular intervals binding with its schedule. From Table 3. It is evident that the number of funded extramural R&D projects are increasing every financial year except in the case of 2007-2008 financial year where there is a decrease (266) in

the number of funded projects. By looking at the data and statistics provided in the Table2, the total number of extramural R&D projects funded by all agencies/department between 2000-2001 and 2000-2001 financial years amounted to 33020. The total number of extramural R&D projects funded by all agencies/department in 2000-2001 financial year was 2009 and it was 2304 in 2001-2002 financial year increased by 14.68% (295) when compared with the previous year. The total number of projects funded in 2002-2003 financial year was 2718 with 17.96% (414) increase in the number of projects funded when compared with the 2001-2002 financial year. Similarly, the total R&D projects funded in 2003-2004 financial year stands at 2743 resultedan increase of 25 projects with less than 1.00% when compared with the 2002-2003. There was very marginal increase (6) in the funded projects in 2004-2005 financial year over previous year.

Table 3. Total Extramural R&D Projects Approved Along With Total Approved Cost (In Crores) Between 2000-2001 and 2009-2010 Financial Years

Financial Year	Sum of No. of Projects
2000-2001	2009
2001-2002	2304
2002-2003	2718
2003-2004	2743
2004-2005	2749
2005-2006	3569
2006-2007	3781
2007-2008	3515
2008-2009	4804
2009-2010	4828
Grand Total	33020

Source: Directory of Extramural Research & Development Projects Approved For Funding By Selected Central Government Agencies/ Departments During 2000-2010

The percentage increase in 2005-2006 was 29.83 % (820 projects), 2006-2007 reported 5.94 % (

212 projects), 2007-2008 reported a decrease in funded projects by 7.04 % (266 projects) respectively over previous financial years. On similar lines 2008-09 financial year reported a significant increase in the funded projects by 36.67% with 1289 more projects when compared with 2007-2008 financial year. 2009-10 year reported a marginal increase of 0.50 % (24 projects) in the total funded projects by all agencies when compared with 2008-2009 financial year.

3.2 Progress in the total approved cost by funding agencies

It can be interpreted that the total approved funds for all extramural R&D projects stood at 8530.02 crores by the central government agencies/departments during 2000-2010 by looking at the statistics shown in the Fig. 1. The total approved funds for extramural R&D projects by agencies stood at 286.71 crores in the year 2000-2001 financial year. There is a significant increase in the volume of total approved funds in 2001-2002 financial year which reported an increase of 55.20%(i.e. 158.25 crores) over 2000-2001 financial year. It is very clear from the statistics shown in the above figure that there was no significant increase in the total approved funds for extramural R&D projects in the 2002-2003, 2003-2004 financial years. In fact, 2003-2004 resulted in a negative growth rate. There was an increase in approved funds by 27.45 % (i.e. 122.88 crores) during 2004-2005. Most importantly, 2005-2006 reported a huge 104% increase in terms of approved funds when compare with previous year. 2006-2007 with - 7.88% and 2008-2009 with -13.39% reported negative growth rate in terms of approved funds by the agencies, but 2007-2008 with 36.85% and 2009-2010 with 6.86% proved good when compared with previous years in terms of approved funds by the agencies.

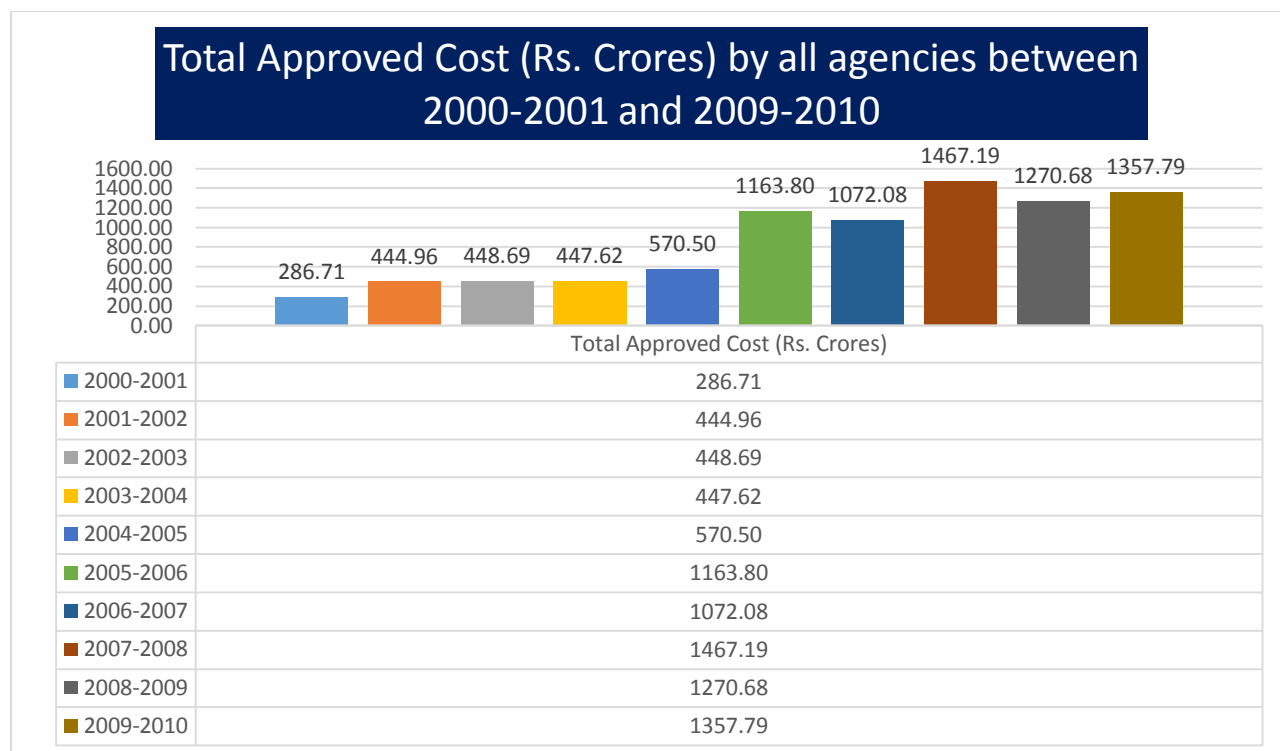


Fig. 1. Total Approved Cost (Rs. Crores) by all agencies between 2000-2001 and 2009-2010

3.3 Contribution of individual funding agencies with respect to approved funds

The Table4 lists the top ten funding agencies/department under central government of India in terms of sum of total approved cost (Rs. crores) between 2000-2001 and 2009-2010 financial years. Department of Science and Technology (DST) secured first rank when it comes to the sum of total approved cost (Rs. crores) during 2000-2010 period. DST has approved 3354.70 crores to several extramural R&D projects. Department of Bio-Technology (DBT) stood at second with 1614.55 crores of amount approved by the agency during 2000-2010. Ministry of Communications & Information Technology (MOCIT) ranked third, followed by Indian Council of Medical Research (ICMR), Defence Research and Development Organisation (DRDO), University Grants Commission (UGC), Council of Scientific and Industrial Research (CSIR), Department of Atomic Energy (DAE), All India Council for Technical Education (AICTE), Ministry of Steel

(MOS) respectively during 2000-2001 and 2009-2010 financial years.

Table 4. List of Top Ten Agencies/Departments In Terms Of Funds Approved To Extramural R&D Projects

S. No.	Agency/Department	Sum of Total Approved Cost (Rs. Crores)
1	Department of Science and Technology (DST)	3354.70
2	Department of Bio-Technology (DBT)	1614.55
3	Ministry of Communications & Information Technology (MOCIT)	782.82
4	Indian Council of Medical Research (ICMR)	539.66
5	Defence Research and Development Organisation (DRDO)	323.12
6	University Grants Commission (UGC)	307.46
7	Council of Scientific and	271.18

	Industrial Research (CSIR)	
8	Department of Atomic Energy (DAE)	256.23
9	All India Council for Technical Education	139.79

	(AICTE)	
10	Ministry of Steel (MOS)	137.28

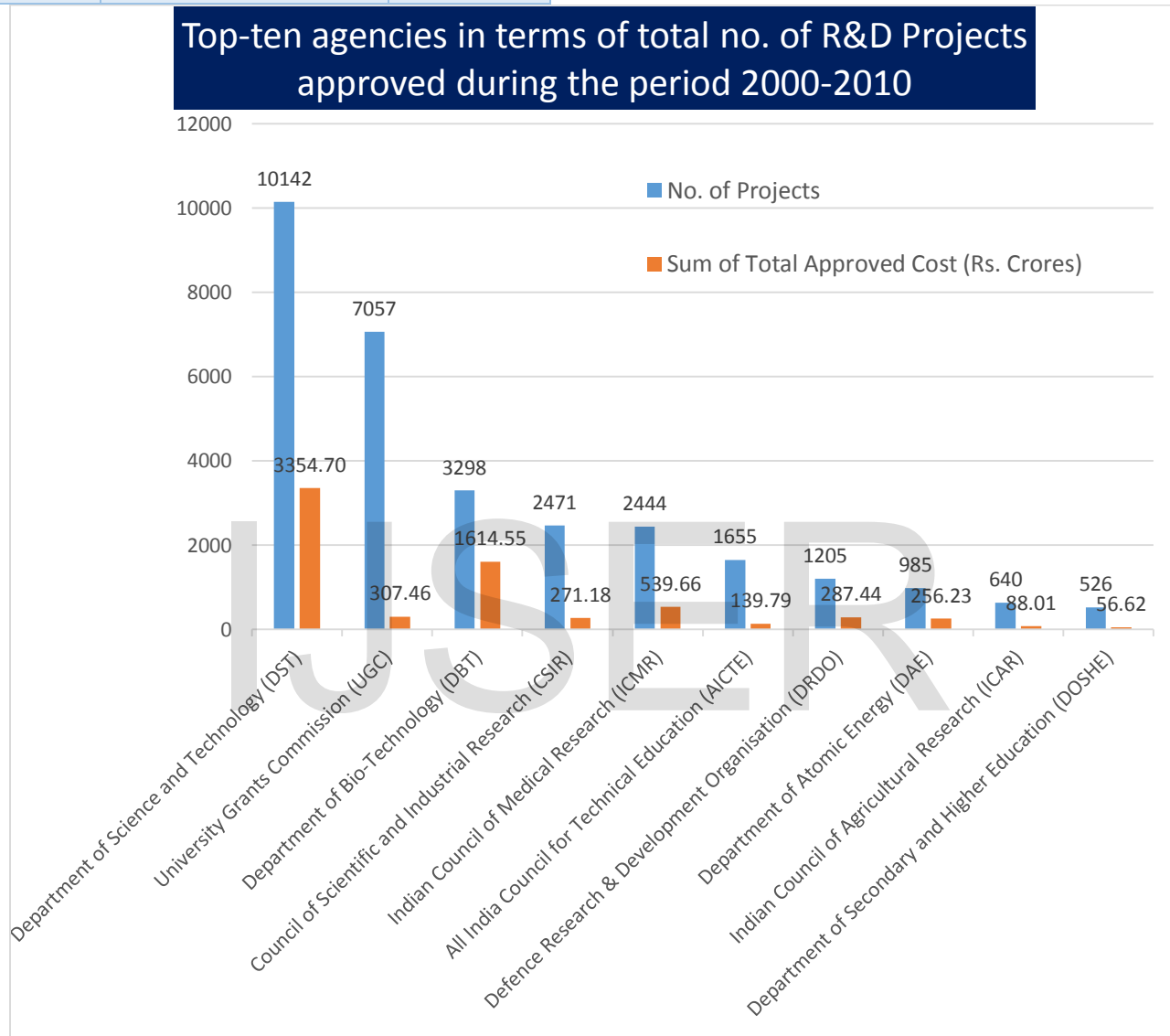


Fig.2. List of top-ten agencies in terms of total no. of R&D Projects approved during the period 2000-2010

3.4 Contribution of individual funding agencies with respect to total approved R&D projects

Observing the statistics shown in Fig.2, it is clear that Department of Science and Technology (DST) ranked number one with 10142 approved extramural R&D projects during 2000-2010 financial years. University

Grants Commission (UGC) occupies second place with 7057 approved projects during 2000-2010 financial years. Department of Bio-Technology (DBT) stood at third place with 3298 approved R&D projects in its account during 2000-2010 financial years followed by Council of Scientific and Industrial Research (CSIR) ranked fourth with 2471 approved R&D

projects, Indian Council of Medical Research (ICMR) ranked fifth with 2444 approved R&D projects, All India Council for Technical Education (AICTE) occupied sixth rank with 1655 approved R&D projects, Defence Research and Development Organization (DRDO) stood at seventh with 1205 approved R&D projects, Department of Atomic Energy (DAE) occupied eighth position with 985 approved R&D projects, Indian Council of Agricultural Research (ICAR) occupied ninth position with 640 approved R&D projects and Department of Secondary and Higher Education (DOSHE) with 526 approved R&D projects placed at tenth for the same period.

4. CONCLUSION

Looking at various statistics from different sources, it is evident that there has been a significant increase in both the number of approved extramural R&D projects as well as in the volume of funds released by the central government agencies through various schemes during 2000-2010 financial years. But as a developing economy India need more such R&D projects to be funded. Statistics shows that more funds were approved in the education domain. For example Department of Science and Technology (DST) ranked number one in both the number of approved extramural R&D projects as well as released volume of funds. The same is evident when observed for University Grants Commission (UGC), Department of Bio-Technology (DBT) etc.

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REFERENCES

- [1] "definition of Research & Development" retrieved on 16th January, 2016, https://en.wikipedia.org/wiki/Research_and_development

- [2] Guidelines on the Meaning of Research and Development for Tax Purposes, United Kingdom (UK) Department for Business, Innovation and Skills, December 2010.



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