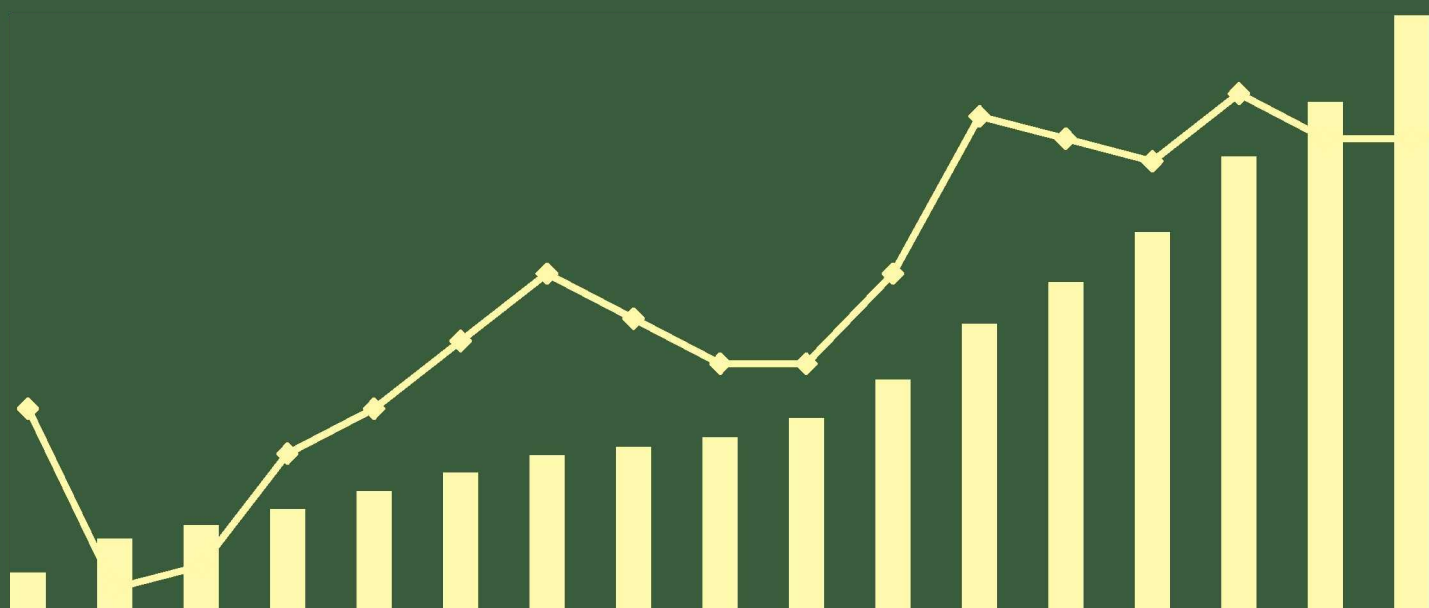


# RESEARCH AND DEVELOPMENT STATISTICS

## 2011-12



सत्यमेव जयते

GOVERNMENT OF INDIA  
MINISTRY OF SCIENCE & TECHNOLOGY  
DEPARTMENT OF SCIENCE & TECHNOLOGY  
NEW DELHI-110016 (INDIA)  
December 2013

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**For a copy of Publication or suggestions for improvement please write to:-**

The Head, NSTMIS Division  
Department of Science & Technology,  
Technology Bhawan,  
New Mehrauli Road,  
New Delhi – 110 016

**Tel/FAX:** 011-26523432

**Email:** parora@nic.in, anrai@nic.in, namita@nic.in

**URL:** www.nstmis-dst.org

**Note: 1 Crore =  $10^7$  = 10.0 millions**  
**1 lakh =  $10^5$  = 0.1 millions**

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सत्यमेव जयते

डॉ. टी. रामसामी  
सचिव

**DR. T. RAMASAMI**  
SECRETARY

भारत सरकार  
विज्ञान और प्रौद्योगिकी मंत्रालय  
विज्ञान और प्रौद्योगिकी विभाग  
टेक्नोलाजी भवन, नया महरौली मार्ग, नई दिल्ली-110 016  
**GOVERNMENT OF INDIA**  
**MINISTRY OF SCIENCE & TECHNOLOGY**  
**DEPARTMENT OF SCIENCE & TECHNOLOGY**  
Technology Bhawan, New Mehrauli Road, New Delhi – 110 016

## FOREWORD

Financial and human resources directed towards Research and Development (R&D) represent principal “Inputs” to R&D and are used as indicators of the status of R&D effort in any country. The Department of Science & Technology (DST) has been undertaking biennial National Surveys since 1973-74 to collect valuable statistics on these resources deployed on R&D activities in India. Based on the data thus collected, a number of analytical reports are being published by the Department. While collecting the data, the UNESCO recommendations on science and technology are adopted so that the data are comparable with other countries.

The present report is based on the survey conducted during 2009-10. DST has strived together data from a large number of scientific agencies, research laboratories, socio-economic ministries/departments, public and private sector industries including multi-national companies. The report presents analysis on a number of parameters based on data drawn both from primary and secondary sources. It includes several cross tabulations on financial and manpower resources deployed for R&D by sector/objectives/fields of science/industry groups/qualification/nature of activity/gender/emoluments, etc. Data mining and data reduction have considerable challenges. There are some inescapable situations in which data estimations are unavoidable. Under such circumstances proven statistical methods of estimations have been used to bridge the gap.

The planning and execution of the National Survey, data compilation, data analysis and preparation of this exhaustive publication has been completely done in-house by the team comprising Dr. Parveen Arora, Dr. A.N. Rai, Mrs. Namita Gupta and others.

The Department is thankful to all the scientific agencies/departments and in-house R&D labs for their cooperation in providing valuable data without which this publication would not have been possible at all. We would welcome constructive suggestions/comments for enrichment of this publication.

(T. RAMASAMI)  
SECRETARY, DST





# RESEARCH & DEVELOPMENT STATISTICS 2011-12

## HIGHLIGHTS

- The national investment on R&D activities attained a level of Rs. 53041.30 crores in 2009-10. The same is estimated to be Rs. 62053.47 crores in 2010-11 and Rs. 72620.44 crores in 2011-12.
- 0.88% of Gross National Product was devoted to R&D during 2009-10.
- The percentage share of Private Sector in National R&D expenditure has increased from 25.9% in 2005-06 to 28.9% in 2009-10.
- The percentage share of Central Government, State Governments, Higher Education and Public Sector Industries in national R&D expenditure during 2009-10 was 54.4%, 7.3%, 4.1%, 5.3% respectively.
- In the Institutional Sector, excluding Higher Education Sector, about 23.9% of the total expenditure was spent on basic research, 33.4% on applied research, 35.1% on experimental development and rest 7.6% on supporting activities.
- 71.1% of the total R&D expenditure was met from government sources and 28.9% came from private sources during 2009-10.
- 84.6% of the R&D expenditure incurred by Central Government sources came from 12 major scientific agencies - CSIR, DRDO, DAE, DBT, DST, DOS, MES, ICAR, ICMR, MCIT, MREs, MOEn. Amongst the major scientific agencies, DRDO accounted for 31% alone.
- State Sector spent Rs. 3865.24 crores on R&D activities during 2009-10. More than 90% of the total investment on R&D activities by State Sector was on development of agriculture and allied areas.
- Industrial Sector spent Rs. 18120.11 crores on R&D activities accounted for 34.2% of National R&D expenditure during 2009-10.
- India's per capita R&D expenditure has increased from US\$5.90 in 2005-06 to US\$ 9.3 in 2009-10.
- The R&D manpower has increased from 1.54 lakhs in 2005 to 1.93 lakhs in 2010.
- During 2010, nearly 4.41 lakhs personnel were employed in the R&D establishments in the country. Out of this 43.7% were performing R&D activities, 28.2% were performing auxiliary activities and 28.1% were providing administrative and non-technical support.
- There were 27532 women directly engaged in R&D activities which constitute 14.3% of the total R&D manpower.
- India's researchers per million population has increased from 140 in 2005 to 164 in 2010.
- 7509 patents were sealed in the year 2010-11. Out of which 1273 patents were sealed by Indians.
- Out of 8312 patents filed by Indians in India. Maximum were from the State of Maharashtra, Tamilnadu, Karnataka and Delhi with a percentage share of 64.9%.
- Out of the total 31088 Patents filed by foreigners in India, United States of America topped the list with a share of 33.5%.
- There were 523 Universities/Deemed Universities, 70 institutes of national importance and 33023 colleges during 2010-11 imparting higher education in the country.





# CHAPTER I



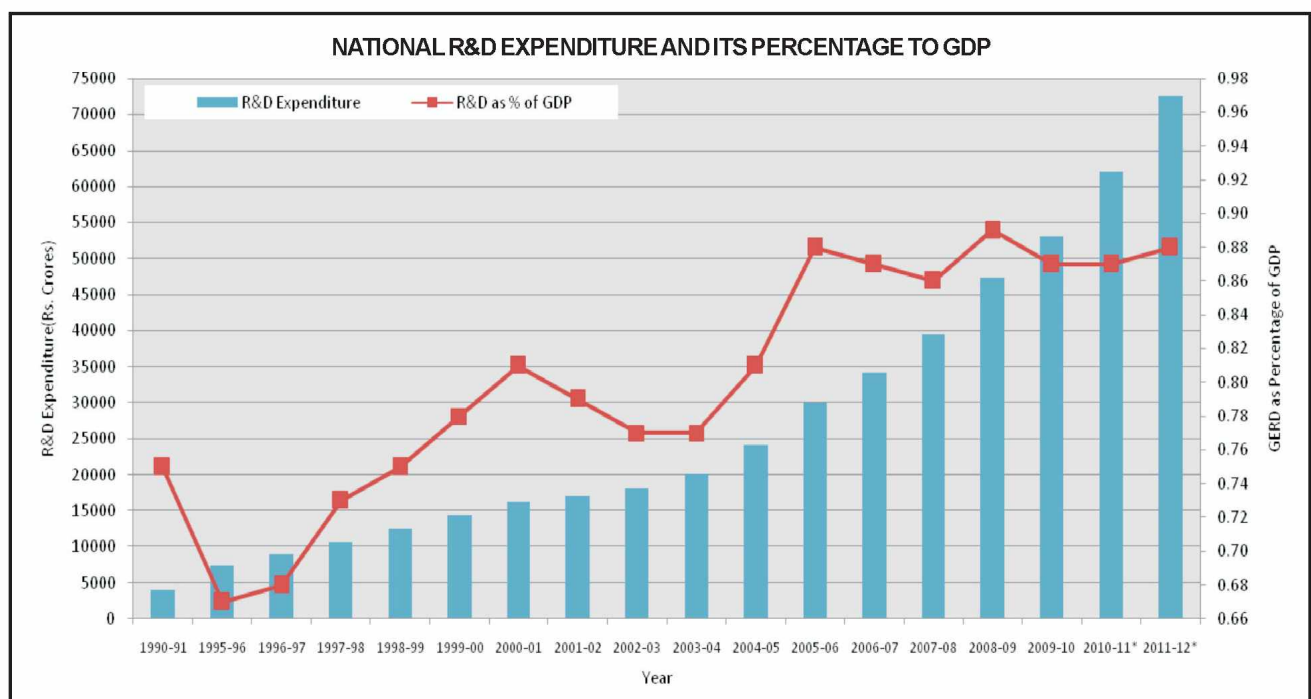
## NATIONAL RESOURCES FOR RESEARCH AND DEVELOPMENT

The Indian Research and Development (R&D) System can be grouped by way of a variety of performers and funding sources. The performers include the national laboratories, universities, in-house R&D laboratories and non-profit organisations. The funding sources include the Central Government, State Governments and the industry, In the Central Government, scientific research is carried out under both these groups. R&D performing bodies inter alia included Department of Atomic Energy (DAE), Department of Space (DOS), Defence Research & Development Organisation (DRDO), Council of Scientific and Industrial Research (CSIR), Indian Council of Agricultural Research (ICAR). In the R&D funding group fall the Department of Science & Technology (DST), Department of Biotechnology (DBT), Ministry of Earth Sciences (MES) etc among others.

Although the primary role of R&D performing

group is to undertake R&D, they also sponsor some amount of extramural research in the areas of their interest. On the other hand, the R&D funding group is primarily engaged in its major role of promoting scientific research in extramural mode. Research carried out by the Public Sector, Private Sector and Non-Governmental Organization is supported mainly with their own sources. Whereas, Academic Sector performs R&D through both intramural as well as extramural sources.

It may not be out of place to mention that under this survey the scope and coverage of the R&D activities has been revised and substantially enlarged by including R&D expenditure incurred by multinational companies, small scale industries and companies not covered by the Department of Scientific and Industrial Research (DSIR) under its recognition Scheme.

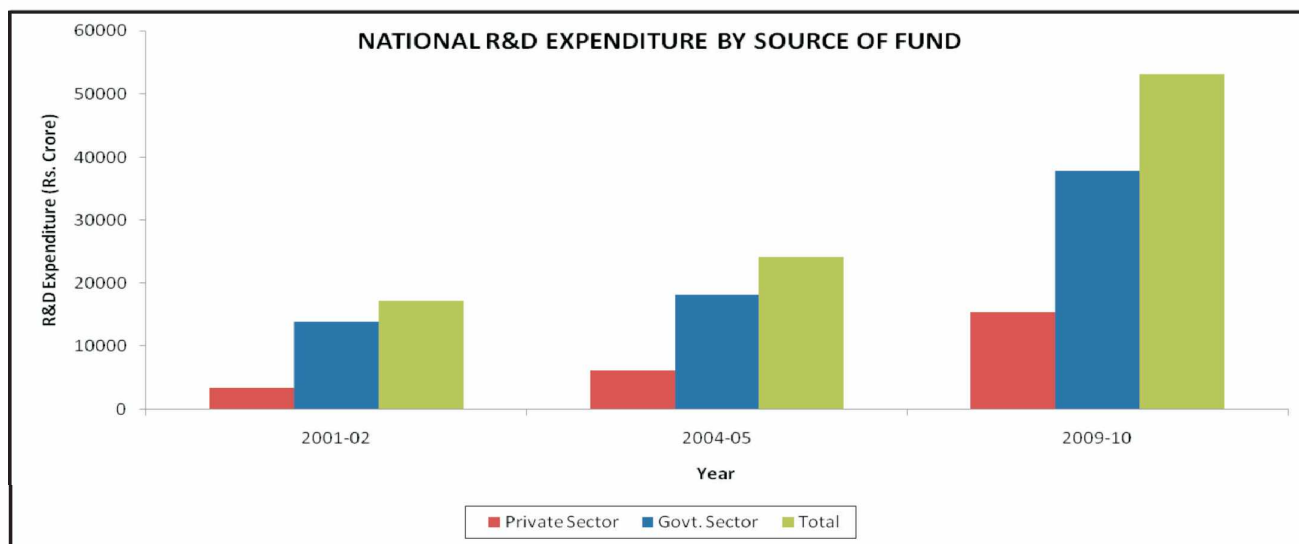
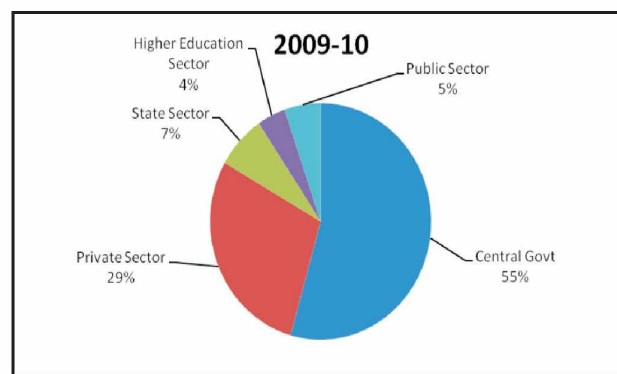
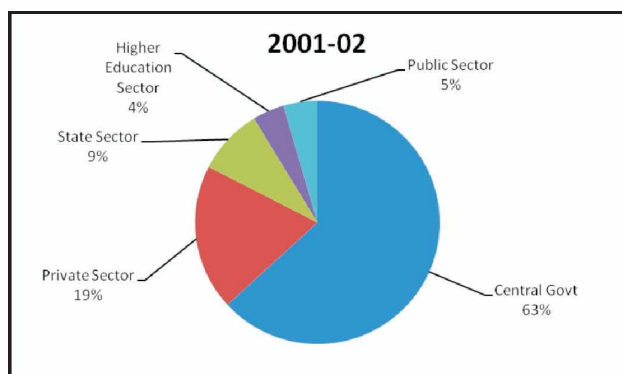


The national expenditure on R&D has increased from Rs. 29932.58 crores in 2005-06 to Rs. 39437.77 crores in 2007-08 and to Rs. 53041.30 crores in 2009-10. By applying the appropriate rates of growth for different sectors as observed from 2005-06 to 2009-10, the projected R&D expenditure would attain a level of Rs. 62053.47 crores in 2010-11 and Rs. 72620.44 crores in 2011-12. The compound annual rate of growth of R&D expenditure at current prices for the period 2005-06 to 2009-10 works out to be 15.4% and the rate of growth of R&D expenditure at constant prices for the same period was 8.1%. R&D expenditure at constant prices (base: 2004-05) has increased from Rs. 28720.73 crores in 2005-06 to Rs. 33540.43 crores in 2007-08 and further to Rs. 39253.37 crores in 2009-10. R&D expenditure at constant prices has been worked out by using GNP price deflators as per Economic Survey 2011-12.

The share of the various sectors in the total R&D expenditure for the year 2009-10 was – central government including the public sector industry 59.7%, private sector 28.9%, the state governments 7.3% and the higher education 4.1%. It is interesting to observe from the figure below that the share of the private sector in National R&D expenditure increased by 50% during the decade from 2001-02 to 2009-10.

If one considers industrial sector (or Business Enterprises Sector) as a whole comprising both public and private sector, the share of Industrial sector in the total national R&D expenditure increased from 30.3% in 2004-05 to 34.2% in 2009-10. The increase in the share of R&D expenditure of industrial sector in the total R&D expenditure is mainly due to significant increase in the share of private sector R&D expenditure which has more than doubled from

### SHARE OF NATIONAL R&D EXPENDITURE BY SECTOR



Rs.5075.82 cores in 2004-05 to Rs.13587.28 in 2009-10. Whereas, the share of public sector remaining the same during this period.

Analyses have shown that 65.8% of the R&D expenditure was incurred by the institutional sector comprising of central, state and academic sector and 34.2% was incurred by the industrial or business enterprise sector (public and private) industries during the year 2009-10. This is contrary to what one observes in the developed countries where the share of industrial sector in the national R&D expenditure is usually more than 50%.

R&D expenditure as percentage of GDP in 2009-10 is 0.87% as compared to 0.78% in 1999-00. Though in absolute terms the R&D expenditure has shown a consistent increasing trend, the R&D expenditure as percentage of GDP has hovered around 0.88% since 2005-06. The annual compound rate of growth of R&D expenditure at current prices

for the period 1999-00 to 2009-10 was 13.9% whereas the growth rate of GDP at current prices was 12.7% for the same period.

As per Economic Survey 2011-12, GDP data has been revised and updated for all the past years up to 2011-12 shifting the base year to 2004-05 by the Central Statistical Organisation. Accordingly, the R&D expenditure figures at constant prices and the ratio of R&D expenditure to GDP/ GNP have also been revised.

R&D expenditure has been classified into 12 objectives based on UNESCO classification. Ideally, the R&D expenditure should be apportioned amongst the 12 objectives based on project wise expenditure. Such an exercise being not feasible, each R&D institution has been assigned to a specific objective depending upon its predominant activity. On this basis, the share of R&D expenditure by different objectives is given in Table 1.1 (Ref. Table 9)

**Table 1.1**

**PERCENTAGE SHARE OF NATIONAL RESEARCH AND DEVELOPMENT EXPENDITURE BY OBJECTIVES, 2009-10**

<b>Objective</b>	<b>Percentage</b>
Defence	18.4
Agricultural Production and Technology	14.7
Protection and Improvement of Human Health	14.5
Non-oriented Research (Basic Research)	11.1
Industrial Production and Technology	11.1
Infrastructure and General Planning of Land Use	9.2
Exploration and Exploitation of Space	8.2
Production, Distribution and Rational Utilisation of Energy	7.2
Exploration and Exploitation of the Earth	3.3
Control & Care of the Environment	1.1
Social Structures and Relationships (Including Socio Economic Services)	0.6
Other Aims	0.5
<b>Total</b>	<b>100.0</b>

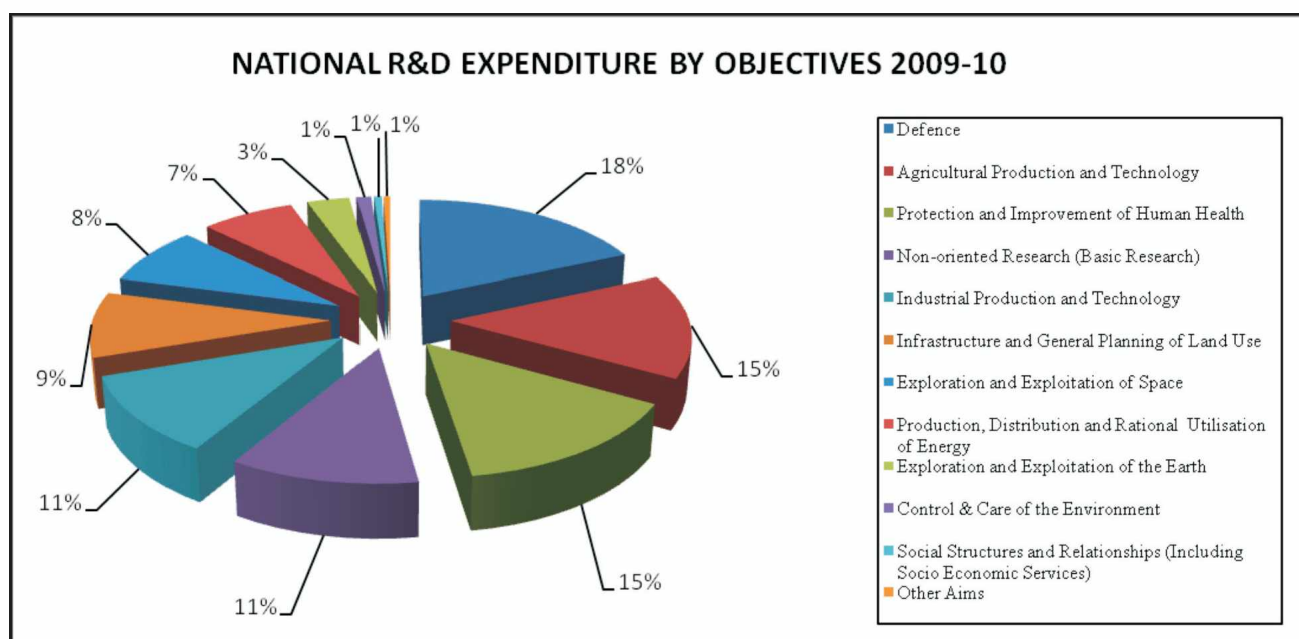


Around 70% of total R&D expenditure was accounted for by the objectives – Defence, Agricultural Production and Technology, Protection and Improvement of Human Health, Non-oriented Research (Basic Research) and Industrial Production and Technology.

The expenditure for S&T activities has been classified by type of work based on the estimates provided by the R&D institutions in the central and state governments excluding higher education. Such a classification of expenditure by type of work is not available for the industrial sector. During the year 2009-10, the percentage share of Basic Research was 23.9%, Applied Research 33.4%, Experimental

Development 35.1% and the related supporting activities was 7.6%. Table 1.2 gives the break up of S&T expenditure by type of work for the year 2009-10 (Ref. Table 8).

Central government including public sector has accounted for 67.1% of the total national R&D expenditure during 2009-10. Major scientific agencies have, in fact, accounted for a share of 84.6% of the total central government R&D expenditure including public sector in-house R&D units. At the national level, major scientific agencies have shared 50.5% of the national R&D expenditure. The share of R&D expenditure in decreasing order among the major scientific agencies is presented in Table 1.3 (Ref. Table 4).



**Table 1.2**

**PERCENTAGE SHARE OF NATIONAL S&T EXPENDITURE BY TYPE OF WORK, 2009-10**

Type	Percentage
Experimental Development	35.1
Applied Research	33.4
Basic Research	23.9
Other Activities	7.6

**Table 1.3****PERCENTAGE SHARE OF R&D EXPENDITURE BY MAJOR SCIENTIFIC AGENCIES, 2009-10**

<b>Scientific Agency</b>	<b>2009-10</b>
Defence Research & Development Organisation (DRDO)	31.6
Department of Space (DOS)	15.5
Department of Atomic Energy (DAE)	14.4
Indian Council of Agricultural Research (ICAR)	10.8
Council of Scientific & Industrial Research (CSIR)	10.0
Department of Science & Technology (DST)	8.3
Department of Biotechnology (DBT)	2.7
Indian Council of Medical Research (ICMR)	2.2
Ministry of Earth Sciences (MoES)	1.7
Ministry of Environment & Forests (MoEF)	1.6
Ministry of Communication & Information Technology (MoCIT)	1.2
Ministry of New and Renewable Energy (MNRE)	0.1
<b>Total</b>	<b>100.0</b>

It may be seen from Table 1.3 that five major scientific agencies – DRDO, DOS, DAE, ICAR and CSIR account for 82.3% of the total R&D expenditure under the central government major scientific agencies with DRDO alone accounting for a share of 31.6%.

Industrial sector R&D expenditure comprising both public and private sector has increased from Rs. 6333.70 crores in 2004-05 to Rs. 8704.17 crores in 2005-06 and further to Rs. 16401.84 crores in 2009-10. The respective share of public and private sectors was 17.2% and 82.8% in 2009-10. The number of R&D units in each of these sectors varies in terms of size of the firm. The public

sector R&D units are larger in the size when compared to private sector.

The analyses on personnel employed in R&D establishments show that as on 1st April, 2010, 4,41,126 personnel were employed in the R&D sector. About 66% of them were employed by the institutional sector and 34% by the industrial sector. Out of the total, 43.7% of the personnel were engaged primarily on R&D work, 28.2% were performing auxiliary (technical support) activities and 28.1 were doing administrative and other non-technical activities. The information regarding the deployment of personnel in institutional sector and industrial sector of R&D establishment is provided in Table 1.4

**Table 1.4****PERCENTAGE DISTRIBUTION OF PERSONNEL  
BY TYPE OF EMPLOYER / ACTIVITY AS ON 1<sup>st</sup> April, 2010**

<b>Employer / Activity</b>	<b>R&amp;D</b>	<b>Auxiliary</b>	<b>Administrative</b>	<b>Total</b>
Institutional Sector	32.7	28.8	38.5	100
Industrial Sector	55.3	31.1	13.6	100
Total	43.7	28.2	28.1	100

Note: Break-up not available for Higher Education Sector



It may be noted that there is no uniformity in the deployment pattern in both sectors, in case of R&D and administrative personnel, there is a large divergence. Industrial sector has comparatively higher proportion of personnel engaged in R&D activities and low proportion of personnel engaged in administrative activities compared to the institutional sector. This may be on account of the fact that the administrative procedural requirements in the institutional sector need more manpower or the number of persons providing administrative support in industrial sector is not fully reflected. In case of some of the industrial units, administrative facilities are common to R&D as well as other non-R&D activities and therefore, data on administrative personnel were not maintained separately.

An attempt has been made to find out the number of auxiliary and administrative personnel for

each R&D person employed for a few selected departments and also for public and private sector industries. This information is given in Table 1.5.

It may be seen from Table 1.5 that the average number of auxiliary personnel per R&D person was 0.72 though it varied from 0.10 to 2.61 in the institutional sector. The figures for public and private sectors industry were 0.36 and 0.59 respectively. The number of administrative personnel per R&D personnel varied from 0.33 to 2.35 in the institutional sector and the same for public and private sector industry was 0.15 and 0.26 respectively. It is interesting to observe that both the number of auxiliary personnel per R&D personnel and the number of administrative personnel per R&D personnel employed in Indian Council of Medical Research(ICMR), State Governments were relatively high as compared other organisations/sectors.

**Table 1.5**

**NUMBER OF AUXILIARY AND ADMINISTRATIVE PERSONNEL PER R&D PERSON  
AS ON 1<sup>st</sup> April, 2010**

Number of supporting personnel per R&D personnel *		
Agency	Auxiliary	Administrative
Atomic Energy	2.05	1.06
Council of Scientific and Industrial Research (CSIR)	0.57	0.36
Defence Research and Development Organisation (DRDO)	0.10	0.33
Indian Council of Agricultural Research (ICAR)	0.82	1.13
Indian Council of Medical Research (ICMR)	2.61	2.35
Space	0.86	0.95
Other Ministries/Depts.	1.44	1.71
State Governments	0.87	2.07
Public Sector	0.36	0.15
Private Sector Industries (incl SIROs)	0.59	0.26
Overall R&D Sector	0.72	0.72

\* Based on response

It can be assumed that those directly engaged in R&D activities and those extending technical support (that is auxiliary personnel) are by and large qualified in S&T. With this assumption, it may be estimated that 3,17,007 S&T personnel were deployed in R&D sector as on April 1, 2010. Out of this number, 1,92,819 were employed directly in R&D or creating new knowledge. There were 27,532 females directly engaged in R&D activities (female R&D personnel) which accounted for only 14.3% of the total R&D personnel engaged in R&D work.

International comparison of R&D efforts provides an opportunity to understand the country's position in relation to other countries. Most of the developed countries spend over 2% of their GDP on R&D but developing countries spend around 0.4% with a few exceptions. R&D spending of 0.87% of GDP in India was, though no doubt higher than a number of developing countries, the country needs to enhance its R&D expenditure to more than 2%.

India has 164 researchers per million population as compared to 7,651 in Finland, 6,529 in Denmark, 6,121 in Singapore, 5,441 in Norway and 5,139 in Japan. However, the total numbers of researchers in India are 1.92 lakhs as compared to 14.12 lakhs in USA, 11.52 lakhs in China and 6.55 lakhs in Japan.

Questions are often asked whether the output

of R&D is commensurate with the level of investment made by the country. No precise model has so far been evolved, to evaluate the output of R&D. In the absence of such rigorous indicators, an attempt is made to look at some of the parameters even if they are only indirect efficiency indicators. Patent statistics is considered to be one such indicator. If one looks at the data for the period 1976-2010, the number of applications for patents made every year varied between 2,870 and 39,400. It was highest for the year 2010-11. The number of patents granted varied from 780 to 16,061 during 1976-2010 and it was highest in 2008-09. The number of patents in force as of 2009-10 was 37,334. The state-wise distribution of number of patent applications filed by Indians during 2009-10 shows that about 75% were from Maharashtra, Karnataka, Tamil Nadu, Delhi, and Andhra Pradesh during 2009-10. As is well known, many foreign nationals take patents in countries other than their own with a view to tap the potential of their products there.

The number of patents sealed in the name of foreigners was almost three to four times those sealed in the name of Indians. So, it may be seen that the number of foreign patents in force during the year 2009-10 was 81.8%. Amongst the foreign patents applications, those from USA accounted for 9,154 out of 27,243 total foreign applications made during 2009-10.

**To sum up, the salient features are as follows :**

- The national expenditure on Research and Development (R&D) has increased from Rs. 29932.58 crores in 2005-06 to Rs. 39437.77 crores in 2007-08 and to Rs. 53041.30 crores in 2009-10.
- The share of R&D expenditure of the central government including public sector industry was 59.7% during 2009-10.
- R&D expenditure by institutional sector was 65.8% of the total national R&D expenditure and the rest 34.2% was incurred by industrial sector comprising both public and private sector industry during 2009-10.
- India has spent only 0.87% of her GDP on R&D during 2009-10 as compared to 0.78% in 1999-00.
- Major scientific agencies accounted for 84.6% of the total R&D expenditure of the central government including public sector in-house R&D units. At national level, major scientific agencies have shared 50.5% of the total R&D expenditure.
- 82.3% of total R&D expenditure of the major scientific agencies under the central government including public sector was accounted for by five agencies – DRDO, DOS, DAE, ICAR, CSIR and in that order with DRDO accounting for a major share of 31.6%.
- As on 1<sup>st</sup> April, 2010, there were 4,41,126 personnel employed in the R&D sector. Out of these, 1,92,819 personnel were employed directly on R&D work.

# CHAPTER II





## RESEARCH AND DEVELOPMENT IN THE CENTRAL SECTOR

Realising the need to receive a substantial gain through the application of Science & Technology for the upliftment of the economy, Central (or Federal) Government continued to shoulder the major share of the financial resources devoted to Research and Development activities. The share of Central Government including Public Sector R&D units and Higher Education Sector was 59.7% in 2009-10. The Higher Education Sector constitutes 4.1% of National R&D expenditure in 2009-10. In absolute terms, the total R&D expenditure of the Central Government inclusive of Public Sector industry (called as Central Sector) has increased from Rs.17872.02 Crores in 2005-06 to Rs.31670.54 Crores in 2009-10. By applying the appropriate growth as observed over a period of time starting from 2004-05 to 2009-10 the R&D expenditure for Central Sector is estimated to reach a level of Rs.36737.25 Crores in 2010-11 and Rs.42614.53 Crores in 2011-12.

With the present trend of share in R&D expenditure by Central Government, the rate of growth for the years 2007-08, 2008-09 and 2009-10 over the previous year was 12.0%, 25.6% and 15.1% respectively. It may be seen from Table 2.1 that the annual (year to year) growth rates of R&D expenditure at constant prices (Base 2004-05) from 1995-96 onwards showed an upward trend from 1995-96 to 1999-00 and then it suddenly fell to 1.2% in 2001-02. Then, it started rising again and rose to 13.7% in 2005-06 and was 8.6% in 2009-10.

R&D expenditure at constant prices has been worked using GNP price deflators. The annual

growth rate of Central Government R&D expenditure at current prices at 2004-05 has a similar trend. The lowest growth rate was recorded both at current and constant prices for the year 2001-02. The growth rates in real terms for R&D expenditure in some years were quite small. There was not much increase in the R&D expenditure after adjusting for inflation except in the year 2004-05 practically and thereafter it again moved upwards in 2005-06 and 2008-09.

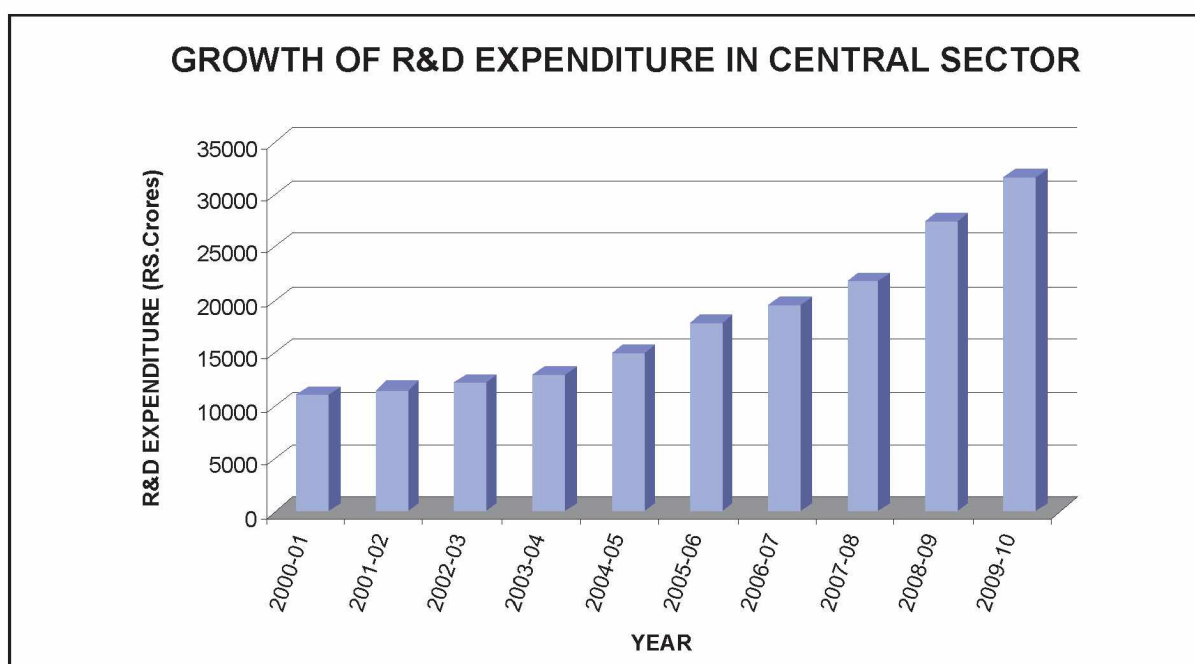
The Central Government R&D expenditure inclusive of Public Sector and Higher Education Sector is classified by twelve socio-economic objectives as laid down by the UNESCO. Ideally, this exercise ought to be done on project to project basis, but due to operational problems, it has not been possible to do so. Hence, each R&D institution has been assigned to a specific objective based upon its predominant activity. The percentage share of total R&D expenditure of Central Government for some of the objectives for the year 2009-10 is given in Table 2.2

It may be seen from Table 2.2 that R&D institutions under Central Government spent 67.3% of Central Sector R&D expenditure on four objectives such as Defence, Non-oriented Research, Exploration of Space, Production, distribution and rational utilization of Energy during 2009-10. The maximum R&D expenditure was on Defence, which accounted for 28%. This was followed by Non-oriented Research with 16.3%. More or less, a similar trend was observed in the past also with variations in inter-se percentage of the above objectives. The objectives have also been revised by UNESCO.

**Table 2.1**

**GROWTH IN CENTRAL SECTOR R&D EXPENDITURE**

Year	Rate of growth in percentage (Over the previous year)	
	At current Prices	At constant prices (Base 2004-05)
1995-96	10.4	1.0
1996-97	10.2	2.1
1997-98	20.2	12.9
1998-99	22.2	13.1
1999-00	16.8	13.4
2000-01	12.5	8.8
2001-02	4.4	1.2
2002-03	6.2	2.3
2003-04	6.3	2.6
2004-05	15.8	9.2
2005-06	18.5	13.7
2006-07	9.4	2.8
2007-08	12.0	5.6
2008-09	25.6	15.9
2009-10	15.1	8.6



**Table 2.2****PERCENTAGE SHARE OF CENTRAL SECTOR R&D EXPENDITURE  
BY OBJECTIVE, 2009-10**

Objective	Percentage
Defence	28.0
Non-oriented Research (Basic Research)	16.3
Exploration and Exploitation of Space	12.8
Production, Distribution and Rational Utilisation of Energy	10.2
Agricultural Production and Technology	9.6
Industrial Production and Technology	9.3
Protection and Improvement of Human Health	5.8
Exploration and Exploitation of Earth	4.3
Infrastructure and General Planning of Land Use	1.7
Control & Care of the Environment	1.2
Other Aims	0.8
<b>Total</b>	<b>100.0</b>

The percentage share of Central Sector including Public Sector industries and Higher Education Sector in National R&D expenditure by objectives for the year 2009-10 is shown in Table 2.3. Almost all of the R&D expenditure in Strategic areas like Space and Defence were borne

by Federal Government. Even in the case of Non-oriented Research and Production Distribution and Rational Utilisation of Energy more than 90.0% of R&D expenditure was spent by Central (Federal) Government.

**Table 2.3****PERCENTAGE SHARE OF CENTRAL GOVERNMENT (INCLUDING PUBLIC SECTOR AND HIGHER EDUCATION SECTOR) OUT OF NATIONAL R&D EXPENDITURE BY OBJECTIVE, 2009-10**

Objective	Percentage
Exploration and Exploitation of Space	99.5
Defence	97.7
Non-oriented Research (Basic Research)	94.2
Production, Distribution and Rational Utilisation of Energy	90.9
Exploration and Exploitation of Earth	84.7
Control & Care of the Environment	69.3
Social Structures & Relationships (including Socio Economic Services)	58.3
Industrial Production and Technology	53.9
Agricultural Production and Technology	41.9
Protection and Improvement of Human Health	25.5
Infrastructure and General Planning of Land Use	11.9
Other Aims	3.2
<b>Percentage share in National R&amp;D Expenditure</b>	<b>60.9</b>



For the purpose of statistical analysis, S&T institutions under central government are grouped as follows:

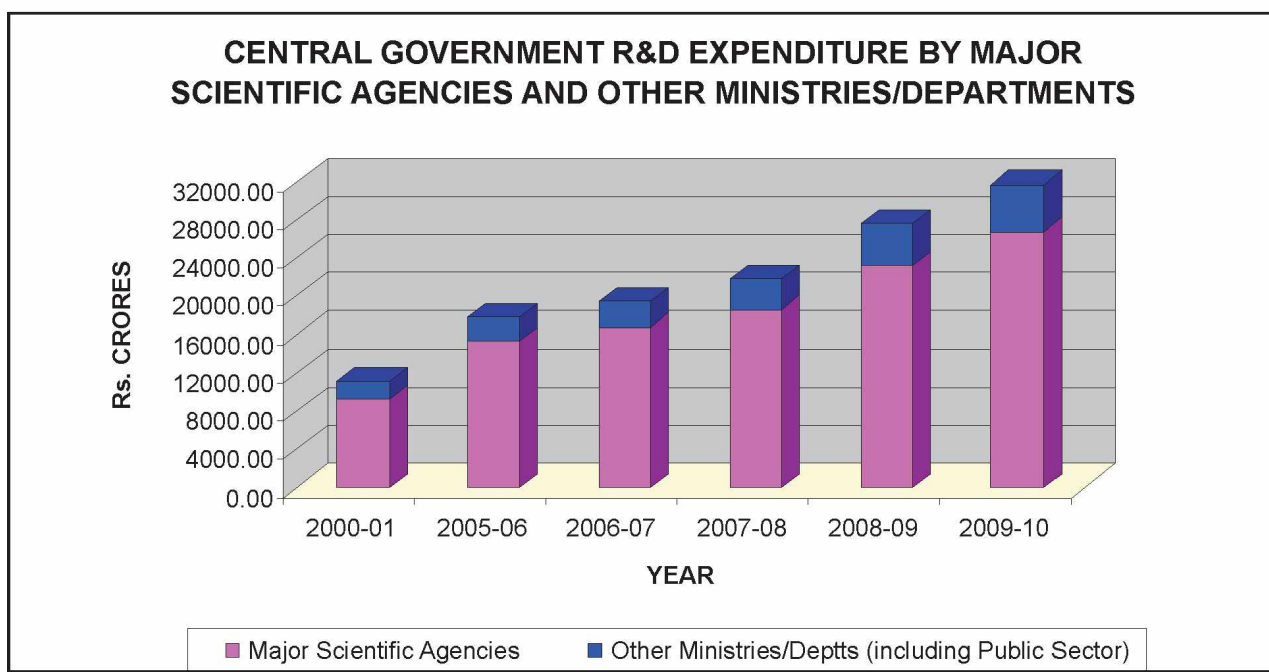
- a. R&D organisations under Major Scientific Agencies i.e. Organisations which have R&D or promotion of S&T as their predominant activity.
- b. R&D organisations under Other Central Ministries/Departments i.e. Organisations which undertake R&D work occasionally in connection with their day-to-day problems.
- c. In-house R&D units of Public Sector Industry.

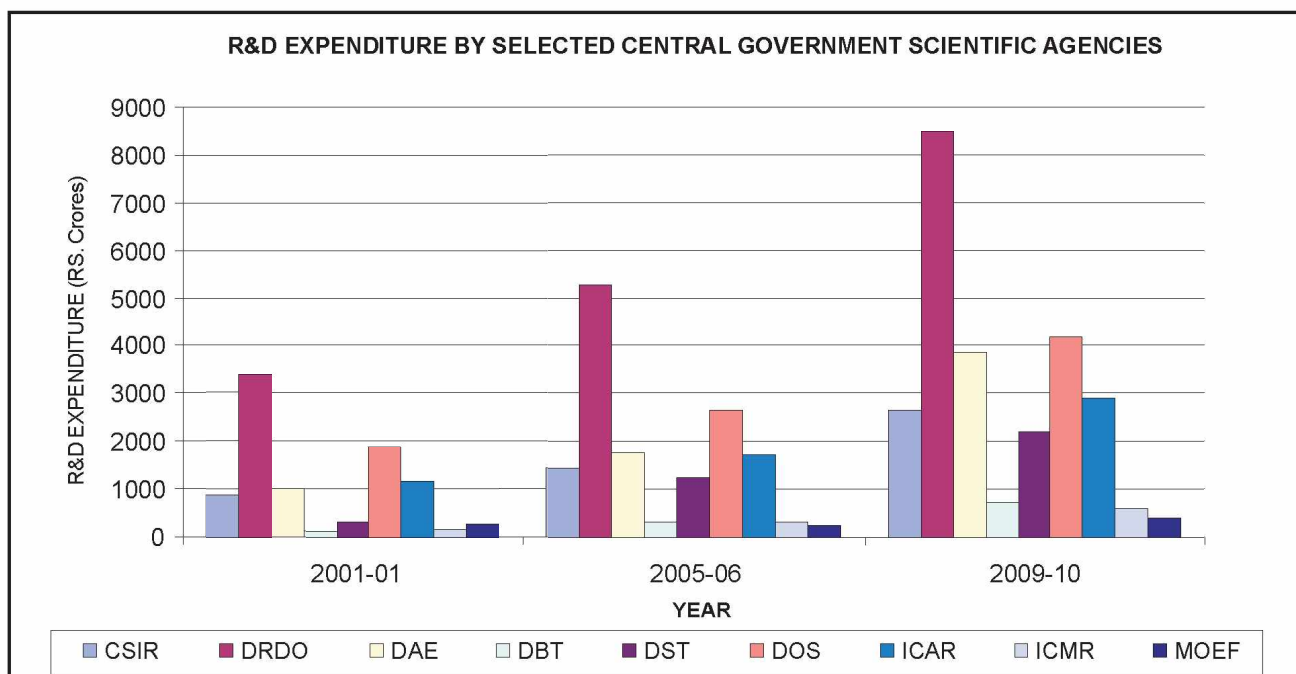
The share of R&D expenditure during 2009-10 by the 12 Major Scientific Agencies in the total Central Sector R&D expenditure including Public Sector R&D units was 84.6%. This forms 50.5% of the National R&D expenditure. It has risen from Rs.9297.68 Crores in 2000-01 to Rs.15389.94 Crores in 2005-06 to Rs.26796.35 Crores in 2009-10 for these agencies. Similarly R&D expenditure for other Ministries/Departments including Public Sector R&D units increased from Rs.2022.54 Crores in 2002-03 to Rs.2481.73 Crores in 2005-06 to Rs.4874.17 Crores in

2009-10. The shares of R&D expenditure by Major Scientific Agencies, Other Central Ministries/Departments and Public Sector in total Central Sector R&D expenditure for 2009-10 were 84.6%, 6.5%, and 8.9% respectively.

Table 2.4 shows the percentage share of R&D expenditure among Major Scientific Agencies. The Table indicates that 90.6% of total R&D expenditure of major scientific agencies was shared by six agencies viz. Defence Research and Development Organisation (DRDO), Department of Space (DOS), Department of Atomic Energy (DAE), Indian Council of Agricultural Research (ICAR), Council of Scientific and Industrial Research (CSIR), and Department of Science and Technology (DST). Defence Research and Development Organisation (DRDO) alone accounts for a share of 31.6%.

The R&D expenditure of the central sector can be divided into institutional R&D and industrial R&D. The industrial R&D expenditure in the central sector is expenditure incurred by the in-house R&D units of the Public Sector industry. For 2009-10, the share of Public Sector industry R&D expenditure in the total central sector R&D expenditure was 8.9% and the remaining 91.1% was incurred by R&D institutions in the central sector.





**Table 2.4**

**INTER-SE PERCENTAGE SHARE OF R&D EXPENDITURE BY MAJOR SCIENTIFIC AGENCIES 2009-10**

Agency	Percentage
Defence Research and Development Organisation	31.6
Department of Space	15.5
Department of Atomic Energy	14.4
Indian Council of Agricultural Research	10.8
Council of Scientific and Industrial Research	10.0
Department of Science and Technology	8.3
Department of Biotechnology	2.7
Indian Council of Medical Research	2.2
Others	4.5
<b>Total</b>	<b>100.0</b>

In all, there are 13 Cooperative Research Associations representing different industries such as textiles, plywood, rubber, automotive, electrical, tea and cement. These Cooperative Research Associations are financed jointly by the Government and the members of the concerned industry. The

R&D expenditure incurred by these Associations had increased from Rs.106.65 Crores in 2005-06 to Rs.180.21 Crores (see Table 7).

With regard to the Manpower employed in R&D establishments, as on 1<sup>st</sup> April, 2010, there

were 2,04,429 personnel employed in the central sector R&D units. This was 46.3% of total national manpower employed in all R&D units in the country. The above figure is inclusive of 16,180 personnel employed in R&D units of Public Sector Undertakings.

Out of the total 2,04,429 personnel employed in R&D establishments under Central Government, 78,062 personnel were primarily engaged in R&D activities comprising 67,361 R&D personnel in Central Government institutional sector and 10,701 R&D personnel in the in-house R&D units of Public Sector Industry. The manpower employed in R&D establishments of Central Sector were either engaged in research and development work or were extending technical support for research and development (termed as auxiliary personnel) or provided administrative support for research activities. The percentage break up of total manpower employed in Central Government inclusive of Public sector industry

according to three types of activities was 38.2% in R&D, 31.1% in auxiliary and 30.7% in administrative activities.

As on 1<sup>st</sup> April 2010, 66,302 women were employed in R&D establishments in the country. Out of this 32,688 (49.3%) were employed in the Central Sector including Public Sector R&D units. Out of 27,532 women S&T personnel directly engaged on R&D activities at the national level, the share of Central Sector inclusive of Public sector was 43.1%. It is seen that for every 100 R&D employees in Central Sector including public sector about 15.2% were women R&D employees.

Out of every 100 women employed in Central Sector, 36.3% were engaged directly in R&D activities, 25.6% were performing auxiliary activities and 38.1% were providing administrative support. The percentage of women working for Administrative activities is high as compared to working for R&D and auxiliary activities.

**To sum up, the salient features as under:**

- Central Government including Public Sector industry and Higher Education Sector continued to shoulder a major share of national R&D expenditure, which was 59.7% during 2009-10.
- In absolute terms, Central Government incurred Rs.33870.51 Crores on R&D during 2009-10.
- Annual rate of growth for R&D expenditure at current prices for 2009-10 over the previous year was 15.1%. The same in constant prices (Base 2004-05) was 8.6%.
- By socio-economic objectives as defined by UNESCO, the Defence R&D accounted for 28% of Federal R&D expenditure during 2009-10.
- Nearly Cent percent of R&D expenditure on Defence and Space was borne by Central Government including Public Sector R&D units during 2009-10.
- Major share (84.6%) of Central Government R&D expenditure was accounted for by 12 Major Scientific Agencies.
- About 2.04 lakhs personnel were engaged in R&D units of the institutional and Public Sector industry under Central Sector and out of this 38.2% were primarily engaged in R&D, 31.1% in auxiliary activities and 30.7% were providing administrative support.
- For every 100 R&D employees in Central Sector 15.2% were women R&D employees.

# CHAPTER III



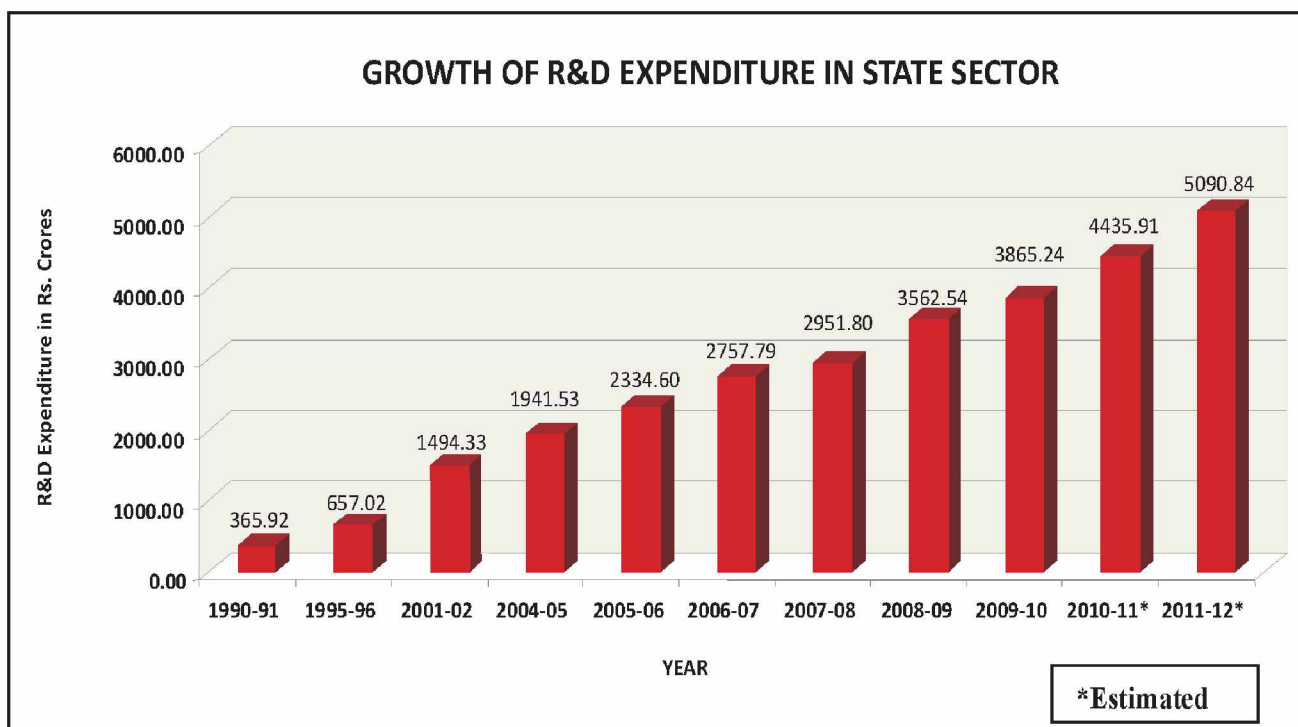


## RESEARCH AND DEVELOPMENT IN THE STATE SECTOR

The Research and Development (R&D) expenditure incurred by the states has increased from Rs.365.92 crores in 1990-91 to Rs.1941.53 crores in 2004-05 and further to Rs. 3865.24 crores in 2009-10. The annual growth rate of the R&D expenditure of the states in 2009-10 over 2004-05 was 14.8 %. It is expected to be of the order of Rs.4435.91 crores in 2010-11 and Rs 5090.84 crores in 2011-12. The R&D expenditure by the states accounted for 7.3% of the national R&D expenditure during 2009-10. The R&D expenditure

in the states constituted only 0.06% of the GDP at current prices during 2009-10. This share has almost remained the same for the past few years.

Out of the total S&T expenditure of Rs. 4993.48 crores incurred by states during 2009-10, R&D activities comprising of Basic Research, Applied Research and Experimental Development accounted for 77.4%. The total R&D expenditure incurred by states by type of work for some recent years are presented in Table 3.1.



**Table 3.1****RESEARCH AND DEVELOPMENT EXPENDITURE BY TYPE OF WORK**

Year	Percentage of R&D Expenditure by type of work		
	Basic Research	Applied Research	Experimental Development
2000-01	12.2	55.0	32.8
2005-06	16.9	52.7	30.4
2006-07	16.8	53.1	30.1
2007-08	16.3	55.1	28.6
2008-09	16.4	54.8	28.8
2009-10	17.0	53.9	29.1

Basic research remained between 12% to 17%, Experimental Development varied from 28% to 33% and the rest accounted by Applied research which varied from 52% to 55% for the various years.

Having dealt with the state sector as a whole, it is perhaps useful to analyze the intensity of R&D activities in different states measured in terms of resources deployed. The state wise percentage distribution of R&D expenditure for the year

2009-10, arranged in descending order is given in Table 3.2

A few states accounted for a major share of the total R&D expenditure of the state sector as a whole. More than 50% of the total R&D expenditure of the states was accounted by Gujarat, Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh and Punjab in that order.

**Table 3.2****PERCENTAGE DISTRIBUTION OF R&D EXPENDITURE BY VARIOUS STATES, 2009-10**

S.No.	State	Percentage	S.No.	State	Percentage
1.	Gujarat	12.2	12.	Assam	3.7
2.	Maharashtra	10.7	13.	West Bengal	3.6
3.	Karnataka	8.6	14.	Himachal Pradesh	3.4
4.	Tamil Nadu	7.3	15.	Madhya Pradesh	3.3
5.	Andhra Pradesh	7.0	16.	Jammu & Kashmir	2.6
6.	Punjab	6.9	17.	Orissa	2.5
7.	Uttar Pradesh	6.1	18.	Manipur	2.1
8.	Rajasthan	4.2	19.	Jharkhand	1.6
9.	Uttarakhand	4.2	20.	Bihar	1.2
10.	Kerala	4.0	21.	Chhattisgarh	0.8
11.	Haryana	3.8	22.	Meghalaya	0.1
				<b>Total</b>	<b>100.0</b>

The expenditure incurred by the state governments on R&D has been apportioned into 12 objectives as defined by the UNESCO. Accordingly, the data on R&D expenditure by major objectives for the year 2009-10 are presented in Table 3.3

Agricultural Production and Technology is the major objective in the state sector incurring 92.9% of the total R&D expenditure during 2009-10.

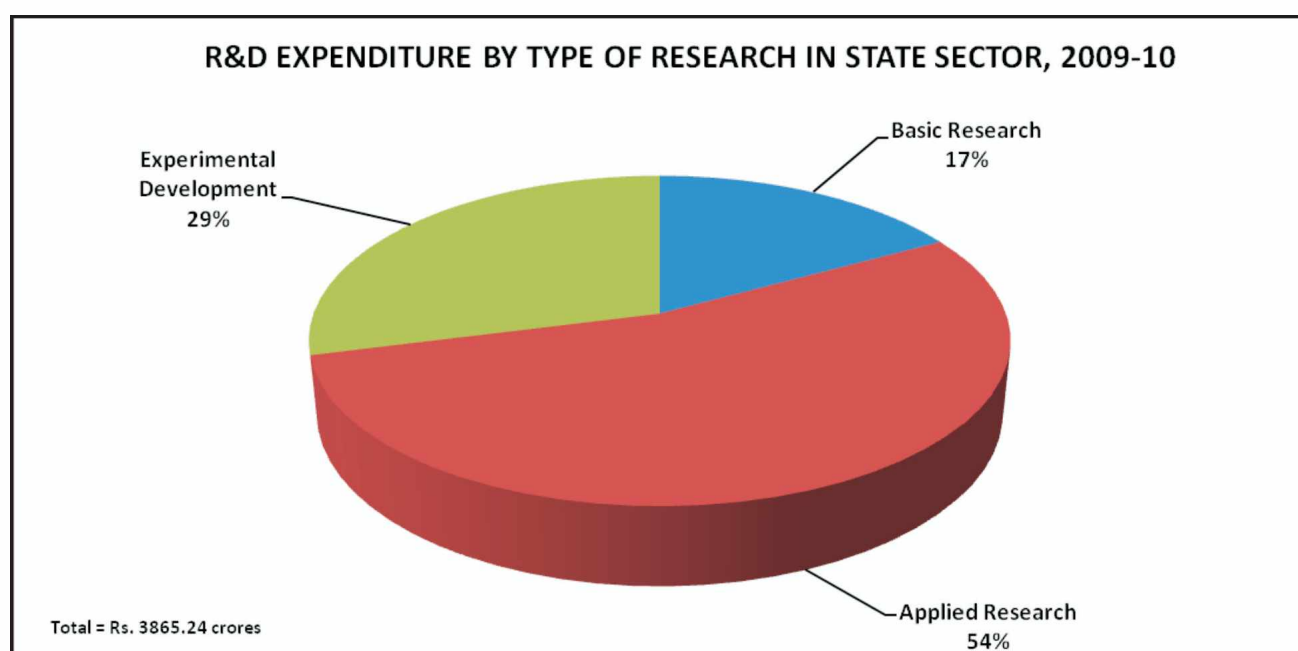
Manpower employed is one of the major resources deployed for R&D activities. The total

personnel employed in the R&D institutions in the states were 80,949 as on April 1, 2010. Out of this, about 25.4% (or 20,544 personnel) were employed directly on R&D activities called as R&D personnel. Besides, 22.1% (or 17,946 personnel) of the total were supporting R&D activities called auxiliary personnel and the rest 52.5% (or 42,459 personnel) were administrative staff. It was noticed that there were 11,913 women personnel employed in the state R&D institutions and out of them 2,904 women were engaged primarily (or directly) on R&D activities.

**Table 3.3**

**PERCENTAGE DISTRIBUTION OF R&D EXPENDITURE BY OBJECTIVES, 2009-10**

Objective	Percentage
Agricultural Production and Technology	92.9
Industrial Production and Technology	2.1
Protection and Improvement of Human Health	1.7
Others	3.3
<b>Total</b>	<b>100.0</b>





**The salient features of the R&D scene in the State sector are as under:**

- State Sector spent Rs. 3865.24 crores on Research and Development activities during 2009-10.
- State Sector accounted for only 7.3% of National R&D expenditure and 0.06% of Gross Domestic Product during 2009-10.
- R&D activities were concentrated in few States only.
- Agriculture was the major field of research in the States.
- There were about 20,544 personnel engaged directly in R&D activities in State Sector, out of them 2,904 were women.
- Women personnel engaged in R&D activities in the states continued to be very small in number as compared to men and they constitute only about 14.1% of the total R&D personnel in the state R&D establishments.

# CHAPTER IV



## RESEARCH AND DEVELOPMENT IN INDUSTRIAL SECTOR

Research and Development (R&D) is an essential facet of any industrial activity especially, in the wake of growing global competition. Financial and human resources represent the principal inputs to R&D and can be used as indicators of the commitment of industry to innovation. It is a well known fact that the R&D in industries is essential for generating know-how necessary for production of quality products, promoting efficiency, promoting exports and technological self-reliance needed in the country as well as absorption, adaptation and up gradation of imported know-how. R&D in Industrial Sector is also essential for solving day-to-day production problems and for exploring the potential for future industrial expansion. The Government of India has been encouraging industrial units to take up R&D activities by paying special attention for promotion and support to R&D.

A scheme for granting recognition to in-house R&D units in industrial sector to both private and public funded R&D laboratories was initiated by the Department of Science and Technology (DST) in 1973. This activity is being dealt by the Department

of Scientific and Industrial Research (DSIR) since 1984. One of the objectives of this scheme is to provide liberalized import facilities to recognized R&D units for purchase of equipment, components, raw materials, etc., necessary for carrying out R&D work in order to update the technology and effecting improvements in the manufacturing process, introducing new products, processes, developing import substitutes. These incentives have encouraged industry to establish their in-house R&D centres (or units).

Industries in India comprise public sector industries (both central and state) and private sector industries. The private sector industries include in-house R&D units and Scientific and Industrial Research Organisations (SIRO) recognized by DSIR. The scope and coverage of data on R&D expenditure and human resources for Private Sector has been enlarged this time by including multi-national companies and companies not covered by the Department of Scientific and Industrial Research (DSIR) under its recognition scheme. Public sector together with private sector is called as industrial sector for convenience.

**Table 4.1**

### RESPONSE PROFILE OF INDUSTRIAL SECTOR

R&D Units	Private Sector			Public Sector	Industrial Sector
	In-house R&D	SIRO	Total Private Sector R&D Units		
Surveyed	1762	485	2247	195	2442
Responded	1196	348	1544	117	1661
Estimated*	137	65	202	—	202
'NIL' R&D	62	25	87	29	116
Not responded	367	47	414	49	463

**Note:** 1. \*projected for total R&D expenditure only  
2. Industrial Sector = Private Sector + Public Sector

For 2009-10 survey, 2442 industrial R&D units were contacted through mail card enquiry. This comprised of 1194 DSIR recognised in-house R&D units of Private Sector, 568 companies performing R&D activities and registered with Ministry of Company Law Affairs, 80 Multi-national Companies, 485 Scientific and Industrial Research Organisations (SIRO non-commercial) and 195 in-house R&D units of the Public/Joint Sector. Requisite information for the survey in the Questionnaires specially designed for this sector has been received from 1005 DSIR recognised companies, 191 R&D units not covered by DSIR recognition scheme including Multi-national Companies, 348 SIRO units and 117 Public/Joint Sector R&D units and the R&D expenditure for 137 R&D units of Private Sector and 65 SIRO units have been estimated to arrive at the total Private Sector R&D expenditure of 1863 R&D units. It may be mentioned here that 62 R&D units in Private Sector and 29 units in Public/Joint Sector reported 'NIL' R&D activities. Detailed analysis of data in respect of R&D expenditure and human resources is based on the actual data received from 1661 in-house R&D units of Industrial Sector. Table 4.1 gives the response profile of Industrial Sector.

Table 4.2 gives the investment on R&D and number of in-house R&D units for public sector, private sector and industrial sector as a whole for four years duration.

Investment on R&D activities by 1863 Industrial Sector R&D units attained a level of Rs. 18120.11 Crores at current prices for the year 2009-10. For the Private and Public Sector industries separately, the R&D expenditure was Rs. 15305.55 crores and Rs.2814.56 crores respectively. Industrial Sector R&D expenditure constitutes 34.2% of the national R&D expenditure of Rs. 18128.11 crores in the year 2009-10. For Private and Public Sector separately the share was 28.9% and 5.3% respectively. The Industrial Sector investment on R&D for the year 2009-10 worked out to be 0.30% of the Gross Domestic Product (GDP) at current prices. The R&D expenditure as percentage of Sales Turnover (STO) for Industrial Sector worked out to be 0.61% for the year 2009-10. Industrial R&D expenditure increased from Rs. 11950.99 crores in 2006-07 to Rs. 17120.11 crores in 2009-10. Based on the past trend, the projected R&D expenditure for the year 2010-11 and 2011-12 were of the order of Rs. 21597.72 crores and Rs. 25752.46 crores respectively.

**Table 4.2**

**R&D EXPENDITURE BY INDUSTRIAL SECTOR**

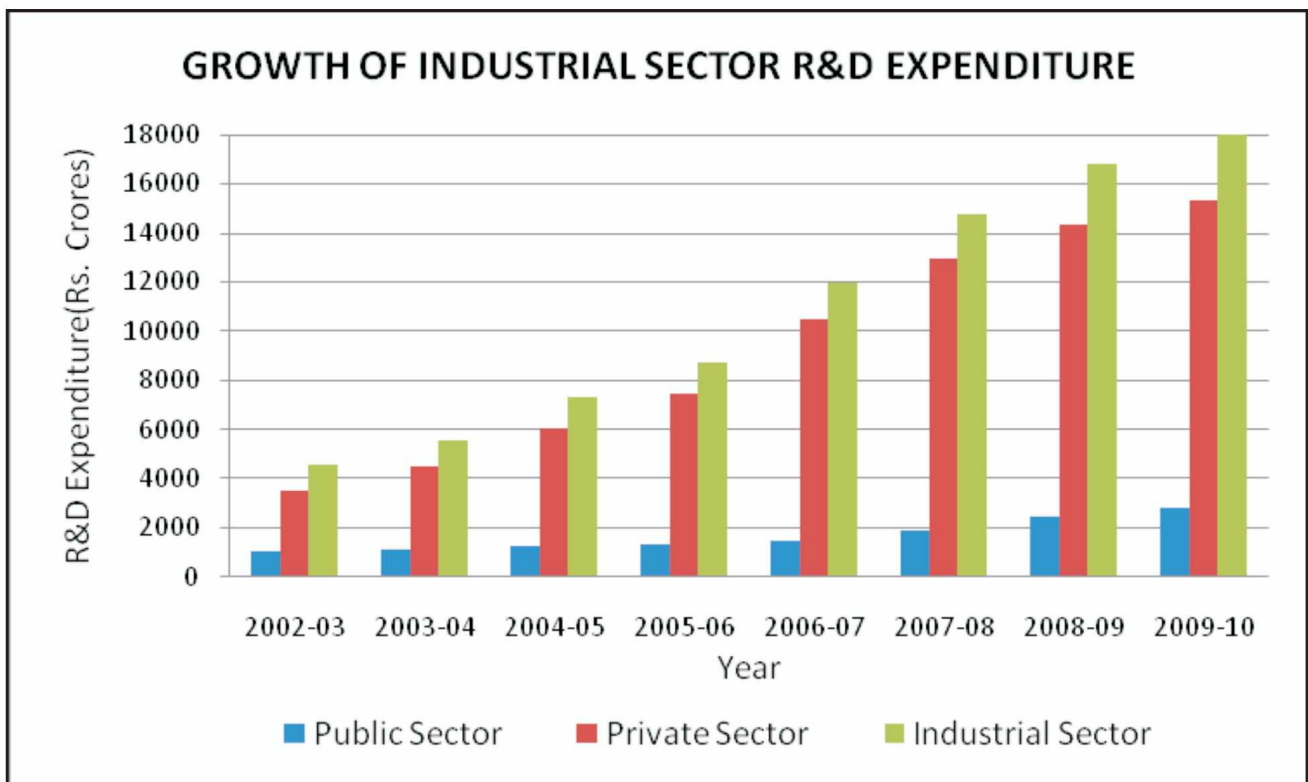
Sector	Period	Public Sector	Private Sector	Industrial Sector
No. of R&D Units	2006-07 to 2009-10	117	1746	1863
R&D Expenditure (Rs. crores)	2006-07	1465.41	10485.58	11950.99
	2007-08	1877.25	12926.14	14803.39
	2008-09	2457.02	14365.40	16822.42
	2009-10	2814.56	15305.55	18120.11



It may be seen from Table 4.2 that 84.5% of the total Industrial Sector investment on R&D was by 93.7% of Private Sector in-house R&D units whereas rest 15.5% was invested by 6.3% of Public/Joint Sector R&D units during 2009-10. It may be interesting to note that though the number of R&D units for public and private sectors were kept constant for the duration of four years, the share of public sector R&D investment has decreased from 23.6% in 2002-03 to 15.5% in 2009-10. It may not be out of place to mention here that the Private Sector R&D expenditure during this period has increased significantly at the faster pace than Public Sector R&D expenditure.

even included small scale industries and voluntary organizations operating on non-commercial basis spending very little on R&D.

It is known that industries are profit oriented and the investment by industries is to a large extent conditioned by the financial benefits accruing to them by way of increase in production, sales, reduction in the cost of production etc. The investment on advertisement also aims at increasing sales. Therefore, the information on R&D expenditure as percentage of sales turnover, advertising expenditure as percentage of sales turnover and expenditure on purchase of new plant and equipment and its



It may also be seen from Table 4.2 that per unit R&D expenditure for Private and Public Sector were quite variant which were Rs. 8.8 crores and Rs. 24.1 crores respectively during 2009-10. The variation between the two set of figures may be attributed to the big size of the companies in public sector and their need for complex and sophisticated technology calling for higher investment on R&D whereas private sector R&D units were heterogeneous in size which

percentage share in sales turnover were compiled to assess the relative importance given by the industries to R&D, advertising and purchase of new plant and equipment. The R&D expenditure as percentage of sales turnover for Industrial Sector worked out to be 0.61% for the year 2009-10 while for the Private and Public Sector separately, the figures were 0.82% and 0.27% respectively. It may be seen that this ratio was quite less than the advertising expenditure as

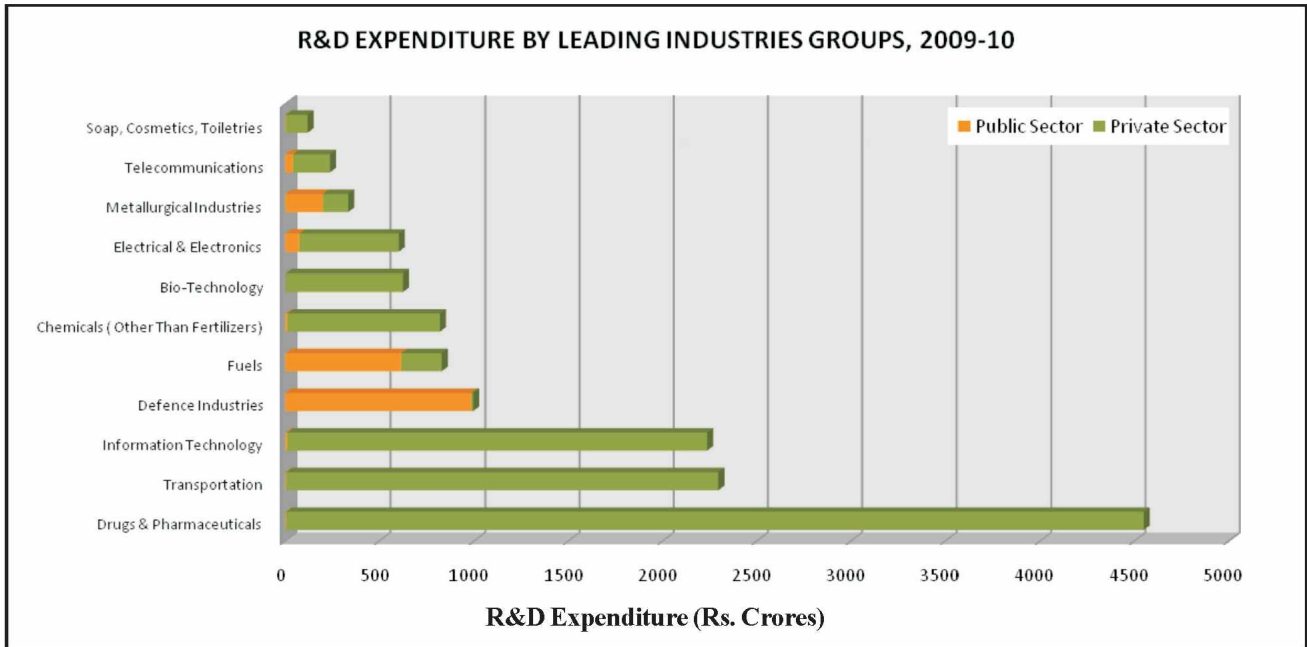
percentage of sales turnover ratio for Private, Public and Industrial Sector. The investment on purchase of new plant and machinery as percentage of sales turnover was 5.33% for Industrial Sector during 2009-10. For the Private and Public Sector separately the figures were 4.71% and 5.72% respectively during 2009-10. It appears from the data and analysis that industry as a whole has higher priority for investment on advertising and purchase of new plant and equipment compared to R&D. It may be mentioned here that the R&D expenditure as percentage of sales turn over for a number of developed countries of the world varies between 3.0% and 4.0%.

The total R&D expenditure of Industrial Sector, Private Sector (excluding non-commercial 413 SIRO units) and Public Sector were apportioned into 41 industrial groups on the basis of the products manufactured by them. Out of 41 industrial groups identified, 13 leading industry groups, arranged in descending order of their R&D expenditure, spent 90.5% of total Industrial Sector R&D expenditure in 2009-10. Table 4.3 gives information on the number of R&D units and total R&D expenditure in each industry group separately for public, private and industrial sector during 2009-10.

**Table 4.3**

**INDUSTRIAL EXPENDITURE CLASSIFIED LEADING INDUSTRY GROUPS DURING 2009-10**

S. No.	Industry Group	Public Sector		Private Sector		Industrial Sector		%
		R&D Units	R&D Exp (Rs. crores)	R&D Units	R&D Exp (Rs. crores)	R&D Units	R&D Exp (Rs. crores)	
1	Drugs & Pharmaceuticals	4	2.07	228	4545.20	232	4547.27	27.72
2	Transportation	4	2.46	89	2290.59	93	2293.05	13.98
3	Information Technology	1	7.44	27	2226.55	28	2233.99	13.62
4	Industrial Machinery	2	830.31	26	164.02	28	994.33	6.06
5	Defence Industries	12	980.27	11	12.35	23	992.62	6.05
6	Agriculture & Agricultural Machinery	3	12.94	104	886.14	107	899.08	5.48
7	Fuels	11	611.96	9	216.60	20	828.56	5.05
8	Chemicals (Other than Fertilisers)	11	7.50	192	812.24	203	819.74	5.00
9	Electrical and Electronics	16	71.67	142	528.65	158	600.32	3.66
10	Metallurgical Industries	16	197.41	65	135.18	81	332.59	2.03
11	Telecommunications	5	38.05	35	197.51	40	235.57	1.44
12	Fertilisers	7	17.87	7	26.36	14	44.23	0.27
13	Paper and Pulps	4	13.50	19	10.78	23	24.28	0.15
14	Others	21	21.11	379	1535.11	400	1556.22	9.49
	<b>TOTAL</b>	<b>117</b>	<b>2814.56</b>	<b>1333</b>	<b>13587.29</b>	<b>1450</b>	<b>16401.85</b>	<b>100</b>



It may be seen from Table 4.3 that Drugs & Pharmaceuticals group with 232 units occupy the first place in terms of R&D expenditure with Rs. 4547.27 crores (27.7%). This was followed by Transportation and Information Technology with 14.0% and 13.6% respectively during 2009-10. In the same manner if one looks at the Public/Private Sector industries data separately, the trend changes. In Public Sector, Defence Industries alone accounted for 34.8% followed by Industrial Machinery groups with 29.5%. In case of Private Sector, the R&D expenditure of Drugs & Pharmaceuticals group was the highest accounting for 33.5% followed by Transportation with 16.8%. At the same time, Drugs & Pharmaceuticals remained the largest with 16.0% as far as the number of units was concerned, followed by Chemicals (Other than Fertilizers) 14.0% in the Industrial Sector as a whole. It may be safely concluded from the above discussion that R&D expenditure in industry was concentrated in some industry groups only.

The heterogeneity in the size of R&D expenditure for different industry groups between Private and Public Sector in-house R&D units was quite significant. Table 4.4 may be seen for details. According to the data given in Table 4.4 per unit R&D

expenditure for Industrial Sector as a whole was maximum for Information Technology, i.e. Rs. 79.79 crores and majority of these industries were under Private Sector. Similarly, the per unit R&D expenditure for the industry group Defence Industries was Rs. 43.16 crores next to Information Technology followed by the group Fuels with Rs. 41.43 crores. When the per unit R&D expenditure of Public Sector was separately looked into, Industrial Machinery ranked first followed by Defence Industries, Fuels and Metallurgical Industries. Among the Private Sector industry groups, this was maximum for Information Technology Rs. 82.46 crores succeeded by Transportation, Fuels and Drugs & Pharmaceuticals. The per unit R&D expenditure of Public and Private Sector, when all units taken, was Rs. 24.06 crores and Rs. 10.11 crores respectively. This may be mainly due to the existence of a large number of R&D units of small scale industrial category and also Private Sector R&D units are heterogeneous in size in terms of R&D resources input. It may be interesting to note from this table that variation in size of R&D investment was quite high between different industry groups. It may further be observed that heterogeneity in the size of R&D expenditure for different industry groups between public and private sector was also quite significant.



**Table 4.4**  
**PER UNIT INDUSTRIAL R&D EXPENDITURE CLASSIFIED BY SECTOR AND BY**  
**INDUSTRY GROUP, 2009-10**

S. No.	Industry Group	Public Sector		Private Sector		Industrial Sector	
		R&D Units	R&D Exp (Rs.crores)	R&D Units	R&D Exp (Rs. crores)	R&D Units	R&D Exp (Rs. crores)
1	Information Technology	1	7.44	27	82.46	28	79.79
2	Defence Industries	12	81.69	11	1.12	23	43.16
3	Fuels	11	55.63	9	24.07	20	41.43
4	Industrial Machinery	2	415.16	26	6.31	28	35.51
5	Transportation	4	0.61	89	25.74	93	24.66
6	Drugs & Pharmaceuticals	4	0.52	228	19.94	232	19.60
7	Agriculture & Agricultural Machinery	3	4.31	104	8.52	107	8.40
8	Telecommunications	5	7.61	35	5.64	40	5.89
9	Metallurgical Industries	16	12.34	65	2.08	81	4.11
10	Chemicals (Other than Fertilisers)	11	0.68	192	4.23	203	4.04
11	Electrical & Electronics	16	4.48	142	3.72	158	3.80
12	Fertilisers	7	2.55	7	3.77	14	3.16
13	Papers and pulps	4	3.38	19	0.57	23	1.06
14	Others	21	1.01	379	4.05	400	3.89
	<b>TOTAL</b>	<b>117</b>	<b>24.06</b>	<b>1333</b>	<b>10.19</b>	<b>1450</b>	<b>11.31</b>

The quantum of manpower employed in R&D units is another major indicator of country's R&D effort. As on 1st April, 2010, 1,49,828 full time equivalent personnel were employed in 1863 units of Industrial Sector in-house R&D units including 413 SIRO units which worked out to be 34.0% of total personnel employed in all the R&D establishments in the country. Out of the total manpower, employed in industrial R&D units 1,33,648 were employed in 1786 Private Sector industries and rest 16,180 were employed in 117 Public/Joint Sector industries. In terms of percentage this works out to be 89.2% and 10.8% in Private and Public Sector respectively.

The personnel employed in the in-house R&D

units of Industrial Sector were either engaged in research and development work (called R&D personnel) or were extending technical support for research and development (called auxiliary personnel) or were providing administrative support (called the administrative personnel) for research activities. It may be safely assumed that R&D personnel and auxiliary personnel were mostly S&T qualified. Information in this context may be seen from Table 4.5 which gives the number of personnel by type of work for Public, Private and Industrial Sector separately. It may be indicated here that the classification of all personnel into the three categories is not easy for many R&D units and therefore, this data may be considered only as order of magnitude.

**Table 4.5**

**CLASSIFICATION OF PERSONNEL BY TYPE OF WORK AS ON 01.04.2010**

Category	Public Sector	Private Sector	Industrial Sector
No. of R&D Units	117	1746	1863
R&D	10701	72113	82814
Auxiliary	3892	42710	46602
Administrative	1587	18825	20412
<b>TOTAL</b>	<b>16180</b>	<b>133648</b>	<b>149828</b>

It may be seen from Table 4.5 that for every 100 personnel employed in Industrial Sector R&D units, 55.3 were engaged in research and development, 31.0 extended technical support for performing the R&D work and 13.7 provided administrative support. In Private Sector including SIRO, out of every 100 personnel, 54.0 were engaged in research and development 32.0 provided technical support and 14.0 provided administrative support and for Public Sector employment, the share of these categories was 66.1, 24.1 and 9.8 respectively.

As on 1st April, 2010, the total number of R&D personnel employed in 1863 Industrial Sector R&D units were 82,814 which work out to be 42.9% of total R&D personnel at national level. For Private Sector this figure was 72,113 and for Public Sector it was 10701. About 20,449 female personnel were employed in Industrial Sector R&D establishments in the country. Out of this, 53.8% (10999) were employed in Industrial Sector R&D work given at the end (Ref. Table - 20).

**To sum up, the salient features are as under:**

- Industrial Sector investment on R&D at current prices during 2009-10 attained a level of Rs. 18120.11 crores. Out of this, 15.5% was spent by Public Sector and 84.5% was spent by Private Sector.
- Industrial Sector accounted for 34.2% of National R&D expenditure during 2009-10.
- Industry spent 0.30% of Gross Domestic Product (GDP) on R&D in 2009-10.
- The R&D expenditure as percentage of Sales Turnover (STO) for Industrial Sector was 0.61% for the year 2009-10 while for Private and Public Sector separately the figures were 0.82% and 0.27% respectively.
- Per unit R&D expenditure for Private and Public Sector industries were Rs. 10.19 crores and Rs. 24.06 crores respectively during 2009-10.
- Drugs and Pharmaceuticals industry group topped the R&D expenditure followed by Transportation. Defence industries during 2009-10.
- As on 1<sup>st</sup> April 2010; 1,49,828 personnel were employed in 1863 Industrial Sector R&D units out of which 82,814 were engaged directly on R&D activities. This was 49.9% of total R&D establishments in the country.
- Out of the total R&D personnel in Industrial Sector, 10.8% were employed in Public Sector and 89.2% were employed in Private Sector.
- Of every 100 personnel employed in Industrial Sector, 55.3 were primarily engaged in R&D, 31.0 extended technical support and 13.7 provided administrative support.





# CHAPTER V



## HIGHER EDUCATION AND SCIENTIFIC RESEARCH

University Grants Commission (UGC), which was established in 1956, under an Act of Parliament, is expected to coordinate the major responsibility of regulating the standard in higher education sector of the country. It has been monitoring the growth of higher education as well as the establishment of new universities and colleges, so as to ensure that higher education grows in response to the needs of society for trained manpower with appropriate levels of professional training, skills and specializations or general educational attainments.

The introduction of new National Policy on Education (NPE) in 1986 has made the Commission to direct its efforts towards an overall improvement in higher education through appropriate emphasis on: Autonomous Colleges, Redesigning of Courses, State Councils of Higher Education Accreditation and Assessment Councils, Alternative Models of Management in Universities, National Qualifying Test for recruitment of teachers, making Research and Development broad-based, Training Orientation of teachers, Improvement of Efficiency, Youth and Sports and Education for the Minorities Scheduled Castes/Scheduled Tribes, Handicapped and Women.

The Expenditure on Education by Central and State Governments increased from Rs. 114.4 crores in 1950-51 to Rs. 9211.86 crores in 1985-86 and further to Rs. 114388.82 crores in 2005-06 and to Rs. 246782.38 crores in 2009-10. The State Governments were accounting for 76.4% of the expenditure during 2009-10 (Ref. Table 28). The expenditure on University and the higher education (Revenue account) has increased in absolute terms from Rs. 1106.59 crores in 1985-86 to Rs. 24186.00 crores in 2009-10, but its percentage share in the total education expenditure declined from 14.7% in 1985-86 to 12.2% in 2009-10 (Ref. Table 29).

The Higher Education Sector is one of the major performers of research. There is no reliable data available on R&D in Higher Education Sector in the country. The Department of Science and Technology had made efforts during 1998 for quantification of manpower and financial resources devoted to R&D in Science and Technology of Higher Education Sector by launching a National Survey executed through 4 zonal centres on sponsored project mode. In 1998-99 for the first time intramural R&D expenditure of Higher Education Sector was quantified from 106 universities and 27 Post Graduate Colleges having R&D to the tune of Rs. 378.56 crores constituting 2.9% in the national R&D expenditure. Further the data from 131 universities and 46 colleges has been collected and analysed and the R&D expenditure has gone up to Rs. 1254.81 crores in 2005-06 to Rs. 2199.97 crores during 2009-10 constituting 4.1% of National R&D expenditure. This amount does not include the expenditure incurred by the State Agricultural Universities and also the Extramural projects funded by Central Departments/Agencies. Such an expenditure has been included under State Sector and Central Sector respectively.

Data on enrolment of students in institutions of higher education can be used as one of the parameters to assess the growth of qualified manpower in the country. The data shown in Table 5.1 reveals that as against the enrolment of 36.05 lakhs students in all faculties in 153 Universities/deemed universities with 5816 colleges in the year 1985-86, there were 1,87,00,000 students enrolled in as many as 523 universities/deemed universities in 33,023 colleges in 2010-11. The number of universities excluding institutions of national importance, which enjoy university status as on 31.3.2011 was 523.

**Table 5.1**

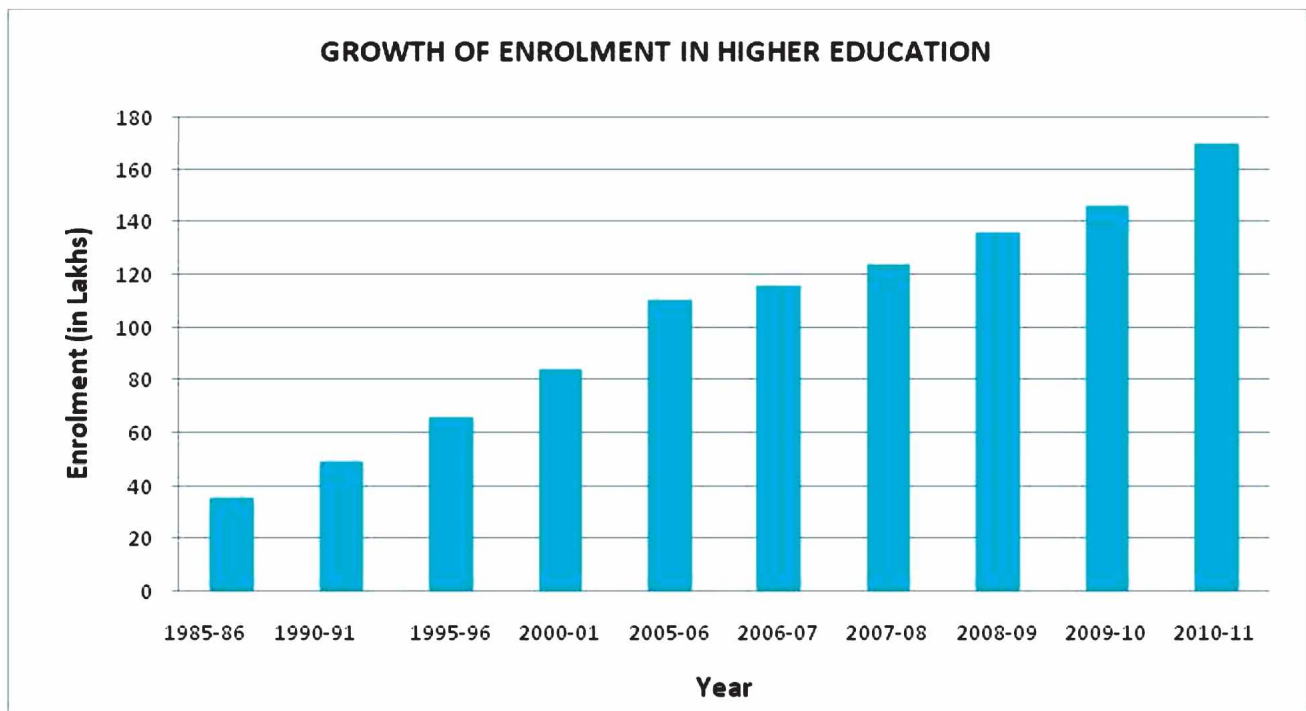
**GROWTH OF UNIVERSITIES/DEEMED UNIVERSITIES/COLLEGES AND ENROLMENT**

(Number)

Year	Universities	Deemed Universities	Colleges	Total Enrolment
1980-81	116	12	4722	27,52,437
1985-86	136	17	5816	36,05,029
1990-91	150	29	7346	49,24,868
1995-96	171	37	9252	65,74,005
1999-00	189	42	11865	80,50,607
2000-01	193	47	12806	83,99,443
2001-02	196	52	15437	89,64,680
2002-03	200	81	16206	95,16,773
2003-04	213	89	16742	102,01,981
2004-05	229	96	18080	110,38,543
2005-06	236	101	19327	120,43,050
2006-07	249	109	21170	131,63,054
2007-08	272	103	23206	144,00,381
2008-09	300	128	25951	157,68,417
2009-10	363	130	31812*	172,43,352
2010-11	393	130	33023*	186,70,050
2011-12	445	129	35539*	203,27,478

The figures on enrolment include all faculties including arts, commerce, humanities, etc.(Ref.T-21)

\*Provisional





**Table 5.2****GROWTH OF ENROLMENT IN S&T HIGHER EDUCATION BY VARIOUS FACULTIES****(Thousands)**

Faculty	1985-86		1995-96		2005-06		2009-10		2010-11		2011-12	
	(000)	%	(000)	%	(000)	%	(000)	%	(000)	%	(000)	%
Science	701	19.4	1288	19.6	2255	20.5	2823	19.3	3127	18.4	3790	18.6
Engg. Tech.	177	4.9	322	4.9	795	7.2	1511	10.3	2862	16.9	3262	16.1
Medicine	123	3.4	224	3.4	348	3.1	509	3.5	653	3.8	716	3.5
Agriculture	42	1.2	72	1.1	64	0.6	80	0.6	93	0.5	97	0.5
Vet. Science	9	0.3	20	0.3	17	0.2	20	0.1	27	0.2	28	0.1
Others	2553	70.8	4648	70.7	7549	68.4	9682	66.2	10212	60.2	12434	61.2
<b>Total</b>	<b>3605</b>	<b>100.0</b>	<b>6574</b>	<b>100.0</b>	<b>11028</b>	<b>100.0</b>	<b>14625</b>	<b>100.00</b>	<b>16974</b>	<b>100.00</b>	<b>20327</b>	<b>100.00</b>

Table 5.2 shows the growth of enrolment faculty wise in higher education from 1985-86 to 2011-12. Though there was an increase in enrolment in absolute terms, the percentage share of S&T faculties in total did not show much change (Ref. Table-22)

**Table 5.3****FACULTY WISE GROWTH OF WOMEN ENROLMENT IN S&T HIGHER EDUCATION****(Thousands)**

Faculty	1985-86		1995-96		2005-06		2009-10		2010-11		2011-12	
	(000)	%	(000)	%	(000)	%	(000)	%	(000)	%	(000)	%
Science	216	6.00	440	6.70	901	8.2	1215	8.3	1349	8.0	1662	8.2
Engg. & Tech.	12	0.30	26	0.40	186	1.7	468	3.2	801	4.7	959	4.7
Medicine	38	1.10	-	-	163	1.5	235	1.6	330	1.9	350	1.7
Agriculture	2	0.10	-	-	11	0.09	16	0.1	25	0.1	25	0.1
Vet. Science	1	0.03	-	-	4	0.03	4	0.03	7	0.04	7	0.03
Others	798	22.10	1725	26.81	3202	27.6	4142	28.3	4537	26.7	5670	27.9
<b>Total</b>	<b>1067</b>	<b>29.63</b>	<b>2191*</b>	<b>33.33</b>	<b>4467</b>	<b>40.5</b>	<b>6080</b>	<b>41.53</b>	<b>7049</b>	<b>41.4</b>	<b>8673</b>	<b>42.63</b>

Note: \*Includes Agriculture, Veterinary and Medicine.

The percentages are work out to on total enrolment of the respective years.

There has been a remarkable growth in the number of women enrolled in the institutions of higher education from 10.67 lakhs in 1985-86 to 44.67 lakhs in 2005-06 and further to 86.73 lakhs in 2011-12. Data presented in table 5.3 shows that their percentage share in total enrolment has gone up from 29.6 in 1985-86 to 42.6% in 2011-12. In absolute terms, their number in S&T faculties increased from 2.69 lakhs in 1985-86 to 12.65 lakhs in 2005-06 and further to 30.03 lakhs in 2011-12. Among the women enrolled in S&T faculties 55.3% belonged to pure science, 11.7% to medicine, 31.9% to engineering and technology and 1.1% to agriculture and veterinary sciences during 2011-12 (Ref. Table-23).

The data in Table 5.4 reveals that the out-turn of S&T personnel has increased from 1,69,393 in 1979 to 2,35,792 in 1995 and further to 11,33,581 in 2010. The percentage share of outturn in Pure Science, Medicine, Agriculture and Veterinary Science

in total S&T out-turn has declined during the period 1979 to 2010, whereas during the same period the share of out-turn in engineering and technology has increased. However, it may be observed that in absolute terms, there is an increase in the out-turn in all the disciplines and levels of qualification during 1979-2010. Graduate degree holders formed the single largest group with 85% of the total out-turn of S&T personnel. Out of them 44.2% were pure science graduates during the year 2010 (Ref. Table 25).

Doctorate degree holders are highly qualified personnel of education system. Analysis of data of Ph.D. degree recipients during 2010-11 reveals that 51.6% of them were from S&T faculties and the rest 48.4% from other non S&T faculties. Pure science alone shared 32.8% of total doctorates to whom Ph.D. degrees were awarded during 2010-11 (Table 5.5).

**Table 5.4**

**OUT-TURN OF S&T PERSONNEL FROM UNIVERSITIES BY FIELD OF SCIENCE AND LEVEL OF QUALIFICATION**

(Number)

	Graduate			Post-Graduate			Doctorates			Total		
	1979	1995	2010	1979	1995	2010	1979	1995	2010	1979	1995	2010
Science	99749	139257	425531	17638	23807	111876	2262	3155	5872	119649 (70.6)	166219 (70.5)	543279 (47.9)
Engg. & Tech.	18364	32250	421660	3155	3667	27609	506	546	1682	22025 (13)	36463 (15.4)	450951 (39.8)
Medicine	15090	19613	103197	3485*	4634*	18304	-	-	-	18575 (11)	24247 (10.3)	121501 (10.7)
Agri. & Vet.Sc.	6280	5752	12633	2384	2284	4469	480	827	748	9144 (5.4)	8863 (3.8)	17850 (1.6)
Total	139483 (82.3)	196872 (83.5)	963021 (85.0)	26662 (15.7)	34392 (14.6)	162258 (14.3)	3248 (2.0)	4528 (1.9)	8302 (0.7)	169393 (100.0)	235792 (100.0)	1133581 (100.0)

\*Note: 1. Doctorates in Medicine included in Doctorates in Science

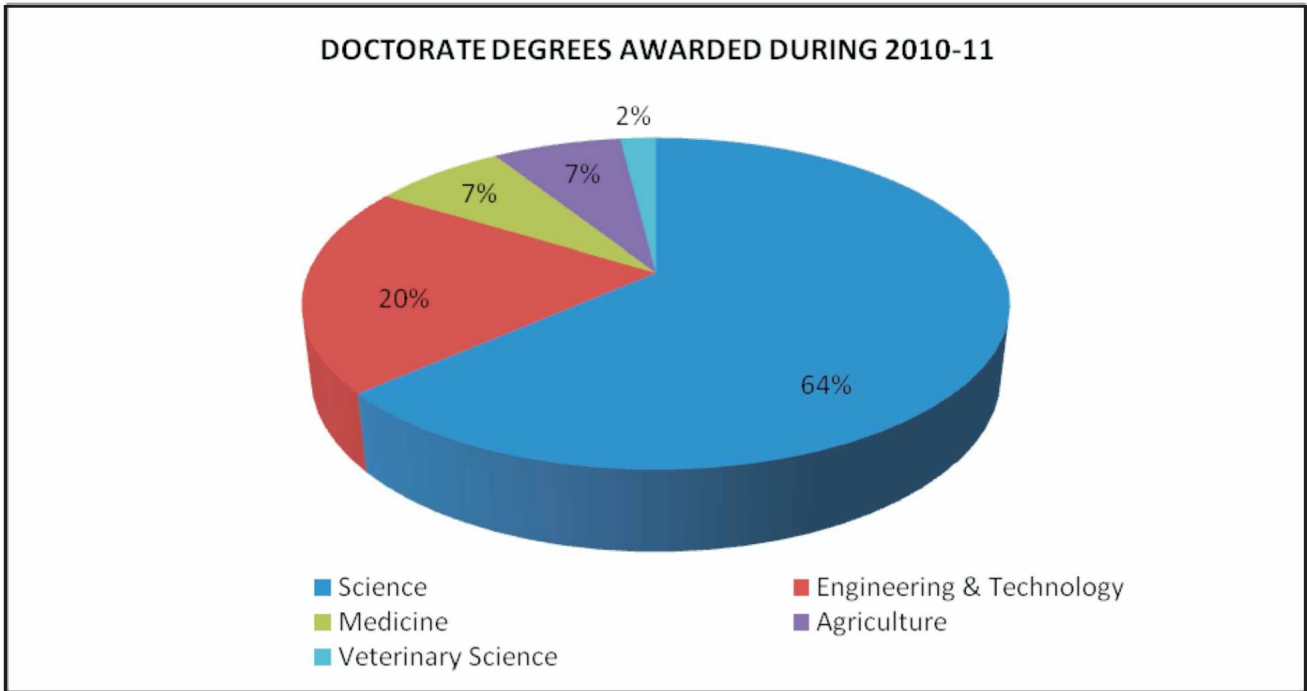
2. figures in brackets are percentage calculated on total out-turn of the respective years

**Table 5.5**

**FACULTY WISE NUMBER OF DOCTORATE DEGREE AWARDED, 2010-11**

Faculty	Doctorates	%
Science	5271	32.8
Engineering & Technology	1682	10.5
Medicine	601	3.7
Agriculture	586	3.6
Veterinary Science	162	1.0
Other*	7791	48.4
<b>Total</b>	<b>16093</b>	<b>100.0</b>

\*Others include Music, Fine Arts, Library Science, Physical Education, etc.



Teaching staff in higher education plays a vital role for training better manpower. UGC is making all efforts to keep the standard of teaching staff up-to-date in knowledge, technical know-how, and skill by providing requisite facilities and incentives through Faculty Improvement Programme and other schemes. As given in Table 5.6 out of the total 9.34 lakhs of teaching staff serving in higher education sector, 16.9% were in university departments/colleges and

83.1% in affiliated colleges. Percentage share of Professors in the total strength of teaching staff was only 8.8% and that of Readers/Associate Prof./Senior Lecturers, Lecturers and Tutors/Demonstrators were 22.6%, 65.5% and 3.1% respectively.

As envisaged in NPE (1986), the University Grants Commission has been strengthening various facilities of educational institutions by way of increased

infrastructure facilities such as class rooms, libraries, laboratories, hostels, staff quarters, teacher hostels and other inputs like technical and research support

and resources for purchase of equipments, books and journals etc.

**Table 5.6**

**TEACHING STAFF POSITIONED IN HIGHER EDUCATION SECTOR, 2011-12**

Organisation	Professors	Readers/Associate Prof./Asstt. Prof (SG)	Lecturers/ Asstt. Prof./ Asstt. Prof. (Senior Scale)	Tutors/ Demonstrators/ Teaching Assistants	Total
Univ.Depts./Univ. colleges	27549	39182	82602	8577	157910
Affiliated**Colleges	54883	172161	528546	20261	775851
<b>Total</b>	<b>82432(8.8%)</b>	<b>211343(22.6%)</b>	<b>611148 (65.5%)</b>	<b>28838 (3.1%)</b>	<b>933761 (100%)</b>

Note: 1. Figures in parentheses indicate the percentage of the cadres in total staff.

2. SG – Selection Grade

**To sum up, the salient features are as under:**

- There were 574 universities/deemed universities and 35,539 colleges during 2011-12 to impart higher education in the country.
- Expenditure on University and other Higher Education (Revenue account) was Rs.197910.92 crores during 2009-10. 203.27 lakhs students were enrolled for higher education out of which 38.8% were in S&T faculties during 2011-12.
- Higher Education sector spent Rs.2199.97 crores on R&D activities with a share of 4.1% in the national R&D expenditure for the year 2009-10.
- Out turn of S&T personnel increased from 2,35,792 in 1995 to 6,61,850 in 2005 and further to 1133581 in 2010.
- Out of 28567 M. Phil and Ph.D. degrees awarded during 2010-11, 9720 were from pure science.
- During 2011-12 there were 9.34 lakhs teaching staff in all faculties in higher education sector, 8.8% of them were in the grade of Professor.

# CHAPTER VI





## RESEARCH AND DEVELOPMENT OUTPUT INDICATORS

Indicators are tools to assist in the assessment of some activity, action or consequence. Research and Development (R&D) is a systematic and creative work undertaken in order to increase the stock of knowledge and use of this knowledge to devise new application for increasing productivity, decreasing production costs, develop new products and processes etc. In an R&D environment it is generally easy to measure input than output, as outputs are partly intangible in nature and cannot be quantified readily. Besides, there are certain conceptual difficulties in defining the output of R&D in clear and unambiguous terms. For example, while it is easy to count the number of scientists employed, it is difficult to describe the quality distribution within such scientific manpower. However, one can make an attempt to collect data on output parameters like patents and know-how developed and utilized, royalties and fees received from the processes sold out, research papers and other publications which might directly or indirectly measure the outcome of R&D.

A variety of patent indicators have been of late used as a measure of inventiveness and output from R&D, particularly with regard to the industrial sector. The patent provides protection to avoid unauthorized duplication (or copying) of the invention. Data on

patents registered in a particular year and comparison with data of similar nature of the previous years indicate the direction in which the research efforts of the country are progressing. Annual reports of Controller General of Patents, Designs and Trade Marks contain time-series data on patents covering various facets. As is known, patents can be registered not only in one's own country but in other countries too. Tables containing detailed information on applications for patents from persons in India and abroad, applications for patents filed in India by foreign countries, patents filed and granted are given at the end.

The data for the last decade shows that the highest number of 39400 applications for patents was made during 2010-11. This figure for 2009-10 was 34287. About 78.9% of the total applications for patents received in 2010-11 were in the name of foreigners residing abroad and only 21.1% were in the name of Indian nationals. (Ref. Table 31)

Table 6.1 provides information on the country-wise number of applications filed for patents in India for a few selected countries during 2009-10 and 2010-11. The number of applications for patents received from abroad during 2010-11 was 31088 as against 27243 during the year 2009-10.

**Table 6.1****COUNTRY WISE NUMBER OF APPLICATIONS FILED FOR PATENTS IN INDIA**

(Number)

S. No.	Name of the country	Number of applications filed	
		2009-10	2010-11
1.	U.S.A.	9154	10405
2.	Germany	3111	3653
3.	Japan	3040	4117
4.	Switzerland	1579	1651
5.	France	1394	1609
6.	Netherlands	1316	1336
7.	U.K.	972	965
8.	Italy	560	608
9.	Russia	45	55
10.	Other Countries	6072	6689
11.	Total of Foreign Countries	27243	31088
12.	India	7044	8312
	Total Applications	34287	39400

It may be seen from Table 6.1 that USA accounted for 33.5% of the total applications received from foreign nationals during 2010-11. USA together with Germany, Japan, Switzerland, France and Netherlands accounted for about 73.2% of total applications received from foreigners during 2010-11.

During the year 2010-11, 8312 applications for patents were filed by Indian nationals. Out of these, 54.4% originated from the states of Delhi, Maharashtra and Tamil Nadu. Together with the States of Karnataka (11.0%) and Andhra Pradesh

(8.8%), these five states accounted for 74.2% of total number of applications filed in the country by Indian Nationals (Ref. Table 33).

Table 6.2 gives information on the number of patents granted in the name of Indians and Foreigners during the last ten years period. The number of patents granted during the year 2010-11 was 7509 out of this 83.0% were in the name of the foreign citizens and 17.0% in the name of Indian citizens. It may be observed from Table 6.2 that the share of patents granted to Indians has shown an increasing trend from 2004-05 to 2007-08. Then, it declined during 2008-09 to 2010-11.

**Table 6.2****PATENTS GRANTED IN INDIA**

(Number)

Year	Indians	Foreigners	Total
2000-01	399	919	1318
2001-02	654	937	1591
2002-03	494	885	1379
2003-04	945	1524	2469
2004-05	764	1147	1911
2005-06	1396	2924	4320
2006-07	1907	5632	7539
2007-08	3173	12088	15261
2008-09	2541	13520	16061
2009-10	1725	4443	6168
2010-11	1273	6236	7509

During the year 2010-11, 39594 patents were in force. Out of these, 81.6% were in the name of foreign nationals. The share of foreign patents in force has declined from 87.8% in 1976-77 to 72.7% in 2005-06. However, it rose to 81.6% in 2010-11 (Ref. Table 34).

Table 6.3 gives information on patent applications filed at patent offices across the world during the years 2010, 2011 and 2012. It may be seen from the table that China filed and received the highest number of patent applications during 2012 as per the World Intellectual Property Indicators 2013. Chinese patent office received the highest number of patent applications 6,52,777 followed by USA, Japan and South Korea with 5,42,815, 3,42,796 and 1,88,915 patent applications respectively from across the world. The Indian patent office received 43,955 patent applications during 2012 which included 9,553 applications from

residents and the rest 34,402 applications from non-residents as compared to 34,287 applications including 7,262 resident applications and 27,025 non-resident applications received during 2010. It indicates that patent filing at Indian patent office is showing an increasing trend over the years.

Table 6.3 further shows that during 2012, patent applications filed by residents dominated in various patent offices across the world such as Japan (84%), China (82%), South Korea (78%), Germany (76%) and Russian Federation (65%) in contrast to countries like India (22%), Canada (13%) and Brazil (16%) where patent applications filed by non-residents dominated. It is interesting to note that USA had equal share of patent applications filed by resident as well as non-residents. The overall world total also shows dominance of residents with 1,514,266 patent applications (64.5%) over non-residents with 833,434 patent applications (35.5%) filed.



**Table 6.3****PATENT APPLICATIONS FILED AT SELECT PATENT OFFICES ACROSS THE WORLD  
DURING THE YEARS 2010 TO 2012**

(Number)

Country	Number of Applications Filed								
	2010			2011			2012		
	Resident	Non-Resident	Total	Resident	Non-Resident	Total	Resident	Non-Resident	Total
China	293066	98111	391177	415829	110583	526412	535313	117464	652777
USA	241977	248249	490226	247750	255832	503582	268782	274033	542815
Japan	290081	54517	344598	287580	55030	342610	287013	55783	342796
South Korea	131805	38296	170101	138034	40890	178924	148136	40779	188915
European Patent Office	74399	76562	150961	71898	70895	142793	73014	75546	148560
Germany	47047	12198	59245	46986	12458	59444	46620	14720	61340
Russian Federation	28722	13778	42500	26495	14919	41414	28701	15510	44211
India	7262	27025	34287	8841	33450	42291	9553	34402	43955
Canada	4550	30899	35449	4754	30357	35111	4709	30533	35242
Brazil	2705	19981	22686	2705	19981	22686	4804	25312	30116
World (in million) (% in brackets)	1.23 (62.1%)	0.75 (37.9%)	1.98 (100%)	1.36 (63.6%)	0.78 (36.4%)	2.14 (100%)	1.51 (64.5%)	0.83 (35.5%)	2.35 (100%)

Source: World Intellectual Property Indicators 2011, 2012 and 2013

The data on a number of parameters like products developed, processes developed, import substitutes developed, design prototypes developed and consultancy services rendered by R&D institutions in different sectors were collected from the primary source through the national survey. Table 6.4 presents the data.

**Table 6.4****R&D OUTPUT BY SECTOR, 2009-10**

(Number)

R&D Output	Institutional Sector		Industrial Sector		Total
	Central Sector	State Sector	Public Sector	Private Sector	
Products developed	567	264	702	12164	13697
Processes developed	352	204	119	2763	3438
Import substitutes developed	106	3	972	1012	2093
Design prototypes developed	395	107	73	3900	4475
Consultancy services rendered	3398	898	881	1775	6952
Patents filed	608	165	298	2986	4057
Patents Sealed	520	13	123	731	1387



It may be kept in mind while making use of these data that the response for questions related to R&D output was low and not always complete. Besides, it is also possible that the data provided by the responding units may be cumulative rather than for each year separately. No quantitative evaluation of the output reported has been done. It may be seen from Table 6.4 that in most of the cases private sector has a major share except in case of consultancy services rendered where institutional sector dominates the other sectors.

The measurement of the number of scientific publications by field and countries is an indicator of the status of scientific research in that area. The results of scientific research can be disseminated through publication of papers in research journals and also

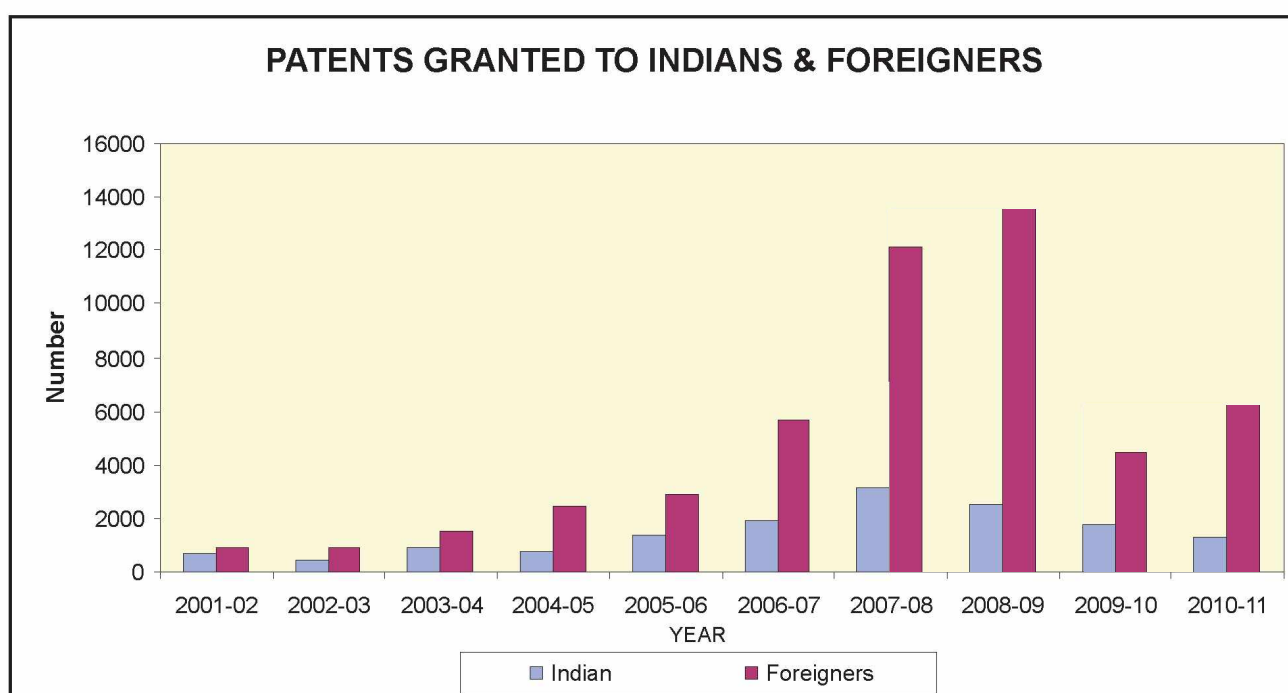
through presentation of papers in national and international seminars/workshops. Information on the number of papers published or the technical reports published has been compiled based on the DST survey separately for institutional and industrial sector and is presented in Table 6.5.

Ideally, academic institutions and also individual researchers not assigned to organized laboratories should also have been included in the National Survey but due to limitations of resources, this survey has been restricted to research laboratories under the central and state governments and in-house R&D units of public and private sector industries. Therefore, the data given in Table 6.5 should be used as indicative rather than exact. The reservations about data in Table 6.4 expressed earlier also hold good for the data in Table 6.5.

**Table 6.5**  
**PAPER/BOOKS PUBLISHED BY SECTOR, 2009-10**

(Number)

Publications	Institutional Sector	Industrial Sector	Total
Papers published	20516	5842	26358
Books published	1033	513	1546
Technical Reports Published	7269	2982	10251



The number of research papers published by India indicated in the above table is incomplete due to reasons mentioned above. However, one can get an idea of the total number of S&T publications originated from India by searching the representative International Bibliometric Databases.

Science Citation Index (SCI) database has been selected and the number of papers listed in that database with an Indian address was counted as the number of peer-reviewed publications published from India. Search has been made for number of publications published from India in SCOPUS

provided total scientific publications from world by which one can get an idea of India's contribution to world scientific publications. Table shows that India's volume of scientific publication remained far ahead of BRICS countries except China during last decade as per SCI database. It surpassed Russia in 2005 and Australia and South Korea in 2007. According to UNESCO Science Report 2010, India ranks 9<sup>th</sup> globally in terms of scientific publication output.

**Table 6.6**

**INDIA'S RESEARCH PUBLICATION TREND, 2000-2012**

Database	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011*	2012*
SCOPUS	22484	23171	25159	28715	31361	35419	41200	45958	51128	56923	65487	73542	82588
SCI	16538	18157	19119	21487	21600	26093	27780	29804	387778	40135	40711	44782	49260

Source: NSTMIS, DST Commissioned Study, 2012 (SCOPUS Database, SCI Database)

Note: \*Forecast

database also. The information based on the SCOPUS and SCI databases is given in Table 6.6. Data shows that India's scientific publication output has shown a rising trend during the last decade. As per the SCOPUS database, research output has increased by 85% from 35,419 in 2005 to 65,486 in 2010. Similarly, it increased by 56% from 26,093 in 2005 to 40,711 as per the SCI database. During 2006-2010, India's growth rate of scientific research publication was 12% and 10% as per the SCOPUS and SCI database respectively as against the world average of 4%.

For international comparisons, searches were made in respect of SCI database for the period 2000 to 2010 for select countries also and the data thus obtained is given in Table 6.7. The output also

It may be seen from Table 6.8 that the number of papers published in the areas of Chemistry, Agricultural Sciences, and Materials Science were more as compared to other subjects during 2006-10. Table 6.8 shows that out of total papers published by the world, Indian contribution in Chemistry is 6.2% followed by Agriculture with 6.0% and Materials Science with 5.6% during the period 2006-10.

The percentage contribution in the areas of Engineering and Geosciences were 4.0% and 3.6% respectively. Indian contribution to Physics, Biology & Biochemistry and Mathematics were of the order of 4.1%, 3.4% and 2.1% respectively during the period 2006 to 2010.

**Table 6.7****RESEARCH PAPERS PUBLISHED FROM INDIA AND SELECT COUNTRIES IN S&T  
FIELDS DURING 2000-2010**

(Number)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
INDIA	16,538	18,157	19,119	21,487	21,600	26,093	27,780	29,804	38,778	40,135	40,711
AUSTRALIA	21,386	22,070	22,317	24,790	24,251	28,289	29,303	29,522	36,542	37,869	38,753
FRANCE	48,065	49,396	47,653	52,733	48,877	56,120	54,784	53,581	63,627	63,970	62,324
GERMANY	67,272	69,181	67,505	73,106	69,270	79,094	77,396	75,870	86,486	88,056	86,978
ISRAEL	9,678	9,809	9,783	11,126	10,232	11,056	11,146	10,863	12,177	11,643	11,574
ITALY	31,157	33,403	33,790	38,084	37,366	42,057	42,463	43,705	50,056	50,798	50,691
JAPAN	72,029	74,471	73,374	80,521	73,459	80,538	76,623	73,793	79,594	78,564	72,607
UK	71,775	71,161	68,813	75,012	71,915	80,794	80,224	81,125	89,685	89,472	90,004
USA	255,099	262,000	259,410	283,333	271,963	307,247	305,325	300,213	335,720	331,790	330,339
BRAZIL	10,465	11,531	12,886	14,292	15,095	17,648	19,264	19,573	30,420	31,770	31,274
CHINA	30,031	34,216	39,446	47,998	54,904	73,481	83,167	90,206	113,102	127,176	134,697
IRAN	1,291	1,514	2,054	2,958	3,371	4,818	5,955	7,838	11,660	14,873	16,391
RUSSIA	28,629	25,869	25,896	26,249	24,776	25,898	22,013	25,845	27,665	29,802	26,374
SINGAPORE	3,634	4,087	4,531	5,225	5,516	6,648	6,874	6,602	7,746	8,516	8,811
SOUTH AFRICA	3,617	3,773	4,104	4,024	4,079	4,868	5,224	5,352	6,744	7,056	7,468
SOUTH KOREA	13,448	15,881	17,073	21,088	22,674	27,766	28,382	27,362	35,448	38,226	39,397
TAIWAN	9,652	11,150	11,407	13,128	13,640	16,765	17,963	18,746	22,636	24,315	23,715
<b>WORLD</b>	<b>761,842</b>	<b>782,101</b>	<b>782,928</b>	<b>863,685</b>	<b>839,068</b>	<b>964,322</b>	<b>968,963</b>	<b>969,602</b>	<b>1,145,632</b>	<b>1,165,540</b>	<b>1,155,661</b>

Source: NSTMIS, DST Commissioned Study, 2012 (SCI Database)



**Table 6.8**

**FIELD-WISE NUMBER OF PAPERS PUBLISHED FROM INDIA AND WORLD DURING 2001-2005 AND 2006-2010**

Fields	2001-05			2006-10		
	India	World	India's Contribution to World Papers (%)	India	World	India's Contribution to World Papers (%)
Agricultural Sciences	4514	79572	5.7	7270	121160	6.0
Biology & Biochemistry	5403	261239	2.1	9722	287663	3.4
Chemistry	25719	518461	5.0	38920	631642	6.2
Clinical Medicine	10046	887628	1.1	19273	1138543	1.7
Computer Science	1828	123731	1.5	2703	128600	2.1
Engineering	9605	332110	2.9	18596	463246	4.0
Environment/Ecology	2737	109992	2.5	4858	154001	3.2
Geosciences	3566	117960	3.0	5508	154694	3.6
Immunology	653	58402	1.1	1181	64054	1.8
Materials Science	7987	194272	4.1	14190	253905	5.6
Mathematics	2071	105222	2.0	3224	151551	2.1
Microbiology	1327	71276	1.9	3736	91155	4.1
Molecular Biology & Genetics	1367	121240	1.1	2675	150909	1.8
Neuroscience & Behaviour	1228	135777	0.9	1720	157138	1.1
Pharmacology & Toxicology	2518	76669	3.3	5755	105338	5.5
Physics	13490	417781	3.2	20525	497330	4.1
Plant & Animal Science	8748	237724	3.7	11591	297755	3.9
Psychiatry/Psychology	282	102068	0.3	475	136246	0.3
Space Science	1381	56210	2.5	2040	63035	3.2
Others	1986	224770	0.9	3246	357433	0.9
<b>Total</b>	<b>106456</b>	<b>4232104</b>	<b>2.5</b>	<b>177208</b>	<b>5405398</b>	<b>3.3</b>

Source: SCI Database

Note: Others include Social Science, Economics & Business .

**To sum up, the salient features are as under:**

- Out of 39400 applications filed for patents 8312 applications were filed by Indians during 2010-11. Among these, more than 50% patents were from the States of Maharashtra, Tamil Nadu and Delhi. This was followed by Karnataka and Andhra Pradesh with 11.0% and 8.8% respectively.
- USA alone accounted for 33.5% of the total applications filed for patents by foreign nationals during 2010-11.
- The number of foreign patents in force has declined from 19,780 in 1976-77 to 13593 in 2006-07 but rose to 32,293 in 2010-11.
- Based on the SCI database in various fields of science & technology during 2006 to 2010 India's contribution to world publications was of the order of 3.3%.
- Out of total research papers published from India in the respective fields of science, Chemistry and Agricultural sciences contributed 6.2% and 6.0% respectively of the world total during 2006-10.

# CHAPTER VII



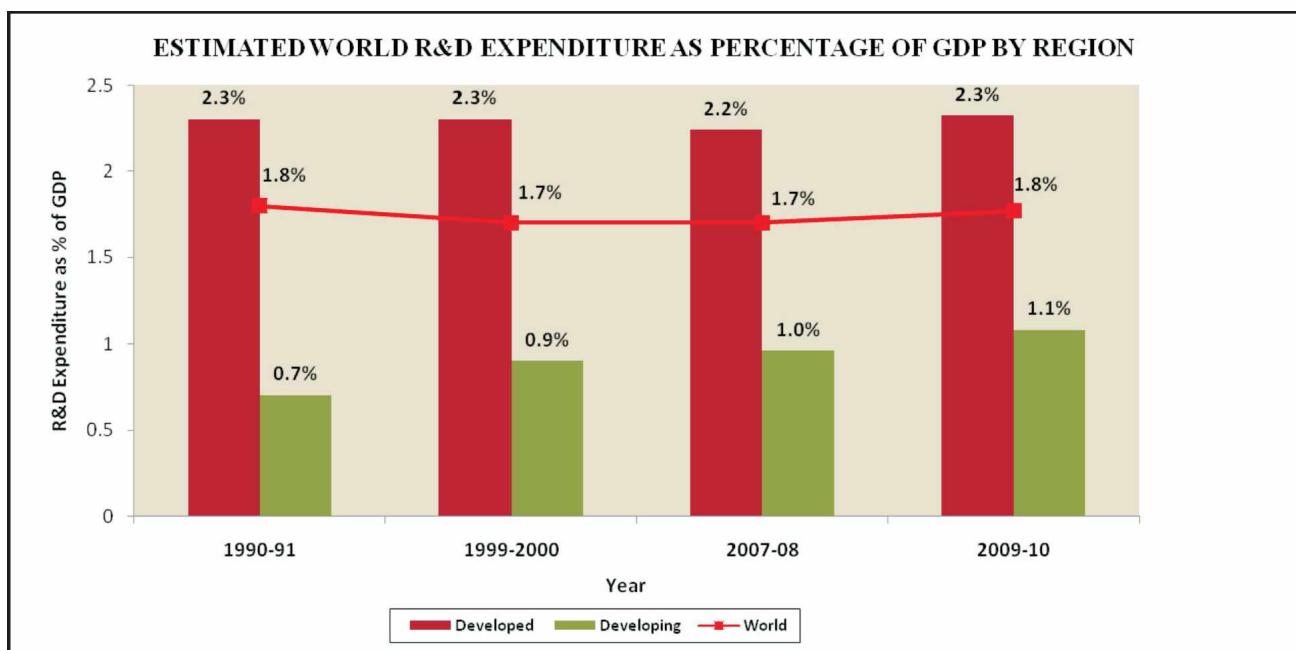


## INTERNATIONAL COMPARISON OF RESEARCH AND DEVELOPMENT

In the preceding chapters, an analysis has been attempted on the total research and development efforts and its components in various sectors. This chapter has been devoted to assess the relative progress in scientific and technological activities achieved by India in comparison to other developing and developed countries. Such a comparison, though prima facie appears to be simple and straight forward, entails a number of difficulties, both conceptual and operational. Though most of the developed countries and a few of the developing countries have a well organised data collection system, yet the concepts vary from country to country. So, it is difficult to compare these data because of the varying concepts and definitions used. A complete data system or recent data are also often lacking for most of the developing countries and even for some of the developed countries. Keeping in view, the constraints given above, an attempt has been made in the ensuing

paragraphs to throw light on the S&T parameters related with socio-economic parameters for selected countries comprising both developing and developed countries.

According to the UNESCO S&T Statistics,<sup>1</sup> the total investment on research and development in the world during 1990-91 was of the order of 409.8 billions PPP\$. This increased to 755.1 billions PPP\$ in 1999-2000 and to 1155.4 billions PPP \$ in 2007-08 and was 1276.9 billions PPP \$ during 2009-10. The investment on research and development by the developed countries during 1990 was 367.9 billions PPP \$ and the rest 41.9 billions PPP \$ was by the developing countries. In terms of percentage it works out to be 90% and 10% respectively. In 1999-2000, the share of developed and developing countries was 79% and 21% and during 2009-2010 this was 73% and 27% respectively.



<sup>1</sup> UIS, UNESCO Website accessed on August 2013 and Bulletin on Science & Technology Statistics, Issue No. 1, August 2013

**Table 7.1****ESTIMATED WORLD R&D EXPENDITURE**

Region	R&D Expenditure (PPP \$ billions)				R&D Expenditure as % of GDP			
	90-91	99-00	07-08	09-10	90-91	99-00	07-08	09-10
World	409.8 (100%)	755.1 (100%)	1155.4 (100%)	1276.9 (100%)	1.8	1.7	1.7	1.8
Developed	367.9 (89.8%)	596.7 (79.0%)	882.9 (76.4%)	931.5 (73.0%)	2.3	2.3	2.2	2.3
Developing	41.9 (10.2%)	158.4 (21.0%)	272.5 (23.6%)	345.4 (27.0%)	0.7	0.9	1.0	1.1

This clearly shows an increasing trend of the percentage share of developing countries in the total world R&D expenditure as percentage of GDP by developed and developing countries are also given in Table 7.1.

One of the most commonly used indicators for international comparison of S&T efforts is the proportion of Gross Domestic Product (GDP) devoted to research and development activities. The expenditure on R&D as percentage of GDP for the whole world in 2009-10 was 1.8%. For the

developed countries this percentage has remained the same with 2.3% during 1990-91, 1999-2000 and 2009-10 whereas in the case of developing countries, the percentage has increased from 0.7% in 1990-91 to 0.9% in 1999-2000 and further to 1.1% in 2009-10 (In nutshell the R&D expenditure to GDP ratio over the decade has remained the same for developed countries while it increased marginally for the developing countries). The information regarding expenditure on research and development by continents is given in Table 7.2.

**Table 7.2****SHARE OF R&D EXPENDITURE IN WORLD TOTAL BY CONTINENTS**

Continent	Expenditure on R&D in billion US \$ PPP and % share in brackets			
	90-91	99-00	07-08	09-10
Africa	5.2 (1.3)	5.8 (0.8)	10.8 (0.9)	11.8 (0.9)
North America	156.4 (38.2)	281.0 (37.2)	398.6 (34.5)	417.5 (32.7)
Latin America & Caribbean	11.3 (2.7)	21.3 (2.8)	34.4 (3.0)	40.0 (3.1)
Asia	94.2 (23.0)	235.6 (31.2)	367.9 (31.8)	421.8 (33.0)
Europe	138.8 (33.9)	202.9 (26.9)	324.4 (28.1)	363.4 (28.5)
Oceania	3.9 (0.9)	8.5 (1.1)	19.2 (1.7)	22.4 (1.8)
<b>World (Total)</b>	<b>409.8 (100)</b>	<b>755.1 (100)</b>	<b>1155.3 (100)</b>	<b>1276.9 (100)</b>

Note : North America includes Canada & United States.

**ESTIMATED WORLD R&D EXPENDITURE CONTINENT-WISE, 2009-10**

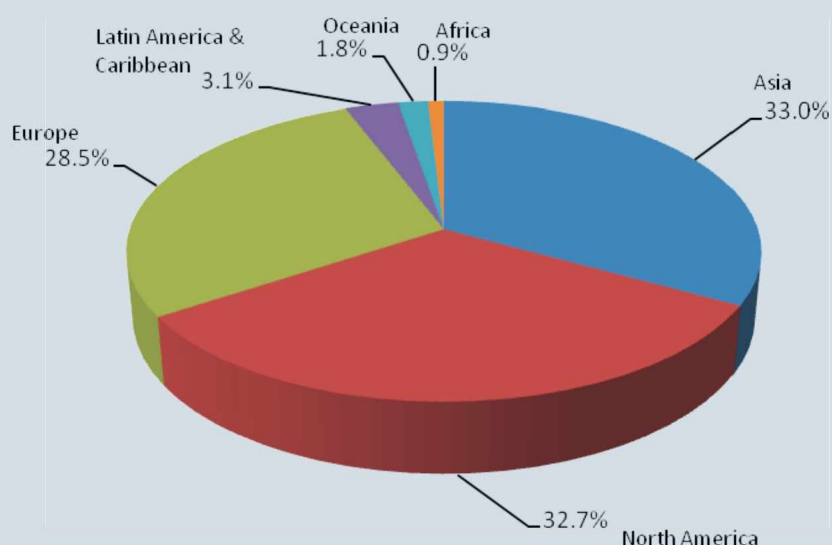


Table 7.3 gives data for R&D expenditure as percentage of GDP in respect of selected countries comprising both developing and developed grouped in classes ranging from 0.0-1.0%, 1.1 - 2.0% and above 2.0%.

It may be seen from Table 7.3 that most of the developed countries spent, more than 2% of their GDP on R&D. Among the developing nations, Brazil and China spent 1.19 % and 1.70% of GDP on their R&D while India spent 0.87% of its GDP on R&D during 2009-10.

**Table 7.3**

**EXPENDITURE ON R&D AS PERCENTAGE OF GDP FOR SELECTED COUNTRIES, 2009-10**

0.0 – 1.0 (%)		1.1 – 2.0 (%)		Above 2.0 (%)	
South Africa	0.93	Canada	1.95	Israel	4.27
India	0.87	United Kingdom	1.87	Finland	3.94
Argentina	0.60	Netherlands	1.82	Sweden	3.60
Pakistan	0.46	Norway	1.78	Korea, Rep.	3.36
Mexico	0.39	China	1.70	Japan	3.36
Sri Lanka #	0.11	Czech Rep.	1.47	Denmark	3.16
		Spain	1.39	Germany	2.82
		Italy	1.26	United States	2.79
		Russian Fed.	1.25	Austria	2.71
		Brazil	1.19	Singapore	2.43
		Hungary	1.17	Australia	2.41
				France	2.23

Source : UIS, UNESCO Website accessed, August 2013

World Development Indicators (database updated August 2013), The World Bank

Note : # Figure available for the year 2008 ; China excludes Hong Kong



It might further be useful to examine whether the countries having high Per Capita Gross Domestic Product also invest more on R&D. For this purpose Per Capita GDP has been broken down into four groups as shown in Table 7.4.

It may be noted from Table 7.4 that amongst the developed countries having per capita GDP of 35,000 PPP \$ and above, the per capita R&D expenditure varied from 723.6 PPP \$ for Netherlands to 1494.6 PPP \$ for Finland while for the countries having a per capita GDP of 20,000 PPP \$ to 35,000 PPP \$, the per capita R&D expenditure varied from 236.9 PPP \$ for Hungary to 1211.2 PPP \$ for Israel.

The developing countries whose per capita GDP was less than 5000 PPP \$ spent per capita R&D expenditure up to 52.8 PPP \$. In case of India, this figure was 26.2 PPP\$. On the other hand, the developing countries whose per capita GDP was between 5000 PPP\$ to 20,000 PPP\$ had per capita

R&D expenditure varying from 54.7 PPP\$ for Mexico to 234.5 PPP\$ for Russian Federation.

Scientists and Engineers carrying out the research and development activities constitute another important input for research. In order to iron out inter-country differences due to varying population sizes, their number is usually expressed per million population. It may be seen from the Table No. 39 (S&T Indicators Tables) that Finland tops the list with 7651 researchers per million population. For Denmark, Singapore, Norway, Japan, Sweden, Korea Republic and USA these figures are 6529, 6121,5441, 5139, 5053, 4963 and 4605 respectively. For India, the number of researchers per million population is 164. However, in terms of total researchers the USA has the highest number of 14,12,639 researchers followed by China 11,52,311 Japan 6,55,530 and Russian Federation 4,42,263 respectively. For India the total number of researchers are 1,92,819.

**Table 7.4**

**PER CAPITA R&D EXPENDITURE FOR SELECTED COUNTRIES GROUPED BY PER CAPITA GDP 2009 (in PPP \$)**

Per Capita GDP below 5000 PPPS		Per Capita GDP below 5000 -20000 PPPS		Per Capita GDP below 20000 - 35000 PPPS		Per Capita GDP below above 35000 PPPS	
Sri Lanka	52.8	Russian Fed.	234.5	Israel	1211.2	Finland	1494.6
India	26.2	Brazil	122.8	Japan	1083.5	Sweden	1384.6
Pakistan	12.1	China	115.5	Korea Republic	919.8	United States	1305.6
		South Africa	95.5	France	767.8	Singapore	1232.5
		Argentina	86.6	United Kingdom	658.6	Denmark	1113.3
		Mexico	54.7	Spain	444.4	Austria	1101.4
				Italy	408.5	Germany	1018.8
				Czech Republic	396.0	Norway	930.2
				Hungary	236.9	Australia	869.7
						Canada	727.4
						Netherlands	723.6

Source : UIS, UNESCO Website accessed, August 2013

World Development Indicators (database updated August 2013),The World Bank

Note : China excludes Hong Kong.



**To sum up, the salient features of International R&D scene are:**

- Most of the developed countries spent more than 2% of their GDP on R&D while India spent 0.87% of GDP on R&D.
- India's per capita R&D expenditure was 26.2 PPP\$ whereas this was between 236.9 PPP\$ and 1494.6 PPP\$ for most of the developed countries.
- India has 164 researchers per million populations as compared to 7651 in Finland, 6529 in Denmark, 6121 in Singapore, 5441 in Norway and 5139 in Japan. However, the total number of researchers in India are 1,92,819 as compared to 14,12,639 in USA, 11,52,311 in China and 6,55,530 in Japan.

# CHAPTER VIII



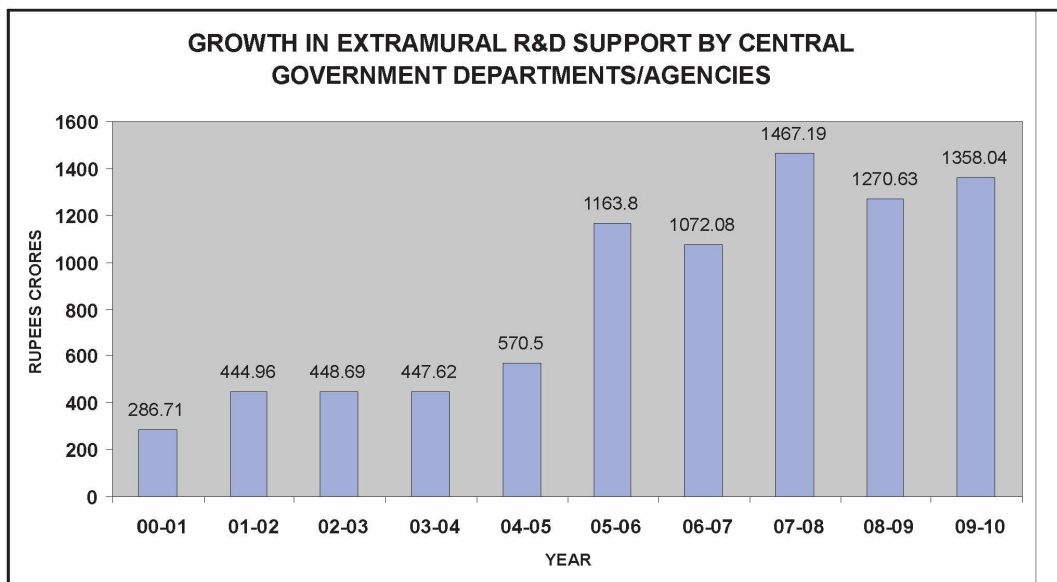
## EXTRAMURAL SUPPORT FOR RESEARCH AND DEVELOPMENT PROJECTS BY CENTRAL GOVERNMENT DEPARTMENTS/AGENCIES

The purpose of the extramural research and development (R&D) project funding is to build general research capability in the country and provide special encouragement to scientists to pursue a research career. The National Science and Technology Management Information System (NSTMIS) division of the Department of Science and Technology has been maintaining a database on all extramural R&D projects funded by various Central Government Departments/Agencies as a part of the Management Information System since 1990. The division also brings out annually a directory of extramural R&D projects approved by various agencies during each financial year.

Almost all the Central S&T Departments such as Department of Atomic Energy (DAE), Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha & Homeopathy (AYUSH), Department of Biotechnology (DBT), Department of Coal (DOC), Department of Science & Technology (DST), Department of Scientific and Industrial Research (DSIR), Ministry of Communication & Information Technology (MOCIT) formerly Ministry of Information Technology, Ministry of Earth Sciences (MOES) formerly DOD, Ministry of Environment and Forests (MOEF), Ministry of New & Renewable Energy (MNRE), Ministry of Power (MOP), Ministry of Steel (MOS), Ministry of Water Resources (MOWR), All India Council for Technical Education (AICTE), Council of Scientific and Industrial Research (CSIR), Defence Research and Development Organisation (DRDO), Indian Council of Agricultural Research (ICAR), Indian Council of Medical Research (ICMR), Indian Space Research Organisation (ISRO) under Department of Space,

Petroleum Conservation Research Association (PCRA), University Grants Commission (UGC) have specified schemes to sponsor R&D projects. Central Board of Irrigation and Power (CBIP) has not funded any Extramural Research (EMR) projects since 1999-2000. Indian Meteorology Department (IMD) has become part of Ministry of Earth Sciences (MOES). Ministry of Social Justice and Empowerment (MOSJE) has not funded any EMR projects during 2006-07 to 2009-10. ICAR has withdrawn its EMR funding scheme since 2005-06. MOCIT released partial data during 2008-09. MOS provided EMR support to Steel Authority of India Limited (SAIL) during 2006-07 and Central Mine Planning and Design Institute (CMPDI) during 2007-08. Central Government Departments/Agencies operate number of EMR Schemes under which they invite time bound projects from individual scientists in Universities/Colleges, Institutes of National Importance, National Laboratories, state level institutions, Public Sector Undertakings and other registered bodies.

The extramural R&D funding by Central S&T departments/agencies has increased at a compound annual growth rate of 18.86 percent during the period 2000-01 to 2009-10. 4828 new projects costing Rs.1358.04 Crores were approved for funding by 19 responding agencies during the year 2009-10, as shown in Table 8.1. This table provides agency-wise information on number of extramural R&D projects approved and their cost during the years 2006-07, 2007-08, 2008-09 and 2009-10. It may be noted that the approved cost given in the tables in this chapter is the cost of the newly approved projects for the entire duration of the project period and not the actual expenditure during the year.



It may be worth mentioning here that Department of Science & Technology provided the highest extramural funding of Rs.447.80 Crores (33.0%) followed by Department of Biotechnology and Ministry of Communications & Information Technology with Rs.213.96 Crores (15.8%) and Rs.179.02 Crores (13.2%) respectively during

2009-10. The lowest support of Rs.1.21 Crores for extramural R&D projects was by the Petroleum Conservation Research Association (PCRA). The share of number of projects supported by the Department of Science & Technology was also highest (30.6%) when compared to other sponsoring agencies.

**Table 8.1**

**AGENCY-WISE SUPPORT TO EXTRAMURAL R&D PROJECTS**

(Rs. Crores)

Agency	2006-07		2007-08		2008-09		2009-10	
	No. of Projects	Approved Cost	No. of Projects	Approved Cost	No. of Projects	Approved Cost	No. of Projects	Approved Cost
DAE	113	24.61	167	36.55	71	29.38	107	49.76
Deptt of AYUSH	9	1.58	11	1.78	3	0.49	8	1.68
DBT	594	353.63	426	302.65	478	232.59	429	213.96
DOC	2	0.87	13	16.05	5	5.19	7	12.36
MOES (formerly DOD)	Nil	Nil	Nil	Nil	35	6.44	4	14.22
DST	1192	381.59	1343	695.87	1368	483.13	1476	447.80
DSIR	3	5.16	3	1.89	85	8.67	71	11.22
MOCIT (formerly MIT)	45	67.06	48	79.04	76	181.99	61	179.02
MOEF	60	14.26	49	6.93	46	8.21	75	12.00
MOP	22	4.07	Nil	Nil	Nil	Nil	13	2.32
CIL	2	1.82	Nil	Nil	Nil	Nil	Nil	Nil
MOS	1	6.84	3	130.44	Nil	Nil	Nil	Nil
MOWR	23	4.37	NA	NA	8	1.48	9	2.95
MNRE	13	2.54	12	5.51	18	20.18	30	82.51
PCRA	20	3.65	27	3.76	9	1.61	8	1.21
AICTE	190	16.17	222	18.90	266	27.95	164	13.81
CSIR	253	25.71	329	43.15	257	37.42	294	47.33
DRDO	196	47.05	188	46.64	222	58.70	178	42.56
ICMR	365	68.67	249	47.30	255	68.15	451	151.59
ISRO	31	4.44	32	3.49	38	11.64	24	2.51
UGC	647	37.99	393	27.24	1564	87.46	1419	69.23
<b>Total</b>	<b>3781</b>	<b>1072.08</b>	<b>3515</b>	<b>1467.19</b>	<b>4804</b>	<b>1270.68</b>	<b>4828</b>	<b>1358.04</b>

Source: Data collected and compiled by DST



Subject area-wise number of projects and approved cost during 2006-07, 2007-08, 2008-09 and 2009-10 are given in Table 8.2. Amongst the eight subject areas, Biological Sciences, Engineering & Technology, Medical Sciences and Chemical Sciences were the main recipients of R&D support during 2009-10. The Biological Sciences received maximum support in terms of number of projects (26.6%) followed by Engineering & Technology (20.2%) which also received maximum financial support (36.4%) followed by Medical Sciences (23.6%). This was followed by Biological Sciences with 17.3% of total funding. The extramural support to Mathematics was the lowest (0.7%).

Importance, National Laboratories and other Institutions under State Governments, Voluntary Agencies, Registered Societies etc. (which are not covered in any of the above types).

The pattern of extramural R&D funding during 2006-07, 2007-08, 2008-09 and 2009-10 based on the above classification is given in Table 8.3. The number of R&D projects supported to academic sector (comprising Universities/Colleges, Deemed Universities and Institutes of National Importance) has hovered around 75% of the total projects during 2006-10 period. The national laboratories and the institutions in the 'Others' category accounted for about 14.5% and 10.5% of the projects respectively

**Table 8.2**  
**SUBJECT AREA-WISE DISTRIBUTION OF EXTRAMURAL R&D PROJECTS**

(Rs. Crores)

Subject	2006-07		2007-08		2008-09		2009-10	
	No. of Projects	Approved Cost	No. of Projects	Approved Cost	No. of Projects	Approved Cost	No. of Projects	Approved Cost
Agriculture	209	91.91	222	74.61	187	42.27	180	54.25
Engg. & Technology	700	233.66	766	472.53	971	392.12	975	493.85
Medical Sciences	755	268.88	594	258.31	657	271.07	860	320.98
NATURAL SCIENCES:								
Biological Sciences	992	303.54	777	338.02	1258	289.65	1285	235.01
Chemical Sciences	501	76.84	596	109.75	756	109.67	698	105.18
Earth Sciences	250	46.40	172	68.86	329	50.76	285	66.60
Mathematics	85	5.92	64	8.57	154	18.12	180	8.95
Physical Sciences	289	44.93	324	136.54	492	97.02	365	73.22
<b>Total</b>	<b>3781</b>	<b>1072.08</b>	<b>3515</b>	<b>1467.19</b>	<b>4804</b>	<b>1270.68</b>	<b>4828</b>	<b>1358.04</b>

The institutions receiving support from the funding agencies have been classified into 5 categories for convenience of analysis: Universities/Colleges, Deemed Universities, Institutes of National

Importance during the same period. The extramural R&D funding support to the academic sector, however, was not comparable with its share of number of projects. It accounted for 64.0% of the total funding during 2009-10.

**Table 8.3**  
**DISTRIBUTION OF EXTRAMURAL R&D PROJECTS BY TYPES OF INSTITUTES**

(Rs. Crores)

Institute Type	2006-07		2007-08		2008-09		2009-10	
	No. of Projects	Approved Cost	No. of Projects	Approved Cost	No. of Projects	Approved Cost	No. of Projects	Approved Cost
Universities/Colleges	1853	300.18	1758	410.81	3123	508.27	2800	434.57
Deemed Universities	302	85.77	246	102.70	48	25.41	97	27.16
Institutes of National Importance	529	182.25	527	234.75	721	228.72	772	407.41
National Laboratories	643	332.35	633	366.80	480	279.56	628	271.61
Others	454	171.53	351	352.13	432	228.72	531	217.29
<b>Total</b>	<b>3781</b>	<b>1072.08</b>	<b>3515</b>	<b>1467.19</b>	<b>4804</b>	<b>1270.68</b>	<b>4828</b>	<b>1358.04</b>

**DISTRIBUTION OF EXTRAMURAL R&D PROJECTS BY TYPES OF INSTITUTES DURING 2009-10**

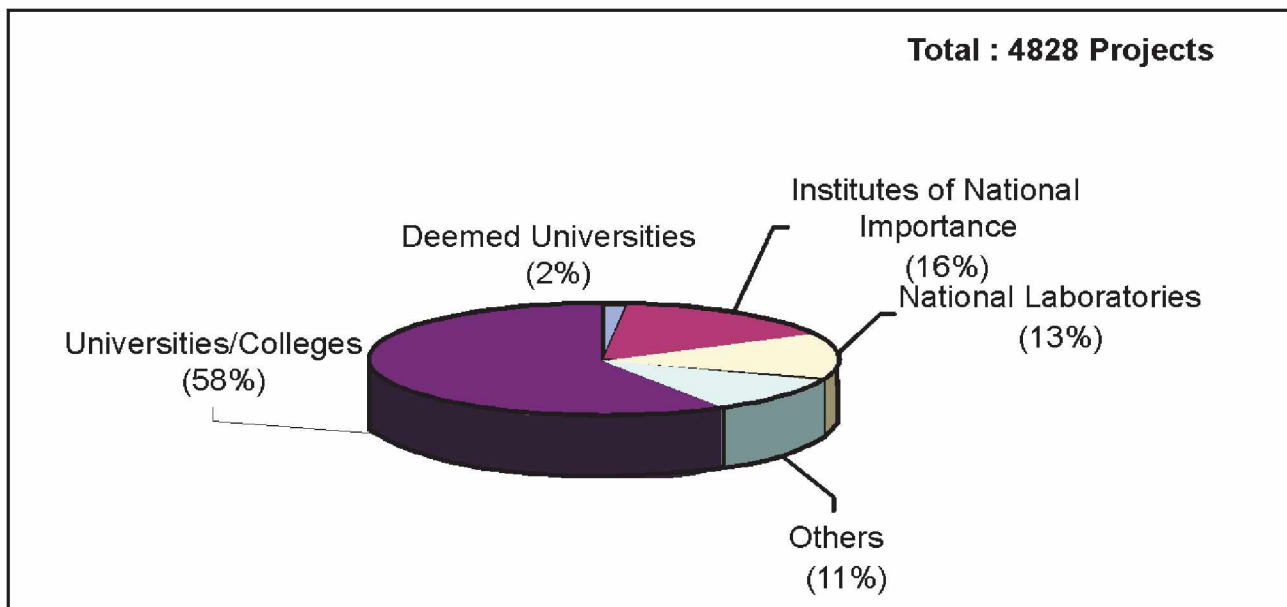


Table 8.4 gives information on state-wise support to extramural R&D projects. During 2009-10, 4828 projects were approved for funding by various sponsoring agencies. Nearly, 69% of the projects were received by the Institutes located in

seven states viz. Tamil Nadu, Karnataka, Uttar Pradesh, Delhi, Maharashtra, West Bengal, and Andhra Pradesh accounted for about 76% of total EMR funding.

**Table 8.4**

**STATE-WISE SUPPORT TO EXTRAMURAL R&D PROJECTS**

(Rs. Lakhs)

State	2006-07		2007-08		2008-09		2009-10	
	No. of Projects	Approved Cost	No. of Projects	Approved Cost	No. of Projects	Approved Cost	No. of Projects	Approved Cost
Andaman & Nicobar	1	18.00	5	109.18	9	144.49	4	600.59
Andhra Pradesh	237	6373.62	254	22386.24	323	10800.50	327	9019.17
Arunachal Pradesh	4	38.70	4	128.66	15	592.84	11	161.26
Assam	114	1872.58	105	2674.15	272	3230.95	200	2711.43
Bihar	12	123.72	14	187.13	29	391.17	17	273.31
Chandigarh	101	1771.00	78	1501.65	82	2145.91	92	1910.44
Chhattisgarh	14	169.68	9	137.05	16	380.17	9	297.55
Delhi	482	19469.17	428	18068.09	514	16910.51	503	20027.42
Goa	19	241.49	25	375.51	28	287.38	22	420.36
Gujarat	81	2692.28	88	3192.09	121	2040.56	96	2736.33
Haryana	53	2674.60	46	1341.61	56	2624.63	71	1306.64
Himachal Pradesh	46	697.22	26	710.28	28	714.10	26	532.99
Jammu & Kashmir	25	526.01	25	857.72	40	684.80	42	712.52
Jharkhand	35	1251.67	55	14192.25	50	1318.79	67	1935.04

State	2006-07		2007-08		2008-09		2009-10	
	No. of Projects	Approved Cost	No. of Projects	Approved Cost	No. of Projects	Approved Cost	No. of Projects	Approved Cost
Karnataka	343	11950.14	300	13248.76	370	14317.07	515	15082.04
Kerala	145	2484.98	103	3731.79	137	5958.48	247	6444.57
Madhya Pradesh	59	688.23	51	638.21	60	845.02	65	1118.56
Maharashtra	382	13277.37	350	14850.23	674	20253.53	424	15355.66
Manipur	14	222.64	15	296.77	54	493.90	44	752.74
Meghalaya	16	366.12	18	633.22	18	672.44	14	465.92
Mizoram	4	148.67	8	155.16	19	115.58	12	116.18
Nagaland	4	49.00	3	154.09	6	489.47	3	104.25
Orissa	54	949.56	62	1055.55	75	1346.37	99	2462.48
Puducherry	33	574.72	29	464.88	19	265.71	30	412.91
Punjab	68	2734.71	83	1305.47	101	1619.12	115	2881.71
Rajasthan	84	1414.14	63	1222.28	126	2038.11	90	1786.82
Sikkim	3	30.11	15	503.93	21	292.07	5	48.27
Tamil Nadu	506	14442.80	474	15302.36	661	16328.89	673	16819.05
Tripura	5	53.69	6	204.04	27	321.06	12	50.59
Uttar Pradesh	382	10574.37	340	9209.15	407	8516.94	506	12539.86
Uttarakhand	81	2081.80	73	5474.30	96	1665.27	124	2120.26
West Bengal	374	7245.18	360	12406.87	350	9261.76	363	14597.06
<b>Total</b>	<b>3781</b>	<b>107207.97</b>	<b>3515</b>	<b>146718.67</b>	<b>4804</b>	<b>127067.59</b>	<b>4828</b>	<b>135803.98</b>

Note: States and Union Territories not receiving EMR support are not mentioned.

In addition to extramural mode, R&D projects are also carried out by the National Laboratories, Universities/Colleges, Public and Private Sector Industries and other research organisations out of the annual grants received by them. This is known as in-house or intramural R&D.

The expenditure on intramural projects constitutes the major component of the national R&D expenditure. The total national R&D expenditure reported in this document comprises both intramural and extramural R&D projects. Share of extramural R&D expenditure in national R&D expenditure for 2009-10 was 2.6%.

**To sum up, the salient features are as under:**

- The extramural R&D support has shown an increasing trend over the past ten years with a compound annual growth rate of 18.86%. It has reached a level of Rs.1358.04 Crores in 2009-10.
- The Department of Science & Technology (DST) (33%) and the Department of Biotechnology (DBT) (15.8%) were the two departments playing a major role in extramural R&D funding.
- R&D support to the academic sector through extramural projects was 64.0% during 2009-10.
- Support to national laboratories was of the order of 20.0% during 2009-10.
- The share of extramural R&D funding in total National R&D expenditure for 2009-10 was 2.6%.

# **Science and Technology (S&T) Indicators Tables**





# **Science and Technology (S&T) Indicators Tables**



**Table 1**

**NATIONAL EXPENDITURE ON RESEARCH AND DEVELOPMENT BY SECTOR**

(Rs. Crores)

Sector	1970-71	1975-76	1980-81	1985-86	1990-91	1995-96	2001-02	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11*	2011-12*
Central Sector	112.47	287.63	580.49	1654.06	3058.27	5199.79	11536.33	15079.95	17872.02	19551.80	21898.88	27513.88	31670.54	36737.25	42614.53
State Sector	12.58	26.73	59.34	162.78	365.92	657.02	1494.33	1941.53	2334.60	2757.79	2951.80	3562.54	3865.24	4435.91	5090.84
Private Sector	14.59	42.35	120.69	251.94	549.98	1627.07	3292.69	6038.96	8471.95	10485.58	12926.14	14365.40	15305.55	18332.88	21965.31
Higher Education Sector							714.80	1056.80	1254.01	1443.21	1660.96	1911.56	2199.97	2547.43	2949.76
<b>Total</b>	<b>139.64</b>	<b>356.71</b>	<b>760.52</b>	<b>2068.78</b>	<b>3974.17</b>	<b>7483.88</b>	<b>17038.15</b>	<b>24117.24</b>	<b>29932.58</b>	<b>34238.39</b>	<b>39437.77</b>	<b>47353.38</b>	<b>53041.30</b>	<b>62053.47</b>	<b>72620.44</b>

Source : Data collected and compiled by DST.

: Private in-house R&D units includes data taken from CMIE database, DSIR records and annual report of industries.

Note : 1. \*Estimated

2. Central Sector data includes 117 R&D units of Public Sector/Joint Sector companies.

3. State Sector includes R&D expenditure of State Agricultural Universities and other state departments/organisations.

4. The number of R&D units in the Private Sector varies from year to year as per DSIR recognition and estimation from other sources.

5. Private Sector industries data for the year 2003-04 onwards comprised of R&D units/firms recognised by DSIR and industries /multi-national companies from CMIE database not registered with DSIR.

6. Data refers to 1746 in-house Private R&D units which include 348 SIRO units, and projected data for 65 SIRO units.

7. Based on the NSTMIS sponsored study, the projected R&D Expenditure of 10584 MSME units amounting to Rs. 214.06 crores, Rs. 223.24 crores, Rs. 232.82 crores, Rs. 234.81 crores & Rs. 252.36 crores for the year 2005-06, 2006-07, 2007-08, 2008-09 & 2009-10 respectively has been added to private sector R&D expenditure.

8. The projected expenditure for MSME's amounting to Rs. 262.74 crores and Rs. 273.54 crores for the year 2010-11 and 2011-12 has been added to private sector.

9. Data for the year 2010-11 and 2011-12 has been estimated by applying the rate of growth for the period 2004-05 to 2009-10 sector-wise.

10. Higher Education Sector includes data from 106 universities and 27 PG colleges doing R&D but excludes R&D expenditure of State Agricultural Universities & extramural project funding of central funding agencies. Data for the year 2006-07 to 2011-12 has been estimated by applying the rate of growth for the previous five years.

11. Central Sector = Central Government Ministries/Department + Public Sector/Joint Sector Industries

**Table 2**

**NATIONAL EXPENDITURE ON R&D IN RELATION TO GNP/GDP**

Year	R&D Expenditure at current prices (Rs. Crores)	GNP at current prices (Rs. Crores)	GDP at current prices (Rs. Crores)	R&D as % of GNP	R&D as % of GDP
1990-91	3974.17	524268	531814	0.76	0.75
1995-96	7483.88	1105102	1118586	0.68	0.67
1996-97	8913.61	1288706	1301788	0.69	0.68
1997-98	10611.34	1434408	1447613	0.74	0.73
1998-99	12473.17	1653771	1668739	0.75	0.75
1999-00	14397.60	1831842	1847273	0.79	0.78
2000-01	16198.80	1969249	1991982	0.82	0.81
2001-02	17038.15	2147677	2167745	0.79	0.79
2002-03	18088.16	2321510	2338200	0.78	0.77
2003-04	20086.34	2601508	2622216	0.77	0.77
2004-05	24117.24	2949089	2971464	0.82	0.81
2005-06	29932.58	3364387	3390503	0.89	0.88
2006-07	34238.39	3920042	3953276	0.87	0.87
2007-08	39437.77	4561574	4582086	0.86	0.86
2008-09	47353.38	5270644	5303567	0.90	0.89
2009-10	53041.30	6053585	6091485	0.88	0.87
2010-11	62053.47 *	7078512 @	7157412 @	0.88	0.87
2011-12	72620.44 *	8198276 #	8279975 #	0.89	0.88

Source : (i) Data on R&D expenditure collected and compiled by DST.

(ii) Data on GNP & GDP - Economic Survey, 2011-12.

- Note : 1. GNP : Gross National Product.  
 2. GDP : Gross Domestic Product.  
 3. R&D : Research & Development.  
 4. GNP/GDP figures are based on 2004-05 series.  
 5. R&D/GNP & R&D/GDP ratio have been revised as per the New Series GNP/GDP figures.  
 6. \* Estimated  
 7. @ Quick estimates.  
 8. # Advance estimates.

**Table 3****NATIONAL EXPENDITURE ON RESEARCH & DEVELOPMENT AT CURRENT AND CONSTANT PRICES****(Rs. Crores)**

Year	National Expenditure on Research and Development	
	Current Prices	Constant Prices (Base: 2004-05)
1985-86	2068.78	7980.96
1986-87	2435.40	8792.89
1987-88	2853.07	9406.71
1988-89	3347.26	10198.12
1989-90	3725.74	10469.28
1990-91	3974.17	10089.84
1991-92	4512.81	10092.32
1992-93	5004.60	10287.86
1993-94	6073.02	11350.07
1994-95	6622.44	11267.64
1995-96	7483.88	11648.51
1996-97	8913.61	12860.73
1997-98	10611.34	14375.30
1998-99	12473.17	15636.16
1999-00	14397.60	17526.19
2000-01	16198.80	19075.59
2001-02	17038.15	19441.97
2002-03	18088.16	19881.93
2003-04	20086.34	21287.83
2004-05	24117.24	24117.24
2005-06	29932.58	28720.73
2006-07	34238.39	30874.04
2007-08	39437.77	33540.43
2008-09	47353.38	37135.00
2009-10	53041.30	39253.37
2010-11	62053.47 *	42369.85 @
2011-12	72620.44 *	45809.55 #

Source : Data collected and compiled by DST.

- Note : 1. For working out Research and Development Expenditure at Constant Prices (Base year 2004-05), Economic Survey 2011-12 has been used.
2. \* Estimated
3. @Quick estimates.
4. # Advance estimates.



Table 4

## EXPENDITURE ON RESEARCH &amp; DEVELOPMENT BY MAJOR SCIENTIFIC AGENCIES

Agency / Year	(Rs. Crores)									
	1970-71	1980-81	1990-91	1995-96	2000-01	2005-06	2006-07	2007-08	2008-09	2009-10
Council of Scientific & Industrial Research	21.56	69.00	249.19	411.70	864.12	1427.04	1457.46	1863.70	2355.20	2666.44
Defence Research & Development Organization	17.55	79.70	681.00	1395.40	3359.32	5283.35	5362.82	6104.55	7699.07	8475.38
Department of Atomic Energy	28.72	73.48	275.54	486.64	1005.52	1752.50	2060.09	2138.57	2982.50	3858.21
Department of Biotechnology	-	-	41.37	73.83	120.58	325.85	432.32	491.59	635.23	727.38
Ministry of Communication & Information Tech. (DIT)	-	5.41	33.03	36.38	51.07	167.85	199.18	236.22	243.04	327.96
Ministry of New and Renewable Energy	-	4.00	16.02	6.98	12.27	9.62	16.12	23.53	16.83	26.51
Ministry of Earth Sciences *	-	-	27.80	45.64	84.23	235.48	256.55	292.98	271.76	448.24
Department of Science & Technology	0.84	40.64	119.82	223.67	311.46	1237.05	1359.46	1676.01	1991.16	2222.90
Department of Space	0.00	56.02	386.22	917.88	1905.40	2667.60	2988.67	3278.00	3493.57	4162.96
Indian Council of Agricultural Research	18.37	97.45	276.25	432.37	1161.74	1717.27	2014.16	1992.38	2583.80	2881.30
Indian Council of Medical Research	2.18	9.00	44.54	50.61	149.12	331.00	394.00	266.65	564.18	583.50
Ministry of Environment & Forests	-	3.74	162.09	244.60	272.86	235.31	275.71	311.21	376.13	415.57
<b>Total</b>	<b>89.21</b>	<b>438.43</b>	<b>2312.88</b>	<b>4325.69</b>	<b>9297.68</b>	<b>15389.94</b>	<b>16816.54</b>	<b>18675.40</b>	<b>23212.46</b>	<b>26796.35</b>

Source : Data collected and compiled by DST.

Note : 1. Not including Public Sector Research and Development Expenditure.

2. - Department did not exist during this period.

3. \* Formerly Department of Ocean Development.

4. Data includes both Plan & Non-Plan R&D Expenditure.

**Table 5**

**EXPENDITURE ON RESEARCH AND DEVELOPMENT BY CENTRAL MINISTRIES/  
DEPARTMENTS OTHER THAN MAJOR SCIENTIFIC AGENCIES**

(Rs. Crores)

S. No.	Ministry/Departments	Research and Development Expenditure				
		2005-06	2006-07	2007-08	2008-09	2009-10
1.	Agriculture and Cooperation	20.12	24.83	26.60	37.07	39.43
2.	Animal Husbandry and Dairying	27.29	27.22	28.53	38.54	49.95
3.	Chemicals and Petrochemicals	14.14	29.19	16.51	25.78	30.29
4.	Civil Aviation	2.16	2.35	2.43	3.32	10.05
5.	Coal	46.48	31.00	46.76	42.65	62.25
6.	Commerce	45.24	47.75	49.95	77.93	75.13
7.	Consumer Affairs	3.33	3.28	3.53	5.60	7.36
8.	Culture	64.56	64.65	71.84	97.93	114.26
9.	Defence *	16.06	17.67	19.43	21.38	23.51
10.	Defence Production and Supplies	583.22	664.98	753.29	916.11	980.27
11.	Fertilizers	14.45	6.05	6.14	3.06	3.72
12.	Food and Public Distribution	8.62	8.59	8.66	10.85	14.43
13.	Food Processing Industries	1.26	1.31	1.95	5.10	7.43
14.	Health and Family Welfare	241.29	258.07	269.82	370.35	443.26
15.	Heavy Industry and Public Enterprises	231.69	323.83	545.08	805.31	952.05
16.	Home Affairs	11.57	10.53	11.25	18.90	22.82
17.	Human Resource Development	138.05	162.80	176.87	274.74	221.11
18.	Industrial Policy and Promotion	73.27	67.24	73.26	93.97	130.41
19.	Information and Broadcasting	0.39	0.45	0.15	0.15	0.12
20.	Labour	0.66	0.80	1.09	1.90	1.70
21.	Micro, Small and Medium Enterprises	19.80	19.55	24.17	25.93	27.27
22.	Mines	21.06	17.64	18.80	32.73	41.73
23.	Petroleum and Natural Gas	269.22	258.32	359.56	481.73	610.07
24.	Pharmaceutical	11.50	21.18	17.63	23.04	31.03
25.	Power	25.18	25.38	22.69	38.27	66.73
26.	Railways	52.11	74.94	70.22	97.29	132.69
27.	Road, Transport and Highways	4.75	5.86	5.61	9.02	12.08
28.	Rural Development	13.07	9.60	10.89	16.92	26.25
29.	Shipping	7.92	5.11	6.28	9.16	9.05
30.	Social Justice and Empowerment	21.84	22.70	27.05	28.66	29.55
31.	Statistics and Program Implementation	27.72	30.52	38.67	46.38	67.24
32.	Steel	81.52	101.50	136.26	163.26	141.60
33.	Telecommunications	159.80	159.36	135.84	162.25	134.05
34.	Textiles	94.08	88.64	103.41	145.75	163.31
35.	Urban Development	6.47	9.09	7.71	7.08	9.46
36.	Water Resources	40.91	40.57	46.29	65.43	77.08
37.	Public Sector under Major Scientific Agencies	51.73	57.66	41.27	51.47	54.42
38.	Joint Sector including State Undertaking	29.21	34.48	36.55	45.61	50.98
	<b>Total</b>	<b>2481.73</b>	<b>2734.66</b>	<b>3222.06</b>	<b>4300.60</b>	<b>4874.17</b>

Source: Data collected and compiled by DST.

Note : 1. NIPER shifted to Department of Pharmaceuticals from Department of Chemicals & Petrochemicals.

2. Maruti Udyog Ltd. shifted to Private Sector from Department of Heavy Industry & Public Enterprises.

3. \* Estimated based on previous data.

4. Data includes both Plan & Non-Plan R&D expenditure

**Table 6****EXPENDITURE ON RESEARCH AND DEVELOPMENT BY STATE GOVERNMENTS****(Rs. Crores)**

S. No.	State	Research and Development Expenditure				
		2005-06	2006-07	2007-08	2008-09	2009-10
1.	Andhra Pradesh	146.30	154.30	162.82	263.18	272.32
2.	Assam	77.37	108.35	113.16	151.63	144.63
3.	Bihar	39.69	41.67	43.76	45.95	48.24
4.	Chhattisgarh	28.70	39.58	29.18	29.00	30.19
5.	Gujarat	208.11	260.42	273.39	389.59	472.40
6.	Haryana	117.93	126.52	134.87	141.18	148.24
7.	Himachal Pradesh	90.11	103.65	96.53	111.92	131.46
8.	Jammu & Kashmir	98.89	125.49	100.16	87.77	100.57
9.	Jharkhand	61.99	68.18	64.62	62.00	60.07
10.	Karnataka	200.44	243.23	375.92	428.39	334.09
11.	Kerala	115.83	127.30	105.21	145.30	153.25
12.	Madhya Pradesh	98.39	111.47	103.54	119.96	125.95
13.	Maharashtra	271.43	324.45	317.28	374.01	413.87
14.	Manipur	27.39	40.70	34.43	44.94	83.08
15.	Meghalaya	2.42	2.90	3.45	3.63	5.33
16.	Orissa	26.21	63.17	61.56	75.18	96.15
17.	Punjab	162.90	186.91	187.43	226.86	268.42
18.	Rajasthan	95.16	108.54	107.96	142.18	161.36
19.	Tamil Nadu	144.26	150.52	191.30	229.57	281.60
20.	Uttar Pradesh	130.23	147.60	178.69	205.14	234.28
21.	Uttarakhand	116.18	126.92	158.67	165.05	161.08
22.	West Bengal	74.66	95.91	107.87	120.13	138.66
	<b>Total</b>	<b>2334.60</b>	<b>2757.79</b>	<b>2951.80</b>	<b>3562.54</b>	<b>3865.24</b>

Source : Data collected and compiled by DST.

Note : 1. Research &amp; Development Expenditure figures are based on survey response.

2. States/Union Territories with no R&amp;D Expenditure or R&amp;D Units are not shown in this Table.

**Table 7****EXPENDITURE ON RESEARCH & DEVELOPMENT BY COOPERATIVE  
RESEARCH ASSOCIATIONS****(Rs.Crores)**

S.No.	Name	2005-06	2006-07	2007-08	2008-09	2009-10
1.	Ahmedabad Textile Industry's Research Association	4.11	5.19	6.00	4.79	4.65
2.	The Automotive Research Association of India	63.35	54.34	66.04	90.76	93.31
3.	The Bombay Textiles Research Association	2.74	2.68	3.35	4.00	4.24
4.	Electrical Research & Development Association	7.50	10.81	14.71	21.02	29.70
5.	Indian Jute Industries Research Association	3.48	2.88	2.39	6.29	4.82
6.	Indian Rubber Manufacturing Research Association	1.02	1.28	1.43	1.71	2.29
7.	Man Made Textiles Research Association	1.30	0.98	1.50	4.40	1.58
8.	Northern India Textile Research Association	4.31	5.56	4.31	5.21	6.71
9.	Petroleum Conservation Research Association *	1.30	3.65	3.76	1.61	1.21
10.	The South Indian Textiles Industry's Research Association	3.68	3.67	3.43	5.99	4.72
11.	Tea Research Association	9.04	9.57	13.14	21.92	18.75
12.	The Synthetic & Art Silk Mills Research Association	3.35	3.32	3.43	4.99	6.52
13.	Wool Research Association	0.88	0.74	0.94	1.25	1.70
	<b>Total</b>	<b>106.05</b>	<b>104.68</b>	<b>124.42</b>	<b>173.93</b>	<b>180.21</b>

Source : Data collected and compiled by DST.

Note : \* Extramural research supported by PCRA.



**Table 8**

**SCIENCE & TECHNOLOGY EXPENDITURE BY TYPE OF WORK BY CENTRAL AND STATE GOVERNMENTS**

(Rs. Crores)

Year	CENTRAL GOVERNMENT					STATE GOVERNMENTS					TOTAL				
	Basic Research	Applied Research	Experimental Development	Other Related S&T Activities	Total S&T	Basic Research	Applied Research	Experimental Development	Other Related S&T Activities	Total S&T	Basic Research	Applied Research	Experimental Development	Other Related S&T Activities	Total S&T
1996-97	1052.78	2173.63	1988.65	478.52	5693.57	114.39	510.62	230.06	197.44	1052.51	1167.17	2684.25	2218.71	675.96	6746.08
1997-98	1295.01	2649.09	2401.46	628.20	6973.76	124.02	553.43	249.30	217.49	1144.24	1419.03	3202.53	2650.75	845.69	8118.00
1998-99	1544.26	3341.59	2852.44	346.85	8085.14	126.83	579.00	335.58	278.65	1320.05	1671.09	3920.59	3188.02	625.50	9405.19
1999-00	1809.75	3916.07	3342.82	406.48	9475.12	156.03	711.85	422.01	339.08	1628.97	1965.78	4627.92	3764.83	745.57	11104.09
2000-01	2036.98	4407.77	3762.55	457.52	10664.83	191.18	866.22	516.92	398.94	1973.27	2228.17	5273.99	4279.47	856.47	12638.10
2001-02	2149.07	4650.31	3969.58	482.70	11251.66	181.99	820.37	491.97	375.30	1869.63	2331.06	5470.68	4461.56	857.99	13121.28
2002-03	3294.41	4078.91	3799.78	509.78	11682.88	236.57	796.00	555.58	338.16	1926.32	3530.98	4874.91	4355.36	847.94	13609.20
2003-04	3455.03	4362.48	4126.15	520.99	12464.64	251.35	850.85	587.57	365.60	2055.38	3706.38	5213.33	4713.72	886.59	14520.02
2004-05	4205.89	5005.79	4610.38	621.60	14443.68	309.92	966.50	665.11	421.86	2363.39	4515.81	5972.29	5275.50	1043.46	16807.06
2005-06	4330.03	5542.20	6712.59	873.50	17458.32	393.90	1231.53	709.17	645.73	2980.33	4723.93	6773.73	7421.76	1519.23	20438.65
2006-07	4869.45	6007.12	7209.83	983.88	19070.27	462.79	1463.13	831.88	762.14	3519.93	5332.24	7470.24	8041.71	1746.01	22590.20
2007-08	5395.64	6613.68	8012.30	1104.94	21126.56	479.89	1626.31	845.61	873.73	3825.53	5875.53	8239.99	8857.91	1978.66	24952.09
2008-09	6860.10	8480.38	9716.38	1363.73	26420.59	583.35	1951.80	1027.38	1061.57	4624.11	7443.46	10432.19	10743.76	2425.30	31044.70
2009-10	7805.63	9735.74	11314.61	1578.63	30434.62	656.76	2084.85	1123.63	1128.24	4993.48	8462.39	11820.59	12438.24	2706.88	35428.09

Source : Data collected and compiled by DST.

Note : 1. R&D : Research and Development = Basic Research + Applied Research + Experimental Development.

2. S&T : Science and Technology = R&D + Other related S&T activities.

3. S&T Expenditure by type of work excludes data of in-house R&D units of Public, Private Sector Industries, Scientific and Industrial Research Organisations & Higher Education Sector.



**Table 9**

**EXPENDITURE ON RESEARCH AND DEVELOPMENT BY OBJECTIVES (2005-06 TO 2009-10)**

(Rs. Crores)

Sl. No.	OBJECTIVE	Central Government		State Governments		Public Sector		Private Sector		Total	
		2005-06	2006-07	2005-06	2006-07	2005-06	2006-07	2005-06	2006-07	2005-06	2006-07
1	Agricultural Production and Technology	1917.09	2206.76	2182.50	2582.04	9.75	5.01	414.42	468.44	4523.76	5262.24
2	Control & Care of the Environment	230.40	268.24	19.42	18.97	0.00	0.00	104.06	142.39	353.88	429.59
3	Defence	5299.41	5380.49	0.00	0.00	583.22	664.98	121.79	128.94	6004.42	6174.41
4	Exploration and Exploitation of Space	2734.11	3078.90	0.00	0.00	0.00	0.00	9.31	19.74	2743.42	3098.64
5	Exploration and Exploitation of the Earth	416.01	455.31	28.15	29.77	300.25	281.44	22.08	15.81	766.49	782.33
6	Industrial Production and Technology	1299.81	1244.58	42.50	52.45	319.82	447.60	1802.23	2096.14	3464.37	3840.77
7	Infrastructure and General Planning of Land Use	265.85	325.96	3.83	3.75	56.19	44.52	2167.60	3008.13	2493.47	3382.37
8	Non-oriented Research (Basic Research)	3010.37	3361.14	23.44	32.39	0.02	0.01	153.76	163.87	3187.59	3557.41
9	Production, Distribution and Rational Utilisation of Energy	1558.96	1805.23	1.33	1.33	16.41	19.67	178.00	225.48	1754.69	2051.71
10	Protection and Improvement of Human Health	968.15	1248.32	32.93	36.47	1.55	2.18	3120.31	3813.90	4122.94	5100.86
11	Social Structures and Relationships (Including Socio Economic Services)	78.98	89.02	0.48	0.62	0.00	0.00	66.65	73.30	146.11	162.94
12	Other Aims	59.69	65.66	0.00	0.00	0.00	0.00	97.68	106.22	157.36	171.88
	<b>Total</b>	<b>17838.83</b>	<b>19529.61</b>	<b>2334.60</b>	<b>2757.79</b>	<b>1287.20</b>	<b>1465.41</b>	<b>8257.89</b>	<b>10262.34</b>	<b>29718.52</b>	<b>34015.15</b>

**Table 9 (Contd.)**

**EXPENDITURE ON RESEARCH AND DEVELOPMENT BY OBJECTIVES (2005-06 TO 2009-10)**

(Rs. Crores)

Sl. No.	OBJECTIVE	Central Government		State Governments		Public Sector		Private Sector		Total	
		2007-08	2008-09	2007-08	2008-09	2007-08	2008-09	2007-08	2008-09	2007-08	2008-09
		1.	2205.78	2900.13	2727.31	3350.56	4.62	6.33	667.34	771.47	5605.05
2.	301.15	363.05	20.49	21.50	0.00	0.00	173.64	150.38	495.27	534.93	
3.	6123.98	7720.45	0.00	0.00	753.29	916.11	138.86	183.61	7016.14	8820.16	
4.	3400.13	3644.08	0.00	0.00	0.00	0.00	10.11	19.27	3410.24	3663.35	
5.	564.93	596.38	35.43	28.94	395.62	534.78	247.66	222.35	1243.64	1382.45	
6.	1494.67	1894.00	62.95	65.76	672.15	940.14	2385.93	2613.04	4615.69	5512.94	
7.	359.23	413.99	4.06	4.61	26.87	28.98	3759.16	4068.83	4149.32	4516.42	
8.	3863.14	4864.52	55.54	37.59	0.03	0.04	218.91	275.90	4137.64	5178.04	
9.	1917.19	2563.70	1.31	1.74	21.78	27.45	266.55	293.29	2206.82	2886.18	
10.	1270.59	1773.25	44.11	51.24	2.89	3.20	4600.37	5278.53	5917.96	7106.22	
11.	118.40	144.68	0.61	0.60	0.00	0.00	84.50	108.82	203.51	254.10	
12.	63.38	90.20	0.00	0.00	0.00	0.00	140.30	145.09	203.68	235.29	
<b>Total</b>		<b>21682.58</b>	<b>26968.42</b>	<b>2951.80</b>	<b>3562.54</b>	<b>1877.25</b>	<b>2457.02</b>	<b>12693.32</b>	<b>14130.59</b>	<b>39204.96</b>	<b>47118.57</b>

Table 9 (Contd.)

## EXPENDITURE ON RESEARCH AND DEVELOPMENT BY OBJECTIVES (2005-06 TO 2009-10)

Sl. No.	OBJECTIVE	Central Government	State Governments	Public Sector	Private Sector	Total
		2009-10	2009-10	2009-10	2009-10	2009-10
1	Agricultural Production and Technology	3239.00	3590.57	7.22	913.14	7749.93
2	Control & Care of the Environment	402.50	24.65	0.00	153.43	580.58
3	Defence	8498.89	0.00	980.27	227.04	9706.21
4	Exploration and Exploitation of Space	4312.10	0.00	0.00	20.48	4332.58
5	Exploration and Exploitation of the Earth	796.79	44.56	671.41	221.27	1734.02
6	Industrial Production and Technology	2082.37	79.87	1074.74	2621.06	5858.04
7	Infrastructure and General Planning of Land Use	553.41	5.44	25.76	4290.78	4875.39
8	Non-oriented Research (Basic Research)	5527.45	50.60	0.04	292.18	5870.26
9	Production, Distribution and Rational Utilisation of Energy	3419.23	2.56	52.25	344.28	3818.32
10	Protection and Improvement of Human Health	1952.08	66.37	2.88	5654.29	7675.62
11	Social Structures and Relationships (Including Socio Economic Services)	187.44	0.62	0.00	133.43	321.50
12	Other Aims	84.69	0.00	0.00	181.79	266.48
	<b>Total</b>	<b>31055.95</b>	<b>3865.24</b>	<b>2814.56</b>	<b>15053.19</b>	<b>52788.94</b>

Source : Data collected and compiled by DST.

Note : Central Government includes Higher Education.

: Private Sector includes Scientific & Industrial Research Organisations (SIRO)

: Objectives Standardised as per UNESCO Classification.

**Table 10**

**RESEARCH AND DEVELOPMENT EXPENDITURE, ADVERTISING EXPENDITURE, NEW PLANT AND MACHINERY EXPENDITURE VERSUS SALES TURNOVER IN PUBLIC AND PRIVATE SECTOR INDUSTRY**

Year	Research and Development Expenditure (Rs. Crores)		Advertising Expenditure (Rs. Crores)		New Plant and Machinery Expenditure (Rs. Crores)		Sales Turnover (Rs. Crores)		Research and Development Expenditure as % of Sales Turnover (%)		Advertising Expenditure as % of Sales Turnover (%)		New Plant and Machinery Expenditure as % of Sales Turnover (%)	
	Public Sector	Private Sector	Public Sector	Private Sector	Public Sector	Private Sector	Public Sector	Private Sector	Public Sector	Private Sector	Public Sector	Private Sector	Public Sector	Private Sector
<b>2005-06</b>	1287.20	7416.97	441.67	12666.53	20104.99	30191.87	700262.79	931528.48	0.18	0.80	0.06	1.36	2.87	3.24
<b>2006-07</b>	1465.41	9345.12	464.96	13963.98	28824.31	26088.82	834994.52	1180017.21	0.18	0.79	0.06	1.18	3.45	2.21
<b>2007-08</b>	1877.25	11564.86	476.83	16299.42	24375.75	31716.19	943483.02	1385984.95	0.20	0.83	0.05	1.18	2.58	2.29
<b>2008-09</b>	2457.02	12840.56	587.00	40060.93	30426.16	69477.40	1080907.03	1509958.76	0.23	0.85	0.05	2.65	2.81	4.60
<b>2009-10</b>	2814.56	13587.28	494.92	40608.83	49049.61	94878.61	1041362.59	1658749.34	0.27	0.82	0.05	2.45	4.71	5.72

Source : Data collected and compiled by DST.

- Note :
1. Data for Public Sector refers to 117 industrial R&D units.
  2. Estimated Public Sector R&D Expenditure for 2010-11 and 2011-12 is Rs.3306.47 crores and Rs.3884.35 crores respectively.
  3. Public Sector data for the year 2010-11 and 2011-12 has been estimated by applying the rate of growth for the period 2004-05 to 2009-10.
  4. Data for Private Sector refers to 1333 industrial R&D units.
  5. Private Sector data does not include SIRO units and MSME's.



**Table 11**

**EXPENDITURE ON RESEARCH AND DEVELOPMENT BY PUBLIC/JOINT SECTOR UNDERTAKINGS, 2009-10**

Ministry/Department/State	Public/Joint Sector Undertaking	R&D Expenditure (Rs. Lakhs)	R&D Expenditure as % of S.T.O.
Atomic Energy	Electronics Corporation of India Ltd.	3109.00	2.62
	Indian Rare Earth Ltd.	204.35	0.61
	Uranium Corporation of India Ltd.	109.52	0.21
Agriculture and Cooperation	Indian Farmers Fertiliser Coop. Ltd. (Consolidated)	47.73	0.01
Biotechnology	Bharat Immunologicals & Biologicals Corporation Ltd.	25.00	8.80
Chemicals and Petrochemicals	Hindustan Insecticides Ltd.	10.00	0.05
	Hindustan Organic Chemicals Ltd.	113.60	0.22
Coal	Central Mine Planning & Design Institute Ltd.	3743.37	8.19
	Neyveli Lignite Corporation Ltd.	866.74	0.18
	The Singareni Collieries Company Ltd.	514.92	0.07
Communication & Information Technology	CMC Ltd.	744.00	1.05
Defence Production and Supplies	BEML Ltd. (Formerly Bharat Earth Movers Ltd.)	9720.18	2.73
	Bharat Dynamics Ltd.	635.39	1.01
	Bharat Electronics Ltd.	31665.85	6.07
	Goa Shipyard Ltd.	326.95	0.38
	Hindustan Aeronautics Ltd. (Consolidated)	55445.03	9.53
	Mishra Dhatu Nigam Ltd.	234.02	0.63
Fertilizers	The Fertilisers & Chemicals Travancore Ltd.	48.39	0.02
	Rashtriya Chemicals & Fertilizers Ltd.	212.94	0.04
Heavy Industry	Bharat Heavy Plate & Vessels Ltd.	104.13	1.00
	Bharat Heavy Electricals Ltd.	82927.00	2.43
	Bharat Pumps & Compressore Ltd.	12.67	0.05
	Burn Standard Company Ltd.	17.00	0.00
	Cement Corporation of India Ltd.	3.12	0.01
	Heavy Engineering Corporation Ltd.	101.00	4.71
	Hindustan Cables Ltd.	60.00	16.67
	Hindustan Newsprint Ltd.	43.40	0.15
	Hindustan Paper Corporation Ltd.	879.87	1.02
	Hindustan Photofilm Ltd.	78.00	2.97
	Hindustan Salts Ltd.	2.08	0.11
	HMT Ltd. (Consolidated)	256.78	1.12
	Instrumentation Ltd.	28.62	0.11
	Nepa Ltd.	72.98	1.16
	Rajasthan Electronics & Instruments Ltd.	134.56	0.01
	Sambhar Salts Ltd.	3.93	0.42
Scooters India Ltd.	19.01	0.14	
Tyre Corporation of India Ltd.	15.00	2.84	
Micro Small Industries and Medium enterprises	The National Small Industries Corporation Ltd.	9.00	2.29



**Table 11 (Contd.)**

**EXPENDITURE ON RESEARCH AND DEVELOPMENT BY PUBLIC/JOINT SECTOR UNDERTAKINGS, 2009-10**

Ministry/Department/State	Public/Joint Sector Undertaking	R&D Expenditure (Rs. Lakhs)	R&D Expenditure as % of S.T.O.
Mines	Hindustan Copper Ltd.	825.00	0.58
	Hindustan Zinc Ltd.	675.00	0.08
	Mineral Exploration Corporation Ltd.	0.10	0.00
	National Aluminium Company Ltd.	266.79	0.05
Petroleum and Natural Gas	Balmer Lawrie & Company Ltd.	376.57	0.22
	Bharat Petroleum Corporation Ltd.	3697.99	0.03
	Engineers India Ltd.	1071.00	1.11
	GAIL India Ltd.	16.17	0.00
	Hindustan Petroleum Corporation Ltd. (Consolidated)	1857.14	0.01
	Indian Oil Corporation Ltd	25001.00	0.09
	Chennai Petroleum Corporation Ltd.	756.01	0.03
	Oil & Natural Gas Corporation Ltd.	25860.30	0.42
	Oil India Ltd.	2249.00	0.29
Pharmaceuticals	Bengal Chemicals & Pharmaceuticals Ltd.	10.00	0.10
	Hindustan Antibiotics Ltd.	126.48	1.07
	Karnataka Antibiotics & Pharmaceuticals Ltd.	45.66	0.21
Power	Power Grid Corporation of India Ltd.	429.00	0.06
	National Hydroelectric Power Corporation Ltd.	58.00	0.01
	National Thermal Power Corporation Ltd.	2200.00	0.04
Scientific & Industrial Research	Central Electronics Ltd.	1249.78	10.91
Shipping	Cochin Shipyard Ltd.	200.00	0.16
Social Justice & Empowerment	Artificial Limbs Manufacturing Corporation of India	55.64	0.88
Steel	Steel Authority of India Ltd. (Alloy Steel Plant)	69.00	0.06
	Bharat Refractories Ltd.	43.00	0.29
	Ferro Scrap Nigam Ltd.	4.44	0.03
	KIOCL Ltd.	21.25	0.02
	MOIL Ltd.	287.71	0.30
	MECON Ltd.	225.78	0.37
	NMDC Ltd.	1507.45	0.21
	Rashtriya Ispat Nigam Ltd.	1266.00	0.12
	Steel Authority of India Ltd.	10726.00	0.24
Telecommunications	ITI Ltd. (Consolidated)	2555.51	0.40
Textiles	National Textile Corporation Ltd. (Consolidated)	60.39	0.18
	The Lagan Jute Machinery Co. Ltd.	20.17	1.26
Gujarat	Gujarat Alkalies & Chemicals Ltd.	137.67	0.10
	Gujarat Insecticides Ltd.	32.71	0.24
	Gujarat Narmada Valley Fertilizers Company Ltd.	155.03	0.06
	Gujarat State Fertilizers & Chemicals Ltd.	1322.89	0.33

**Table 11 (Contd.)**

**EXPENDITURE ON RESEARCH AND DEVELOPMENT BY PUBLIC/JOINT SECTOR UNDERTAKINGS, 2009-10**

Ministry/Department/State	Public/Joint Sector Undertaking	R&D Expenditure (Rs. Lakhs)	R&D Expenditure as % of S.T.O.
Haryana	Haryana Leather Chemicals Ltd.	82.84	2.40
	Haryana State Electronics Development Corporation Ltd.	511.04	10.94
Karnataka	The Hutti Gold Mines Company Ltd.	7.85	0.02
	Karnataka Power Transmission Corporation Ltd.	89.00	0.10
	Karnataka Soaps & Detergents Ltd.	83.11	0.46
Kerala	Keltron Component Complex Ltd.	6.48	0.15
	Kerala Agro Machinery Corporation Ltd.	2.34	0.02
	Kerala Automobiles Ltd.	9.98	0.47
	Kerala Electrical Allied Engineering Company Ltd.	26.40	0.25
	The Kerala Minerals & Metals Ltd.	26.90	0.06
	Kerala State Drugs & Pharmaceuticals Ltd.	7.25	0.49
	Kerala State Electricity Board.	111.20	0.02
	Transformers & Electricals Kerala Ltd.	5.75	0.03
Maharashtra	Travancore Titanium Products Ltd.	126.51	1.05
	Haffkine Bio- Pharmaceutical Corp. Ltd.	27.73	0.16
Punjab	Maharashtra State Seeds Corporation Ltd.	24.88	0.07
	Punjab Chemicals & Crop Protection Ltd.	196.62	0.93
Tamil Nadu	Punjab Tractors Ltd. (Merged with Mahindra & Mahindra Ltd.)	1266.84	0.66
	Tamil Nadu Cooperative Sugar Federation Ltd.	3.57	4.46
	Tamil Nadu Generation & Distribution Corporation Ltd.	139.56	0.01
	Tamil Nadu Newsprint & Papers Ltd.	353.83	0.34
Uttar Pradesh	Tamil Nadu Petroproducts Ltd.	34.16	0.04
	Pradeshik Co- operative Dairy Federation Ltd.	18.70	0.04
West Bengal	Webel Electronic Communication Systems Ltd.	11.34	0.02
	Webel Mediatronics Ltd.	241.27	33.14
	WEBFIL Ltd.	34.12	1.51
	<b>Total</b>	<b>281456.03</b>	<b>0.27</b>

Source : Data collected and compiled by DST.

Note : 1. R&D - Research and Development

2. S.T.O. - Sales Turnover

**Table 12**

**EXPENDITURE ON RESEARCH AND DEVELOPMENT BY INDUSTRY GROUPS FOR  
PUBLIC SECTOR (2005-06 TO 2009-10)**

Sl. No.	Industry Group	No. of R&D Units	R&D Expenditure (Rs. Lakhs)		R&D Expenditure as % of S.T.O.	
			2005-06	2006-07	2005-06	2006-07
1	Agriculture & Agricultural Machinery	3	805.67	1192.51	0.64	0.93
2	Biotechnology	1	10.08	0.00	2.86	0.00
3	Boilers & Steam Generating Plants	0	0.00	0.00	0.00	0.00
4	Cement & Gypsum	1	0.08	0.00	0.0003	0.00
5	Ceramics	1	40.00	43.00	0.40	0.39
6	Chemicals (Other than Fertilizers)	11	591.07	582.09	0.19	0.17
7	Commercial Offices, Household Equipment	0	0.00	0.00	0.00	0.00
8	Consultancy Services	3	714.26	879.93	0.68	0.73
9	Defence Industries	12	58322.04	66497.76	6.75	6.11
10	Drugs and Pharmaceuticals	4	115.93	154.31	0.65	0.60
11	Dyestuffs	0	0.00	0.00	0.00	0.00
12	Earth Moving Machinery	0	0.00	0.00	0.00	0.00
13	Electricals and Electronics Equipment	16	4953.78	5615.22	0.08	0.08
14	Fermentation Industries	0	0.00	0.00	0.00	0.00
15	Fertilizers	7	1058.20	915.78	0.06	0.06
16	Food Processing Industries	1	45.78	4.96	0.11	0.03
17	Fuels	11	27025.48	25635.47	0.05	0.04
18	Glass	0	0.00	0.00	0.00	0.00
19	Glue & Gelatine	0	0.00	0.00	0.00	0.00
20	Industrial Instruments	0	0.00	0.00	0.00	0.00
21	Industrial Machinery	2	15310.89	25426.91	1.05	1.34
22	Information Technology	1	1181.00	1166.00	1.38	1.17
23	Leather, Leather Goods & Pickers	0	0.00	0.00	0.00	0.00
24	Machine Tools	4	528.45	232.25	1.84	0.83
25	Math. Surveying & Drawing Instruments	0	0.00	0.00	0.00	0.00
26	Medical and Surgical Appliances	1	28.68	63.49	0.47	1.10
27	Metallurgical Industries	16	11742.16	12528.16	0.20	0.17
28	Misc. Mechanical Engineering Industries	1	6.00	0.00	0.06	0.00
29	Papers and Pulps	4	371.12	544.67	0.33	0.43
30	Photographic Raw Film and Paper	1	68.00	74.00	4.65	5.07
31	Prime Movers	0	0.00	0.00	0.00	0.00
32	Rubber Goods	1	12.40	13.00	0.33	0.36
33	Scientific Instruments	1	26.46	35.13	0.12	0.15
34	Soaps, Cosmetics and Toilet Preparations	1	13.75	26.75	0.12	0.22
35	Sugar	1	3.41	2.30	5.25	3.33
36	Telecommunications	5	5610.67	4794.27	2.17	1.76
37	Textiles (Dyed, Printed, Processed)	3	54.69	63.34	0.17	0.20
38	Timber Products	0	0.00	0.00	0.00	0.00
39	Transportation	4	80.09	49.46	0.03	0.01
40	Vegetable Oil & Vanaspati	0	0.00	0.00	0.00	0.00
41	Miscellaneous Industries	0	0.00	0.00	0.00	0.00
<b>Total</b>		<b>117</b>	<b>128720.14</b>	<b>146540.76</b>	<b>0.18</b>	<b>0.18</b>



Table 12 (Contd.)

**EXPENDITURE ON RESEARCH AND DEVELOPMENT BY INDUSTRY GROUPS FOR PUBLIC SECTOR (2005-06 TO 2009-10)**

Sl. No.	Industry Group	No. of R&D Units	R&D Expenditure (Rs. Lakhs)		R&D Expenditure as % of S.T.O.	
			2007-08	2008-09	2007-08	2008-09
1	Agriculture & Agricultural Machinery	3	1057.42	1124.56	0.78	0.62
2	Biotechnology	1	30.00	30.00	2.11	4.42
3	Boilers & Steam Generating Plants	0	0.00	0.00	0.00	0.00
4	Cement & Gypsum	1	0.00	2.47	0.00	0.01
5	Ceramics	1	43.00	43.00	0.36	0.32
6	Chemicals (Other than Fertilizers)	11	524.01	680.48	0.14	0.17
7	Commercial Offices, Household Equipments	0	0.00	0.00	0.00	0.00
8	Consultancy Services	3	884.10	954.48	0.66	0.65
9	Defence Industries	12	75329.17	91610.55	6.80	6.80
10	Drugs and Pharmaceuticals	4	170.37	176.22	0.43	0.43
11	Dyestuffs	0	0.00	0.00	0.00	0.00
12	Earth Moving Machinery	0	0.00	0.00	0.00	0.00
13	Electricals and Electronics Equipment	16	4535.49	5883.81	0.06	0.07
14	Fermentation Industries	0	0.00	0.00	0.00	0.00
15	Fertilizers	7	996.84	1352.70	0.05	0.05
16	Food Processing Industries	1	3.34	28.12	0.01	0.04
17	Fuels	11	35930.14	48254.00	0.05	0.06
18	Glass	0	0.00	0.00	0.00	0.00
19	Glue & Gelatine	0	0.00	0.00	0.00	0.00
20	Industrial Instruments	0	0.00	0.00	0.00	0.00
21	Industrial Machinery	2	46399.01	69055.91	2.15	2.46
22	Information Technology	1	796.00	683.00	0.80	0.81
23	Leather, Leather Goods & Pickers	0	0.00	0.00	0.00	0.00
24	Machine Tools	4	258.63	313.06	1.07	1.41
25	Math. Surveying & Drawing Instruments	0	0.00	0.00	0.00	0.00
26	Medical and Surgical Appliances	1	88.50	113.80	1.85	1.92
27	Metallurgical Industries	16	16734.7	20301.32	0.20	0.23
28	Miscellaneous Industries	0	0.00	0.00	0.00	0.00
29	Papers and Pulps	4	346.72	928.94	0.14	0.38
30	Photographic Raw Film and Paper	1	71.00	76.00	4.14	0.03
31	Prime Movers	0	0.00	0.00	0.00	0.00
32	Rubber Goods	1	13.60	14.40	0.34	0.55
33	Scientific Instruments	1	33.59	25.68	0.14	0.10
34	Soaps, Cosmetics and Toilet Preparations	1	26.22	51.63	0.18	0.30
35	Sugar	1	14.31	0.63	20.44	1.85
36	Telecommunications	5	3216.98	3630.99	1.69	1.30
37	Textiles (Dyed, Printed, Processed)	3	80.36	91.97	0.25	0.32
38	Timber Products	0	0.00	0.00	0.00	0.00
39	Transportation	4	141.91	274.03	0.04	0.06
40	Vegetable Oil & Vanaspati	0	0.00	0.00	0.00	0.00
41	Misc. Mechanical Engineering Industries	1	0.00	0.00	0.00	0.00
<b>Total</b>		<b>117</b>	<b>187725.41</b>	<b>245701.75</b>	<b>0.20</b>	<b>0.23</b>

Table 12 (Contd.)

**EXPENDITURE ON RESEARCH AND DEVELOPMENT BY INDUSTRY GROUPS FOR PUBLIC SECTOR (2005-06 TO 2009-10)**

Sl. No.	Industry Group	No. of R&D Units	R&D Expenditure (Rs. Lakhs)	R&D Expenditure as % of S.T.O.
		R&D	2009-10	2009-10
1	Agriculture & Agricultural Machinery	3	1294.06	0.53
2	Biotechnology	1	25.00	8.80
3	Boilers & Steam Generating Plants	0	0.00	0.00
4	Cement & Gypsum	1	3.12	0.01
5	Ceramics	1	43.00	0.29
6	Chemicals (Other than Fertilizers)	11	750.12	0.20
7	Commercial Offices, Household Equipments	0	0.00	0.00
8	Consultancy Services	3	1305.78	0.83
9	Defence Industries	12	98027.42	5.95
10	Drugs and Pharmaceuticals	4	207.12	0.40
11	Dyestuffs	0	0.00	0.00
12	Earth Moving Machinery	0	0.00	0.00
13	Electricals and Electronics Equipment	16	7166.72	0.07
14	Fermentation Industries	0	0.00	0.00
15	Fertilizers	7	1786.98	0.08
16	Food Processing Industries	1	18.70	0.04
17	Fuels	11	61195.84	0.08
18	Glass	0	0.00	0.00
19	Glue & Gelatine	0	0.00	0.00
20	Industrial Instruments	0	0.00	0.00
21	Industrial Machinery	2	83031.13	2.42
22	Information Technology	1	744.00	1.05
23	Leather, Leather Goods & Pickers	0	0.00	0.00
24	Machine Tools	4	357.78	1.43
25	Math. Surveying & Drawing Instruments	0	0.00	0.00
26	Medical and Surgical Appliances	1	55.64	0.88
27	Metallurgical Industries	16	19740.73	0.24
28	Misc. Mechanical Engineering Industries	1	12.67	0.05
29	Papers and Pulps	4	1350.08	0.60
30	Photographic Raw Film and Paper	1	78.00	2.97
31	Prime Movers	0	0.00	0.00
32	Rubber Goods	1	15.00	2.84
33	Scientific Instruments	1	28.62	0.11
34	Soaps, Cosmetics and Toilet Preparations	1	83.11	0.46
35	Sugar	1	3.57	4.46
36	Telecommunications	5	3805.29	0.58
37	Textiles (Dyed, Printed, Processed)	3	80.56	0.23
38	Timber Products	0	0.00	0.00
39	Transportation	4	245.99	0.05
40	Vegetable Oil & Vanaspati	0	0.00	0.00
41	Miscellaneous Industries	0	0.00	0.00
	<b>Total</b>	<b>117</b>	<b>281456.03</b>	<b>0.27</b>

Source : Data collected and compiled by DST.

Note : S.T.O - Sales Turnover

: R&D - Research and Development

: Maruti Udyog Ltd. Shifted to Private Sector.

: Indian Petrochemicals Corporation Ltd. Shifted to Private Sector.



**Table 13**

**EXPENDITURE ON RESEARCH AND DEVELOPMENT BY INDUSTRY GROUPS FOR PRIVATE SECTOR (2005-06 to 2009-10)**

Sl. No.	Industry Group	No. of R&D Units	R&D Expenditure (Rs. Crores)		R&D Expenditure as % of S.T.O.	
			2005-06	2006-07	2005-06	2006-07
1	Agriculture & Agricultural Machinery	104	345.64	406.72	0.85	0.83
2	Biotechnology	76	179.70	353.28	3.45	3.85
3	Boilers & Steam Generating Plants	1	4.31	5.36	0.27	0.23
4	Cement & Gypsum	13	38.61	37.88	0.13	0.11
5	Ceramics	12	6.02	7.82	0.20	0.22
6	Chemicals (Other than Fertilizers)	192	411.32	664.77	0.20	0.27
7	Commercial Offices, Household Equipment	9	18.70	25.85	0.32	0.35
8	Consultancy Services	8	6.59	7.11	0.70	0.66
9	Defence Industries	11	7.71	6.22	0.37	0.26
10	Drugs and Pharmaceuticals	228	2605.68	3093.46	3.62	3.45
11	Dyestuffs	8	7.47	4.64	0.72	0.48
12	Earth Moving Machinery	8	16.57	25.08	0.36	0.39
13	Electricals and Electronics Equipment	142	307.91	358.66	0.42	0.35
14	Fermentation Industries	3	1.98	1.34	0.05	0.03
15	Fertilizers	7	8.04	14.88	0.13	0.20
16	Food Processing Industries	34	29.48	45.21	0.15	0.22
17	Fuels	9	11.25	12.76	0.02	0.02
18	Glass	1	0.00	0.03	0.00	0.00
19	Glue & Gelatine	5	1.79	2.07	0.14	0.17
20	Industrial Instruments	21	23.36	21.77	0.35	0.25
21	Industrial Machinery	26	59.61	96.30	0.27	0.35
22	Information Technology	27	1678.69	1970.43	7.58	5.47
23	Leather, Leather Goods & Pickers	3	6.37	6.14	0.49	0.41
24	Machine Tools	14	10.69	17.37	0.37	0.59
25	Math. Surveying & Drawing Instruments	0	0.00	0.00	0.00	0.00
26	Medical and Surgical Appliances	10	1.32	2.35	0.67	0.75
27	Metallurgical Industries	65	78.36	98.12	0.09	0.08
28	Misc. Mechanical Engineering Industries	33	77.71	85.09	0.60	0.57
29	Papers and Pulps	19	8.96	10.26	0.19	0.20
30	Photographic Raw Film and Paper	6	0.74	4.00	0.07	0.32
31	Prime Movers	5	66.46	62.15	1.41	0.96
32	Rubber Goods	27	36.67	50.25	0.12	0.15
33	Scientific Instruments	17	13.03	10.10	4.35	2.66
34	Soaps, Cosmetics and Toilet Preparations	9	64.70	84.49	0.45	0.54
35	Sugar	18	28.71	13.73	0.04	0.02
36	Telecommunications	35	67.59	92.53	0.65	0.46
37	Textiles (Dyed, Printed, Processed)	27	15.15	17.23	0.16	0.17
38	Timber Products	3	0.35	0.29	0.09	0.05
39	Transportation	89	1164.17	1622.64	1.10	1.26
40	Vegetable Oil & Vanaspati	3	4.23	5.02	0.26	0.20
41	Miscellaneous Industries	5	1.34	1.74	0.04	0.04
<b>Total</b>		<b>1333</b>	<b>7416.97</b>	<b>9345.12</b>	<b>0.80</b>	<b>0.79</b>

**Table 13 (Contd.)**

**EXPENDITURE ON RESEARCH AND DEVELOPMENT BY INDUSTRY GROUPS FOR  
PRIVATE SECTOR (2005-06 to 2009-10)**

Sl. No.	Industry Group	No. of R&D Units	R&D Expenditure (Rs. Crores)		R&D Expenditure as % of S.T.O.	
			2007-08	2008-09	2007-08	2008-09
1	Agriculture & Agricultural Machinery	104	644.54	760.21	1.16	1.22
2	Biotechnology	76	506.42	552.73	3.18	3.02
3	Boilers & Steam Generating Plants	1	4.24	6.88	0.12	0.20
4	Cement & Gypsum	13	42.56	68.47	0.10	0.15
5	Ceramics	12	9.52	10.30	0.23	0.21
6	Chemicals (Other than Fertilizers)	192	730.31	786.91	0.24	0.27
7	Commercial Offices, Household Equipment	9	31.31	40.06	0.34	0.38
8	Consultancy Services	8	8.77	11.22	0.65	0.69
9	Defence Industries	11	7.89	9.48	0.26	0.28
10	Drugs and Pharmaceuticals	228	3681.98	4268.31	3.61	3.45
11	Dyestuffs	8	4.73	4.65	0.40	0.36
12	Earth Moving Machinery	8	32.62	34.03	0.34	0.46
13	Electricals and Electronics Equipment	142	459.10	483.89	0.37	0.35
14	Fermentation Industries	3	3.29	3.43	0.05	0.04
15	Fertilizers	7	22.89	14.74	0.22	0.09
16	Food Processing Industries	34	48.72	58.09	0.21	0.21
17	Fuels	9	241.86	217.13	0.27	0.22
18	Glass	1	0.08	0.38	0.01	0.03
19	Glue & Gelatine	5	2.46	8.66	0.19	0.63
20	Industrial Instruments	21	31.44	29.16	0.30	0.29
21	Industrial Machinery	26	154.20	193.31	0.50	0.41
22	Information Technology	27	2026.61	1919.96	4.84	4.31
23	Leather, Leather Goods & Pickers	3	5.04	7.06	0.28	0.38
24	Machine Tools	14	13.87	19.90	0.38	0.65
25	Math. Surveying & Drawing Instruments	0	0.00	0.00	0.00	0.00
26	Medical and Surgical Appliances	10	5.01	4.32	1.11	0.78
27	Metallurgical Industries	65	124.83	136.89	0.07	0.07
28	Misc. Mechanical Engineering Industries	33	138.42	172.10	0.81	1.28
29	Papers and Pulps	19	11.62	10.45	0.21	0.18
30	Photographic Raw Film and Paper	6	5.27	5.70	0.38	0.37
31	Prime Movers	5	83.13	93.53	1.16	1.19
32	Rubber Goods	27	62.84	87.63	0.22	0.29
33	Scientific Instruments	17	9.90	20.44	2.19	4.08
34	Soaps, Cosmetics and Toilet Preparations	9	87.53	121.69	0.49	0.48
35	Sugar	18	29.01	24.13	0.05	0.03
36	Telecommunications	35	145.95	176.30	0.86	1.35
37	Textiles (Dyed, Printed, Processed)	27	23.07	20.98	0.21	0.17
38	Timber Products	3	0.53	0.60	0.07	0.06
39	Transportation	89	2114.82	2447.15	1.52	1.82
40	Vegetable Oil & Vanaspati	3	6.98	7.22	0.22	0.20
41	Miscellaneous Industries	5	1.50	2.46	0.03	0.03
<b>Total</b>		<b>1333</b>	<b>11564.86</b>	<b>12840.56</b>	<b>0.83</b>	<b>0.85</b>

**Table 13 (Contd.)**

**EXPENDITURE ON RESEARCH AND DEVELOPMENT BY INDUSTRY GROUPS FOR PRIVATE SECTOR (2005-06 to 2009-10)**

Sl. No.	Industry Group	No. of R&D Units	R&D Expenditure (Rs. Crores)	R&D Expenditure as % of S.T.O.
		R&D	2009-10	2009-10
1	Agriculture & Agricultural Machinery	104	886.14	1.20
2	Biotechnology	76	622.76	1.81
3	Boilers & Steam Generating Plants	1	11.23	0.34
4	Cement & Gypsum	13	63.34	0.13
5	Ceramics	12	14.11	0.25
6	Chemicals (Other than Fertilizers)	192	812.24	0.25
7	Commercial Offices, Household Equipment	9	46.01	0.40
8	Consultancy Services	8	11.08	0.60
9	Defence Industries	11	12.35	0.32
10	Drugs and Pharmaceuticals	228	4545.20	3.22
11	Dyestuffs	8	4.80	0.35
12	Earth Moving Machinery	8	47.39	0.55
13	Electricals and Electronics Equipment	142	528.65	0.32
14	Fermentation Industries	3	4.01	0.04
15	Fertilizers	7	26.36	0.19
16	Food Processing Industries	34	62.49	0.21
17	Fuels	9	216.60	0.21
18	Glass	1	0.12	0.01
19	Glue & Gelatine	5	10.21	0.70
20	Industrial Instruments	21	41.82	0.42
21	Industrial Machinery	26	164.02	0.28
22	Information Technology	27	2226.55	4.87
23	Leather, Leather Goods & Pickers	3	6.97	0.34
24	Machine Tools	14	14.48	0.74
25	Math. Surveying & Drawing Instruments	0	0.00	0.00
26	Medical and Surgical Appliances	10	5.85	0.93
27	Metallurgical Industries	65	135.18	0.07
28	Misc. Mechanical Engineering Industries	33	135.43	0.86
29	Papers and Pulps	19	10.78	0.18
30	Photographic Raw Film and Paper	6	5.94	0.34
31	Prime Movers	5	110.69	1.40
32	Rubber Goods	27	81.68	0.23
33	Scientific Instruments	17	15.32	2.83
34	Soaps, Cosmetics and Toilet Preparations	9	116.39	0.51
35	Sugar	18	64.09	0.09
36	Telecommunications	35	197.51	1.24
37	Textiles (Dyed, Printed, Processed)	27	26.83	0.21
38	Timber Products	3	0.39	0.04
39	Transportation	89	2290.59	1.37
40	Vegetable Oil & Vanaspati	3	9.13	0.23
41	Miscellaneous Industries	5	2.54	0.03
	<b>Total</b>	<b>1333</b>	<b>13587.28</b>	<b>0.82</b>

Source : Data collected and compiled by DST.

Note : S.T.O. - Sales Turn Over. : R&D - Research and Development



Table 14

## EXPENDITURE ON RESEARCH AND DEVELOPMENT BY INDUSTRY GROUPS FOR MSME'S

Sl. No.	Industry Group	NIC * Code	No. of R&D Units	R&D Expenditure (Rs. Crores)			R&D Expenditure as % of S.T.O.		
				2007-08	2008-09	2009-10	2007-08	2008-09	2009-10
1	Chemicals (Other than Fertilizers)	20	497	9.87	11.54	13.59	0.80	0.93	1.00
2	Commercial Offices, Household Equipment	26	1105	41.08	40.43	42.22	1.69	1.55	1.49
3	Drugs and Pharmaceuticals	21	672	15.76	17.45	19.46	1.03	1.03	0.99
4	Electricals and Electronics Equipment	27	813	12.82	12.98	12.20	0.75	0.65	0.53
5	Industrial Machinery	28	3375	80.90	81.21	92.70	1.19	1.12	1.17
6	Leather, Leather Goods & Pickers	15	693	15.22	13.51	15.17	0.98	0.80	0.90
7	Metallurgical Industries	25	1646	24.46	23.77	22.12	0.72	0.59	0.50
8	Other Manufacturing (Gems & Jewellery)	32	118	1.23	1.29	0.97	0.43	0.40	0.28
9	Papers and Pulp	17	83	1.35	1.74	2.11	0.68	0.71	0.76
10	Rubber Goods	22	83	1.38	1.81	1.58	0.79	0.90	0.69
11	Textiles (Dyed, Printed, Processed)	13	1436	28.08	28.65	29.47	1.81	1.64	1.70
12	Timber Products	16	63	0.64	0.47	0.77	0.40	0.23	0.38
	<b>Total</b>		<b>10584</b>	<b>232.79</b>	<b>234.85</b>	<b>252.35</b>	<b>1.03</b>	<b>0.95</b>	<b>0.94</b>

Source : NSTMIS - DST sponsored project.

Note : 1. Micro, Small & Medium Enterprises (MSME's) are defined in terms of investment in Plant & Machinery.

- Micro Enterprises investment does not exceed rupees twenty five lakh.

- Small Enterprises investment more than rupees twenty five lakh but does not exceed rupees five crore .

- Medium Enterprises investment more than rupees five crore but does not exceed rupees ten crore.

2. \* National Industrial classification, 2008.

Table 15

## NATIONAL R&amp;D EXPENDITURE IN RELATION TO ECONOMIC ACTIVITY

Economic Activity	2005-06	2006-07	2007-08	2008-09	2009-10
<b>(A) Agriculture, Forestry &amp; Fishing, Mining &amp; Quarrying (R&amp;D expenditure Rs. Crores)</b>					
GDP by industry of origin (at factor cost Rs. Crores)	4629.90	5387.33	5886.49	7304.69	8053.82
Ratio of R&D expenditure to GDP by industry of origin (%)	732234	829771	961330	1083032	1236765
<b>Overall GDP (at factor cost Rs. Crores)</b>	3390503	3953276	4582086	5303567	6091485
Ratio of R&D expenditure to overall GDP (%)	0.14	0.14	0.13	0.14	0.13
<b>(B) Manufacturing, Construction, Electricity Gas &amp; Water Supply (R&amp;D expenditure Rs. Crores)</b>					
GDP by industry of origin ( at factor cost Rs. Crores)	7362.32	9071.77	10807.52	13053.93	14983.39
Ratio of R&D expenditure to GDP by industry of origin (%)	859410	1033410	1205458	1360426	1521744
Ratio of R&D expenditure to overall GDP (%)	0.86	0.88	0.90	0.96	0.98
	0.22	0.23	0.24	0.25	0.25
<b>(C) Transport &amp; Communication (R&amp;D expenditure Rs. Crores)</b>					
GDP by industry of origin (at factor cost Rs. Crores)	3663.82	4487.52	5262.84	5739.23	6130.90
Ratio of R&D expenditure to GDP by industry of origin (%)	846606	998379	1150044	1310845	1485476
Ratio of R&D expenditure to overall GDP (%)	0.43	0.45	0.46	0.44	0.41
	0.11	0.11	0.11	0.11	0.10
<b>(D) Public Administration &amp; Defence and Other Services (R&amp;D expenditure Rs. Crores)</b>					
GDP by industry of origin (at factor cost Rs. Crores)	14269.81	15283.62	17471.03	21244.20	23859.78
Ratio of R&D expenditure to GDP by industry of origin (%)	459151	505121	573790	703895	885314
Ratio of R&D expenditure to overall GDP (%)	3.11	3.03	3.04	3.02	2.70
	0.42	0.39	0.38	0.40	0.39
<b>Total R&amp;D Expenditure Rs. Crores (A+B+C+D)</b>	29925.84	34230.24	39427.88	47342.04	53027.89
Ratio of R&D expenditure to overall GDP (%)	0.88	0.87	0.86	0.89	0.87

Source : 1. Data collected and compiled by DST.

2. GDP at factor cost and by industry of origin taken from Economic Survey 2011-12

Note : Projected Data of 10584 MSME units amounting to Rs. 214.06 crores, Rs. 223.24 crores, Rs. 232.82 crores, Rs. 234.81 crores & Rs. 253.36 crores for the year 2005-06, 2006-07, 2007-08, 2008-09 & 2009-10 respectively has been added to total R&D expenditure.



Table 16

### NATIONAL EXPENDITURE ON R&D BY SUB-SECTOR OF ECONOMIC ACTIVITY

(Rs. Crores)

Economic Activity	NIC Code	Research & Development Expenditure				
		2005-06	2006-07	2007-08	2008-09	2009-10
<b>(A) Agriculture, Forestry &amp; Fishing, Mining &amp; Quarrying</b>						
1. Agriculture, Hunting and Related Service Activities	01	3909.12	4611.77	4813.63	6050.56	6619.47
2. Forestry, Logging and Related Service Activities	02	305.22	357.35	365.62	462.45	497.82
3. Fishing, Operation of Fish Hatcheries and Fish Farms	03	153.26	163.42	162.00	213.28	272.72
4. Mining of Coal and Lignite, Extraction of Peat	05	50.39	35.27	50.54	47.15	66.48
5. Extraction of Crude Petroleum and Natural Gas	06	156.52	164.83	429.33	451.12	507.89
6. Mining of Metal Ores, other Mining and Quarrying	07	55.39	54.69	65.36	80.13	89.44
<b>Total R&amp;D Expenditure(Rs Crore) (A) (1+2+...+6)</b>		<b>4629.90</b>	<b>5387.33</b>	<b>5886.49</b>	<b>7304.69</b>	<b>8053.82</b>
<b>GDP by industry of origin (at factor cost Rs. Crores)</b>		<b>732234</b>	<b>829771</b>	<b>961330</b>	<b>1083032</b>	<b>1236765</b>
<b>Ratio of R&amp;D expenditure to GDP by industry of origin (%)</b>		<b>0.63</b>	<b>0.65</b>	<b>0.61</b>	<b>0.67</b>	<b>0.65</b>
<b>(B) Manufacturing, Construction, Electricity, Gas &amp; Water Supply</b>						
1. Manufacture of Food Products and Beverages	10	210.10	231.96	251.74	350.14	437.25
2. Manufacture of Tobacco Products	12	67.50	80.76	142.48	134.64	109.58
3. Manufacture of Textiles	13	110.06	105.69	121.98	153.59	180.09
4. Manufacture of Wearing Apparel, Dressing and Dyeing of Fur	14	20.21	21.16	25.24	26.46	30.46
5. Tanning and Dressing of Leather, Luggage Handbags etc.	15	45.27	45.31	45.93	57.65	65.14
6. Manufacture of Wood and Products of Wood and Cork	16	7.54	10.20	10.96	11.00	12.21
7. Manufacture of Paper and Paper Products	17	40.43	40.60	43.34	58.07	78.88
8. Manufacture of Coke, Refined Petroleum Products and Nuclear Fuel	19	147.44	135.67	187.86	261.20	349.75
9. Manufacture of Chemicals, Chemical Products & Fertilizers	20	478.60	717.59	806.14	873.65	973.71
10. Drugs & Pharmaceuticals	21	3408.42	4231.74	5098.01	5896.76	6475.92
11. Manufacture of Rubber and Plastic Products	22	58.45	92.23	92.09	123.81	125.46
12. Manufacture of other Non-Metallic Mineral Products	23	73.98	93.21	90.25	116.50	110.90
13. Manufacture of Basic Metals	24	154.54	201.11	264.01	310.04	278.12
14. Manufacture of Fabricated Metal Products	25	66.32	74.62	78.95	91.35	84.95
15. Manufacture of Medical, Precision and Optical Instruments	26	58.16	55.90	61.52	63.59	67.37
16. Manufacture of Electrical Machinery and Apparatus	27	288.87	362.83	431.14	466.14	519.11
17. Manufacture of Machinery and Equipment	28	458.45	611.64	966.76	1272.16	1391.84

Table 16 (Contd.)

## NATIONAL EXPENDITURE ON R&amp;D BY SUB-SECTOR OF ECONOMIC ACTIVITY

(Rs. Crores)

Economic Activity	NIC Code	Research & Development Expenditure				
		2005-06	2006-07	2007-08	2008-09	2009-10
18. Other Manufacturing (Gems & Jewellery)	32	0.97	1.10	1.23	1.29	0.97
19. Electricity, Gas, Steam and Water Supply	35	1606.56	1873.85	2008.26	2673.89	3536.17
20. Land Transport, Transport via Pipelines	49	60.45	84.62	79.62	111.98	155.51
<b>Total R&amp;D Expenditure (Rs Crore) (B) (1+2+...+20)</b>		<b>7362.32</b>	<b>9071.77</b>	<b>10807.52</b>	<b>13053.93</b>	<b>14983.39</b>
<b>GDP by industry of origin (at factor cost Rs. Crores)</b>		<b>859410</b>	<b>1033410</b>	<b>1205458</b>	<b>1360426</b>	<b>1521744</b>
<b>Ratio of R&amp;D expenditure to GDP by industry of origin (%)</b>		<b>0.86</b>	<b>0.88</b>	<b>0.90</b>	<b>0.96</b>	<b>0.98</b>
<b>(C) Transport &amp; Communication</b>						
1. Manufacture of Motor Vehicles	29	1111.36	1555.02	2142.75	2637.87	2533.31
2. Manufacture of other Transport Equipment	30	300.87	334.69	392.08	347.79	406.21
3. Telecommunications	61	281.18	321.03	358.55	436.13	444.18
4. Computer and Related Activities	62	1970.41	2276.78	2369.46	2317.44	2747.20
<b>Total R&amp;D Expenditure(Rs in Crores) (C) (1+2+...+4)</b>		<b>3663.82</b>	<b>4487.52</b>	<b>5262.84</b>	<b>5739.23</b>	<b>6130.90</b>
<b>GDP by industry of origin (at factor cost Rs. Crores)</b>		<b>846606</b>	<b>998379</b>	<b>1150044</b>	<b>1310845</b>	<b>1485476</b>
<b>Ratio of R&amp;D expenditure to GDP by industry of origin (%)</b>		<b>0.43</b>	<b>0.45</b>	<b>0.46</b>	<b>0.44</b>	<b>0.41</b>
<b>(D) Public Administration &amp; Defence and other Services</b>						
1. Public Administration and Defence	84	5890.35	6051.71	6885.18	8646.07	9491.54
2. Education	85	1885.44	2150.42	2426.27	3089.96	3430.91
3. Health and Social Work	86	938.06	1110.12	1111.88	1568.85	1683.28
4. Service Sector	94	5197.53	5573.62	6532.94	7231.90	8521.51
5. Others	99	358.42	397.76	514.75	707.42	732.54
<b>Total R&amp;D Expenditure (Rs Crores) (D) (1+2+...+5)</b>		<b>14269.81</b>	<b>15283.62</b>	<b>17471.03</b>	<b>21244.20</b>	<b>23859.78</b>
<b>GDP by industry of origin (at factor cost Rs. Crores)</b>		<b>459151</b>	<b>505121</b>	<b>573790</b>	<b>703895</b>	<b>885314</b>
<b>Ratio of R&amp;D expenditure to GDP by industry of origin (%)</b>		<b>3.11</b>	<b>3.03</b>	<b>3.04</b>	<b>3.02</b>	<b>2.70</b>
<b>Total R&amp;D Expenditure(Rs in Crores) (A+B+C+D)</b>		<b>29925.84</b>	<b>34230.24</b>	<b>39427.88</b>	<b>47342.04</b>	<b>53027.89</b>

Source : 1. Data collected and compiled by DST.

2. GDP at factor cost and by industry of origin taken from Economic Survey 2011-12

Table 17

**GOVERNMENT EXPENDITURE ON R&D BY SUB-SECTOR OF ECONOMIC ACTIVITY**

(Rs. Crores)

Economic Activity	NIC Code	Research & Development Expenditure				
		2005-06	2006-07	2007-08	2008-09	2009-10
<b>(A) Agriculture, Forestry &amp; Fishing, Mining &amp; Quarrying</b>						
1. Agriculture, Hunting and Related Service Activities	01	3717.87	4401.52	4555.12	5709.25	6196.18
2. Forestry, Logging and Related Service Activities	02	300.57	350.37	357.15	452.40	489.43
3. Fishing, Operation of Fish Hatcheries and Fish Farms	03	153.26	163.42	162.00	213.28	272.72
4. Mining of Coal and Lignite, Extraction of Peat	05	14.84	6.00	12.86	10.00	11.00
5. Extraction of Crude Petroleum and Natural Gas	06	19.09	26.64	12.56	8.05	27.57
6. Mining of Metal Ores, Other Mining and Quarrying	07	36.66	36.85	39.93	34.65	50.20
<b>Total R&amp;D Expenditure(Rs Crores) (A) (1+2+...+6)</b>		<b>4242.29</b>	<b>4984.79</b>	<b>5139.62</b>	<b>6427.64</b>	<b>7047.10</b>
<b>GDP by industry of origin (at factor cost Rs. Crores)</b>		<b>732234</b>	<b>829771</b>	<b>961330</b>	<b>1083032</b>	<b>1236765</b>
<b>Ratio of R&amp;D expenditure to GDP by industry of origin (%)</b>		<b>0.58</b>	<b>0.60</b>	<b>0.53</b>	<b>0.59</b>	<b>0.57</b>
<b>(B) Manufacturing, Construction, Electricity Gas &amp; Water Supply</b>						
1. Manufacture of Food Products and Beverages	10	96.85	102.71	103.91	170.18	212.06
2. Manufacture of Tobacco Products	12	0.00	0.00	0.00	0.00	0.00
3. Manufacture of Textiles	13	90.10	83.50	97.34	132.62	157.02
4. Manufacture of Wearing Apparel, Dressing and Dyeing of Fur	14	0.00	0.00	0.00	0.00	0.00
5. Tanning and Dressing of Leather, Luggage Handbags etc.	15	23.73	23.98	25.67	37.08	43.00
6. Manufacture of Wood and Products of Wood and Cork	16	6.68	9.34	9.79	9.93	11.05
7. Manufacture of Paper and Paper Products	17	25.71	22.27	24.92	34.49	50.17
8. Manufacture of Coke, Refined Petroleum Products and Nuclear Fuel	19	0.00	0.00	0.00	0.00	0.00
9. Manufacture of Chemicals, Chemical Products & Fertilizers	20	61.19	54.96	65.23	64.72	112.80
10. Drugs & Pharmaceuticals	21	564.65	710.31	817.74	978.13	1206.43
11. Manufacture of Rubber and Plastic Products	22	10.81	27.63	14.27	21.16	27.24
12. Manufacture of other Non-Metallic Mineral Products	23	27.26	41.57	36.90	34.82	33.91
13. Manufacture of Basic Metals	24	37.77	52.28	61.15	90.83	70.60
14. Manufacture of Fabricated Metal Products	25	0.00	0.00	0.00	0.00	0.00
15. Manufacture of Medical, Precision and Optical Instruments	26	0.00	0.00	0.00	0.00	0.00
16. Manufacture of Electrical Machinery and Apparatus	27	0.38	0.53	0.52	0.46	0.70



Table 17 (Contd.)

## GOVERNMENT EXPENDITURE ON R&amp;D BY SUB-SECTOR OF ECONOMIC ACTIVITY

(Rs. Crores)

Economic Activity	NIC Code	Research & Development Expenditure				
		2005-06	2006-07	2007-08	2008-09	2009-10
17. Manufacture of Machinery and Equipment	28	0.00	0.00	0.00	0.00	0.00
18. Electricity, Gas, Steam and Water Supply	35	1555.66	1813.99	1918.01	2575.43	3430.76
19. Land Transport, Transport via Pipelines	49	56.86	80.81	75.84	106.31	144.77
<b>Total R&amp;D Expenditure(Rs Crores) (B) (1+2+...+19)</b>		<b>2557.64</b>	<b>3023.89</b>	<b>3251.29</b>	<b>4256.16</b>	<b>5500.51</b>
<b>GDP by industry of origin (at factor cost Rs. crores)</b>		<b>859410</b>	<b>1033410</b>	<b>1205458</b>	<b>1360426</b>	<b>1521744</b>
<b>Ratio of R&amp;D expenditure to GDP by industry of origin (%)</b>		<b>0.30</b>	<b>0.29</b>	<b>0.27</b>	<b>0.31</b>	<b>0.36</b>
<b>(C) Transport &amp; Communication</b>						
1. Manufacture of Motor Vehicles	29	63.35	54.34	66.04	90.76	93.31
2. Manufacture of other Transport Equipment	30	0.00	0.00	0.00	0.00	0.00
3. Telecommunications	61	157.55	180.71	180.58	223.69	208.65
4. Computer and Related Activities	62	223.50	252.16	292.14	347.44	474.47
<b>Total R&amp;D Expenditure(Rs Crores) (C) (1+2+...+4)</b>		<b>444.41</b>	<b>487.20</b>	<b>538.76</b>	<b>661.89</b>	<b>776.42</b>
<b>GDP by industry of origin (at factor cost Rs. crores)</b>		<b>846606</b>	<b>998379</b>	<b>1150044</b>	<b>1310845</b>	<b>1485476</b>
<b>Ratio of R&amp;D expenditure to GDP by industry of origin (%)</b>		<b>0.05</b>	<b>0.05</b>	<b>0.05</b>	<b>0.05</b>	<b>0.05</b>
<b>(D) Public Administration &amp; Defence and other Services</b>						
1. Public Administration and Defence	84	5299.41	5380.49	6123.98	7720.45	8498.89
2. Education	85	425.15	493.76	502.94	801.57	823.92
3. Health and Social Work	86	603.73	747.01	667.40	1082.42	1149.32
4. Service Sector	94	4988.38	5329.30	6234.68	6961.87	8192.51
5. Others	99	358.42	397.76	514.75	707.42	732.54
<b>Total R&amp;D Expenditure (Rs Crores) (D) (1+2+...+5)</b>		<b>11675.09</b>	<b>12348.31</b>	<b>14043.76</b>	<b>17273.72</b>	<b>19397.18</b>
<b>GDP by industry of origin (at factor cost Rs. crores)</b>		<b>459151</b>	<b>505121</b>	<b>573790</b>	<b>703895</b>	<b>885314</b>
<b>Ratio of R&amp;D expenditure to GDP by industry of origin (%)</b>		<b>2.54</b>	<b>2.44</b>	<b>2.45</b>	<b>2.45</b>	<b>2.19</b>
<b>Total R&amp;D Expenditure (Rs. in Crores) (A+B+C+D)</b>		<b>18919.42</b>	<b>20844.19</b>	<b>22973.42</b>	<b>28619.40</b>	<b>32721.22</b>

Source : Data collected and compiled by DST.

Note : Government includes Major Scientific Agencies, Central Ministries/ Departments &amp; State Governments



Table 18

## INDUSTRIAL SECTOR EXPENDITURE ON R&amp;D BY SUB-SECTOR OF ECONOMIC ACTIVITY

(Rs. Crores)

Economic Activity	NIC Code	No. of R&D Units	Research & Development Expenditure					
			2005-06	2006-07	2007-08	2008-09	2009-10	
<b>(A) Agriculture, Forestry &amp; Fishing, Mining &amp; Quarrying</b>								
1. Agriculture, Hunting and Related Service Activities	01	140	191.24	210.25	258.51	341.30	423.28	
2. Forestry, Logging and Related Service Activities	02	1	4.65	6.98	8.47	10.05	8.39	
3. Fishing, Operation of Fish Hatcheries and Fish Farms	03	0	0.00	0.00	0.00	0.00	0.00	
4. Mining of Coal and Lignite, Extraction of Peat	05	7	35.55	29.27	37.68	37.15	55.48	
5. Extraction of Crude Petroleum and Natural Gas	06	4	137.43	138.19	416.78	443.07	480.32	
6. Mining of Metal Ores, Other Mining and Quarrying	07	15	18.73	17.84	25.44	45.33	39.05	
<b>Total R&amp;D Expenditure(Rs Crores) (A) (1+2+...+6)</b>		<b>167</b>	<b>387.61</b>	<b>402.54</b>	<b>746.87</b>	<b>876.89</b>	<b>1006.52</b>	
<b>Ratio of R&amp;D expenditure to GDP by industry of origin (%)</b>			<b>732234</b>	<b>829771</b>	<b>961330</b>	<b>1083032</b>	<b>1236765</b>	
<b>(B) Manufacturing, Construction, Electricity Gas &amp; Water Supply</b>			<b>0.05</b>	<b>0.05</b>	<b>0.08</b>	<b>0.08</b>	<b>0.08</b>	
1. Manufacture of Food Products and Beverages	10	59	113.25	129.25	147.83	179.96	225.20	
2. Manufacture of Tobacco Products	12	4	67.50	80.76	142.48	134.64	109.58	
3. Manufacture of Textiles	13	28	19.97	22.19	24.64	20.97	23.08	
4. Manufacture of Wearing Apparel, Dressing and Dyeing of Fur	14	2	20.21	21.16	25.24	26.46	30.46	
5. Tanning and Dressing of Leather, Luggage Handbags etc.	15	3	21.54	21.33	20.26	20.57	22.14	
6. Manufacture of Wood and Products of Wood and Cork	16	3	0.86	0.86	1.17	1.07	1.16	
7. Manufacture of Paper and Paper Products	17	27	14.72	18.32	18.42	23.59	28.71	
8. Manufacture of Coke, Refined Petroleum Products and Nuclear Fuel	19	16	147.44	135.67	187.86	261.20	349.75	
9. Manufacture of Chemicals, Chemical Products & Fertilizers	20	226	424.15	670.78	750.77	820.48	874.50	
10. Drugs & Pharmaceuticals	21	339	2843.77	3521.43	4280.27	4918.63	5269.49	
11. Manufacture of Rubber and Plastic Products	22	39	47.64	64.60	77.83	102.65	98.22	
12. Manufacture of other Non-Metallic Mineral Products	23	28	46.72	51.64	53.35	81.68	76.99	
13. Manufacture of Basic Metals	24	24	116.77	148.83	202.86	219.21	207.52	
14. Manufacture of Fabricated Metal Products	25	55	66.32	74.62	78.95	91.35	84.95	
15. Manufacture of Medical, Precision and Optical Instruments	26	43	108.97	108.94	137.29	130.80	127.19	
16. Manufacture of Electrical Machinery and Apparatus	27	99	237.68	309.26	354.85	398.48	458.59	

Table 18 (Contd.)

## INDUSTRIAL SECTOR EXPENDITURE ON R&amp;D BY SUB-SECTOR OF ECONOMIC ACTIVITY

(Rs. Crores)

Economic Activity	NIC Code	No. of R&D Units	Research & Development Expenditure				
			2005-06	2006-07	2007-08	2008-09	2009-10
17. Manufacture of Machinery and Equipment	28	113	458.45	611.64	966.76	1272.16	1391.84
18. Other Manufacturing (Gems & Jewellery)	32	~	0.97	1.10	1.23	1.29	0.97
19. Electricity, Gas, Steam and Water Supply	35	40	50.90	59.86	90.26	98.46	105.41
20. Land Transport, Transport via Pipelines	49	1	3.59	3.81	3.79	5.67	10.74
<b>Total R&amp;D Expenditure (Rs Crores) (B) (1+2+...+20)</b>		<b>1149</b>	<b>4811.42</b>	<b>6056.03</b>	<b>7566.10</b>	<b>8809.31</b>	<b>9496.48</b>
<b>GDP by industry of origin (at factor cost Rs. crores)</b>			<b>859410</b>	<b>1033410</b>	<b>1205458</b>	<b>1360426</b>	<b>1521744</b>
<b>Ratio of R&amp;D expenditure to GDP by industry of origin (%)</b>			<b>0.56</b>	<b>0.59</b>	<b>0.63</b>	<b>0.65</b>	<b>0.62</b>
<b>(C) Transport &amp; Communication</b>							
1. Manufacture of Motor Vehicles	29	31	1048.01	1500.68	2076.71	2547.11	2440.00
2. Manufacture of other Transport Equipment	30	81	300.87	334.69	392.08	347.79	406.21
3. Telecommunications	61	38	123.63	140.33	177.97	212.44	235.53
4. Computer and Related Activities	62	35	1746.90	2024.63	2077.31	1970.00	2272.73
<b>Total R&amp;D Expenditure (Rs in Crores) (C) (1+2+...+4)</b>		<b>185</b>	<b>3219.41</b>	<b>4000.32</b>	<b>4724.08</b>	<b>5077.34</b>	<b>5354.48</b>
<b>GDP by industry of origin (at factor cost Rs. crores)</b>			<b>846606</b>	<b>998379</b>	<b>1150044</b>	<b>1310845</b>	<b>1485476</b>
<b>Ratio of R&amp;D expenditure to GDP by industry of origin (%)</b>			<b>0.38</b>	<b>0.40</b>	<b>0.41</b>	<b>0.39</b>	<b>0.36</b>
<b>(D) Public Administration &amp; Defence and other Services</b>							
1. Public Administration and Defence	84	24	590.94	671.22	761.20	925.62	992.65
2. Education	85	89	206.28	213.45	262.37	376.83	407.02
3. Health and Social Work	86	185	334.33	363.11	444.48	486.43	533.96
4. Service Sector	94	64	209.15	244.32	298.26	270.03	329.00
5. Others	99	0	0.00	0.00	0.00	0.00	0.00
<b>Total R&amp;D Expenditure (Rs Crores) (D) (1+2+...+5)</b>		<b>362</b>	<b>1340.71</b>	<b>1492.10</b>	<b>1766.31</b>	<b>2058.91</b>	<b>2262.63</b>
<b>GDP by industry of origin (at factor cost Rs. crores)</b>			<b>459151</b>	<b>505121</b>	<b>573790</b>	<b>703895</b>	<b>885314</b>
<b>Ratio of R&amp;D expenditure to GDP by industry of origin (%)</b>			<b>0.29</b>	<b>0.30</b>	<b>0.31</b>	<b>0.29</b>	<b>0.26</b>
<b>Total R&amp;D Expenditure (Rs in Crores) (A+B+C+D)</b>		<b>1863</b>	<b>9759.15</b>	<b>11950.99</b>	<b>14803.36</b>	<b>16822.46</b>	<b>18120.10</b>

Source : Data collected and compiled by DST.

Note : 1. Industrial Sector Comprises of Private, Public Sector, Scientific and Industrial Research Organisations (SIRO) &amp; MSME's.

2. Projected Data of 10584 MSME units amounting to Rs. 214.06 crores, Rs. 223.24 crores, Rs. 232.82 crores, Rs. 234.81 crores &amp; Rs. 253.36 crores for the year 2005-06, 2006-07, 2007-08, 2008-09 &amp; 2009-10 respectively has been added to private sector R&amp;D expenditure.

3. ~ MSME units not reflected

Table 19

**FULL TIME EQUIVALENT OF MANPOWER EMPLOYED IN  
R&D ESTABLISHMENTS AS ON 01.04.2010**

(Number)

Name of Establishment	Personnel Engaged in			Total (1+2+3)
	R&D Activities (1)	Auxilliary Activities (2)	Administrative Activities (3)	
<b>A. INSTITUTIONAL SECTOR</b>				
Major Scientific Agencies	57331	41108	39740	138179
Central Government Ministries/Departments	10030	18532	21508	50070
State Governments	20544	17946	42459	80949
<b>Total Institutional Sector (1)</b>	<b>87905</b>	<b>77586</b>	<b>103707</b>	<b>269198</b>
<b>B. HIGHER EDUCATION SECTOR (2) *</b>	22100	–	–	22100
<b>C. INDUSTRIAL SECTOR</b>				
Public Sector including Joint Sector	10701	3892	1587	16180
Private Sector	63971	35329	11684	110984
SIRO	8142	7381	7141	22664
Private + SIRO	72113	42710	18825	133648
<b>Total Industrial Sector (3)</b>	<b>82814</b>	<b>46602</b>	<b>20412</b>	<b>149828</b>
<b>Total (1+2+3)</b>	<b>192819</b>	<b>124188</b>	<b>124119</b>	<b>441126</b>

Source : Data collected and compiled by DST.

Note : 1. Data for Industrial Sector refers to 1863 in-house R&amp;D units including 1333 Private Sector industries, 117 Public Sector industries and 413 SIRO units.

2. R&amp;D : Research and Development.

3. \* Estimated

4. – Not Available

**Table 20**

**FULL TIME EQUIVALENT OF WOMEN EMPLOYED IN R&D ESTABLISHMENTS  
AS ON 01.04.2010**

(Number)

Name of Establishment	Personnel Engaged in			Total (1+2+3)
	R&D Activities (1)	Auxilliary Activities (2)	Administrative Activities (3)	
<b>A. INSTITUTIONAL SECTOR</b>				
Major Scientific Agencies	8781	4700	8029	<b>21510</b>
Central Government Ministries/Departments	1975	3420	4162	<b>9557</b>
State Governments	2904	2046	6963	<b>11913</b>
<b>Total Institutional Sector (1)</b>	<b>13660</b>	<b>10166</b>	<b>19154</b>	<b>42980</b>
<b>B. HIGHER EDUCATION SECTOR (2) *</b>	<b>2873</b>	–	–	<b>2873</b>
<b>B. INDUSTRIAL SECTOR</b>				
Public Sector including Joint Sector	1109	251	261	<b>1621</b>
Private Sector	7072	1999	1405	<b>10476</b>
SIRO	2818	3060	2474	<b>8352</b>
<b>Total Industrial Sector (3)</b>	<b>10999</b>	<b>5310</b>	<b>4140</b>	<b>20449</b>
<b>Total (1+2+3)</b>	<b>27532</b>	<b>15476</b>	<b>23294</b>	<b>66302</b>

Source : Data collected and compiled by DST.

Note : 1. Data for Industrial Sector refers to 1863 in-house R&D units including 1333 Private Sector industries, 117 Public Sector industries and 413 SIRO units.

2. Data does not include Small Scale Industries (SSI).

3. R&D : Research and Development.

4. \* Estimated

5. – Not Available



**Table 21****UNIVERSITIES / COLLEGES AND THEIR ENROLMENT FROM 1976 - 77 TO 2011-12****(Number)**

<b>Year</b>	<b>Universities</b>	<b>Institutions Deemed to be Universities</b>	<b>Colleges</b>	<b>Total Enrolment</b>
1976-77	105	9	4317	2431563
1977-78	108	9	4375	2564972
1978-79	108	10	4460	2618228
1979-80	112	10	4558	2648579
1980-81	116	12	4722	2752437
1981-82	120	12	4880	2952066
1982-83	125	14	5039	3133093
1983-84	126	14	5246	3307649
1984-85	132	16	5590	3404096
1985-86	136	17	5816	3605029
1986-87	143	21	6040	3757158
1987-88	144	22	6685	4020159
1988-89	145	27	6773	4285489
1989-90	149	28	7145	4602680
1990-91	150	29	7346	4924868
1991-92	155	31	7761	5265886
1992-93	159	31	7993	5534966
1993-94	163	34	8441	5817249
1994-95	168	36	9019	6113929
1995-96	171	37	9252	6574005
1996-97	172	38	9940	6842598
1997-98	182	39	10678	7260418
1998-99	182	40	11397	7705520
1999-00	189	42	11865	8050607
2000-01	193	47	12806	8399443
2001-02	196	52	15437	8964680
2002-03	200	81	16206	9516773
2003-04	213	89	16742	10201981
2004-05	229	96	18080	11038543
2005-06	241	101	19327	12043050
2006-07	249	109	21170	13163054
2007-08	272	103	23206	14400381
2008-09	300	128	25951	15768417
2009-10	363	130	31812*	17243352
2010-11	393	130	33023*	18670050
2011-12	445	129	35539*	20327478*

Source : University Grants Commission (UGC) Annual Reports.

- Note : 1. Series revised from 2003-04 based on the figures for the year 2011-12  
2. The number of Universities/Deemed Universities does not include Institutes of National importance.  
3. The number of colleges excludes junior colleges and those offering diploma/certificate courses.  
4. \* Provisional  
5. Figures of students enrolment pertain to regular courses in universities and colleges (excluding polytechnics, other diploma awarding institutions and non-formal system of higher education)

**Table 22**

**FACULTY-WISE ENROLMENT IN HIGHER EDUCATION FROM 1985-86 TO 2011-12**

(Thousands)

Course of Study	1985-86		1995-96		2001-02		2005-06		2006-07		2007-08		2008-09		2009-10		2010-11		2011-12		
	Enrolment	% of total	Enrolment	% of total	Enrolment	% of total	Enrolment	% of total	Enrolment	% of total	Enrolment	% of total	Enrolment	% of total	Enrolment	% of total	Enrolment	% of total	Enrolment	% of total	
<b>Science and Technology Disciplines (A)</b>																					
Science	701.0	19.4	1288.5	19.6	1739.1	19.4	2255.2	20.45	2374.8	20.45	2543.4	20.55	2612.4	19.15	2822.6	19.3	3127.0	18.42	3789.9	18.64	
Engineering/Technology	176.5	4.9	322.126	4.9	618.6	6.9	795.1	7.21	837.3	7.21	914.6	7.39	1313.7	9.63	1510.8	10.33	2862.4	16.86	3261.6	16.05	
Medicine	123.1	3.4	223.516	3.4	277.9	3.1	348.5	3.16	367.0	3.16	404.7	3.27	446.1	3.27	509.0	3.48	652.5	3.84	715.7	3.52	
Agriculture	41.9	1.2	72.3141	1.1	89.6	1.0	64.0	0.58	67.4	0.58	73.0	0.59	80.5	0.59	80.4	0.55	93.2	0.55	97.3	0.48	
Veterinary Science	9.5	0.3	19.722	0.3	17.9	0.2	16.5	0.15	17.4	0.15	19.8	0.16	21.8	0.16	20.5	0.14	27.4	0.16	28.5	0.14	
<b>Total (A)</b>	<b>1052.0</b>	<b>29.2</b>	<b>1926.18</b>	<b>29.3</b>	<b>2743.2</b>	<b>30.6</b>	<b>3479.3</b>	<b>31.55</b>	<b>3663.7</b>	<b>31.55</b>	<b>3955.6</b>	<b>31.96</b>	<b>4474.5</b>	<b>32.80</b>	<b>4943.2</b>	<b>33.80</b>	<b>6762.6</b>	<b>39.84</b>	<b>7893.0</b>	<b>38.83</b>	
<b>Other Disciplines (B)</b>																					
Arts (including Oriental Learning)	1466.3	40.7	2655.9	40.4	4132.7	46.1	4976.9	45.13	5240.7	45.13	5508.9	44.51	5875.5	43.07	6144.0	42.01	6177.7	36.39	7539.5	37.09	
Commerce/Management	782.1	21.7	1439.71	21.9	1604.7	17.9	1986.1	18.01	2091.4	18.01	2243.9	18.13	2486.9	18.23	2607.6	17.83	2904.8	17.11	3571.1	17.57	
Law	196.1	5.4	348.422	5.3	286.9	3.2	336.4	3.05	354.2	3.05	380.0	3.07	382.0	2.80	343.7	2.35	327.1	1.93	373.2	1.84	
Education	82.6	2.3	151.202	2.3	116.5	1.3	161.0	1.46	169.5	1.46	188.1	1.52	286.5	2.10	365.6	2.50	570.0	3.36	732.6	3.60	
Others	25.9	0.7	52.592	0.8	80.7	0.9	88.2	0.8	92.9	0.80	100.3	0.81	136.4	1.00	220.8	1.51	232.7	1.37	217.9	1.07	
<b>Total (B)</b>	<b>2553.1</b>	<b>70.8</b>	<b>4647.82</b>	<b>70.7</b>	<b>6221.5</b>	<b>69.4</b>	<b>7548.7</b>	<b>68.45</b>	<b>7948.8</b>	<b>68.45</b>	<b>8421.1</b>	<b>68.04</b>	<b>9167.3</b>	<b>67.20</b>	<b>9681.7</b>	<b>66.20</b>	<b>10212.3</b>	<b>60.16</b>	<b>12434.4</b>	<b>61.17</b>	
<b>Total (A+B)</b>	<b>3605.0</b>	<b>100.00</b>	<b>6574.01</b>	<b>100.00</b>	<b>8964.7</b>	<b>100.00</b>	<b>11028.0</b>	<b>100.00</b>	<b>11612.5</b>	<b>100.00</b>	<b>12376.7</b>	<b>100.00</b>	<b>13641.8</b>	<b>100.00</b>	<b>14625.0</b>	<b>100.00</b>	<b>16974.9</b>	<b>100.00</b>	<b>20327.4</b>	<b>100.00</b>	

Source : University Grants Commission (UGC) Annual Reports

Table 23

## FACULTY-WISE ENROLMENT OF WOMEN IN HIGHER EDUCATION FROM 1985-86 TO 2011-12

(Thousands)

Year	Science & Technology Disciplines					Other Disciplines					Total (1+...+10)
	Science (1)	Engg. (2)	Med. (3)	Agri. (4)	Vety. Sc. (5)	Arts (6)	Comm- erce (7)	Law (8)	Educ- ation (9)	Others (10)	
1985-86	215.7 (30.8)	12.2 (6.9)	37.5 (30.5)	2.3 (5.5)	0.6 (6.3)	576.3 (39.3)	156.7 (20.0)	17.6 (9.0)	38.6 (46.7)	9 (34.7)	1067.5 (29.6)
2001-02	699.4 (40.2)	131.8 (21.3)	123.0 (44.3)	9.1 (10.2)	3.2 (17.8)	1820.1 (44.0)	582.0 (36.3)	56.9 (19.8)	59.4 (51.0)	29.5 (36.6)	3514.4 (39.2)
2002-03	736.9 (39.1)	154.0 (21.6)	134.4 (42.8)	9.3 (16.3)	3.0 (15.8)	1889.8 (44.0)	608.9 (35.5)	61.9 (20.3)	67.1 (50.4)	30.6 (35.7)	3695.9 (38.8)
2003-04	809.0 (39.8)	165.3 (23.1)	145.3 (46.3)	9.9 (16.9)	3.0 (20.2)	2041.8 (45.5)	657.7 (36.7)	62.5 (20.6)	76.0 (52.0)	31.6 (37.7)	4002.1 (40.2)
2004-05	850.2 (39.7)	175.7 (23.3)	153.7 (46.6)	10.6 (17.1)	3.4 (21.6)	2162.4 (45.7)	696.5 (36.9)	68.6 (21.5)	78.7 (51.1)	34.3 (39.0)	4234.1 (39.3)
2005-06	901.3 (40.0)	185.9 (23.4)	162.6 (46.7)	10.8 (16.9)	3.6 (21.8)	2278.3 (45.8)	735.2 (37.0)	73.3 (21.8)	82.7 (51.4)	33.1 (37.5)	4466.8 (40.5)
2006-07	901.3 (38.0)	185.8 (22.2)	162.6 (44.3)	10.7 (15.9)	3.6 (20.5)	2402.0 (45.8)	735.2 (35.2)	73.2 (20.7)	82.6 (48.7)	33.051 (35.6)	4590.1 (39.5)
2007-08	1014.0 (39.9)	209.5 (22.9)	183.4 (45.3)	12.1 (16.5)	4.0 (20.3)	2562.2 (46.5)	827.6 (36.9)	82.4 (21.7)	93.0 (49.4)	36.7 (36.6)	5024.9 (40.6)
2008-09	1129.3 (43.2)	276.8 (21.1)	202.8 (45.5)	15.3 (19.0)	4.5 (20.7)	2772.6 (47.2)	915.7 (36.8)	89.3 (23.4)	180.8 (63.1)	62.1 (45.6)	5649.1 (41.4)
2009-10	1214.9 (43.0)	467.6 (31.0)	234.7 (46.1)	16.4 (20.4)	4.3 (20.8)	2776.3 (45.2)	967.4 (37.1)	84.5 (24.6)	225.0 (61.5)	89.4 (40.5)	6080.4 (41.6)
2010-11	1349.2 (43.1)	800.7 (28.0)	330.0 (50.6)	25.2 (27.0)	6.9 (25.3)	2904.6 (47.0)	1136.9 (39.1)	83.8 (25.6)	324.0 (56.8)	87.4 (37.5)	7048.7 (41.5)
2011-12	1662.1 (43.9)	959.1 (29.4)	350.3 (48.9)	24.8 (25.5)	7.0 (24.6)	3634.9 (48.2)	1414.8 (39.6)	107.8 (28.9)	428.7 (58.5)	82.9 (38.0)	8672.4 (42.7)

Source : University Grants Commission (UGC)

Note : 1. Figure in brackets indicate the % of women enrolment in total enrolment discipline-wise.

2. Agri. : Agriculture; Vety. Sc. : Veterinary Sciences; Engg. : Engineering and Technology; Med.: Medicine

**Table 24**

**ENROLMENT OF WOMEN IN HIGHER EDUCATION BY SCIENCE AND TECHNOLOGY DISCIPLINES**

(Thousands)

Year	Science & Technology Disciplines					Other Disciplines	Total
	Science (1)	Engg. (2)	Medicine (3)	Agri. (4)	Vety.Sc. (5)	(6)	(1+...+6)
1998-99	494.2 (19.2)	54.1 (2.1)	84.9 (3.3)	15.4 (0.6)	2.6 (0.1)	1922.9 (74.7)	2574 (100.0)
1999-00	520.9 (19.0)	63.1 (2.3)	90.5 (3.3)	15.5 (0.6)	2.7 (0.1)	2048.9 (74.7)	2742 (100.0)
2001-02	699.4 (19.9)	131.8 (3.8)	123.0 (3.5)	9.1 (0.3)	3.2 (0.1)	2547.9 (72.5)	3514 (100.0)
2002-03	736.9 (19.9)	154.0 (4.2)	134.4 (3.6)	9.3 (0.3)	3.0 (0.1)	2658.3 (71.9)	3696 (100.0)
2003-04	809.0 (20.2)	165.3 (4.1)	145.3 (3.6)	9.9 (0.2)	3.0 (0.1)	2869.6 (71.7)	4002 (100.0)
2004-05	850.2 (20.1)	175.7 (4.1)	153.7 (3.6)	10.6 (0.3)	3.4 (0.1)	3040.7 (71.8)	4234.3 (100.0)
2005-06	901.3 (20.2)	185.8 (4.2)	162.6 (3.6)	10.7 (0.2)	3.6 (0.1)	3202.4 (71.7)	4466.3 (100.0)
2006-07	901.3 (19.1)	185.8 (3.9)	162.6 (3.5)	10.7 (0.2)	3.6 (0.1)	3444.9 (73.2)	4708.9 (100.0)
2007-08	1014.0 (20.2)	209.5 (4.2)	183.4 (3.6)	12.1 (0.2)	4.0 (0.1)	3601.9 (71.7)	5024.9 (100.0)
2008-09	1129.3 (20.2)	276.8 (4.9)	202.8 (3.6)	15.3 (0.3)	4.5 (0.1)	4020.5 (71.0)	5649.1 (100.0)
2009-10	1214.9 (20.0)	467.6 (7.7)	234.7 (3.9)	16.4 (0.3)	4.3 (0.1)	4142.6 (68.1)	6080.4 (100.0)
2010-11	1349.2 (19.1)	800.7 (11.4)	330.0 (4.7)	25.2 (0.4)	6.9 (0.1)	4536.7 (64.4)	7048.7 (100.0)
2011-12	1662.1 (19.2)	959.1 (11.1)	350.3 (4.0)	24.8 (0.3)	7.0 (0.1)	5671.1 (65.3)	8674.4 (100.0)

Source : University Grants Commission (UGC)

Note : 1. Figure in brackets indicate the enrolment of women as a percentage of total women enrolment.  
 2. Agri. : Agriculture; Vety. Sc. : Veterinary Sciences; Engg. : Engineering and Technology.  
 3. Others Disciplines include Arts, Commerce, Law, Education, etc.



Table 25

OUT-TURN OF SCIENTIFIC AND TECHNICAL PERSONNEL FROM UNIVERSITIES IN INDIA 1947-2010

Degree/Year	1947	1950	1954	1964	1974	1984	1987	1988	1989	1995	2003	2004	2005	2006	2007	2008	2009	2010
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
B.Sc. (Science)	5996	9628	14427	34085	123822	115085	129940	129981	134366	139257	334865	321412	321660	362256	378374	384152	430753	425551
M.Sc.(Science)	905	1425	2911	8906	17633	20691	23669	24301	24591	23807	75459	72013	72633	81217	90967	96189	106371	111876
Ph.D.(Science)	N.A.	N.A.	164	537	1515	2977	3038	3038	3044	3155	4740	5929	6005	4933	5272	5563	5005	5872
BE/B.Sc. (Engg.)	270	2198	3207	9892	15043	21963	28345	27894	28927	32250	127499	189151	188580	143223	173343	187470	332441	421660
ME./M.Tech(Engg)	30	100	147	620	1984	2681	4465	4306	4560	3667	12249	17675	16380	17494	18158	20506	21552	27609
Ph.D.(Engg.)	N.A.	N.A.	19	47	266	464	675	573	560	546	779	882	968	969	1351	1278	1449	1682
MBBS	959	1557	2582	4452	10578	15818	17538	18038	17968	19613	31697	36335	32916	58468	71518	79721	96719	103197
MD/MS	N.A.	88	110	1266	2081	4888	5228	5802	5945	4634	7071	7355	6451	10569	13372	14410	16899	18304
B.Sc.(Agr.)	535	1000	910	5909	4505	8116	7810	7757	8301	5752	9109	10723	10832	10897	11583	12528	12544	12633
M.Sc.(Agr.)	79	154	208	1670	1419	2785	2827	2752	2876	2284	4416	4857	4405	4178	4396	4352	4394	4469
Ph.D.(Agr.)	N.A.	N.A.	4	217	287	678	832	832	792	827	1195	1142	1020	837	747	723	814	748
Total	8774	16150	24689	141406	179133	196146	224367	225274	231930	235792	609079	667474	661850	695041	769081	806892	1028941	1133581

Source : University Grants Commission (UGC), University Development in India (Basic facts & figures - 2006, 2007, 2008, 2009 & 2010 manuscripts)

- Note :
1. Figures for Engineering and Technology Degree Holders include IITs also.
  2. Information for the year 2006, 2007, 2008, 2009 & 2010 pertains to 345, 351, 361, 392 & 411 Universities/University Level Institutions out of 365, 384, 406, 461 and 461 respectively.
  3. Doctorates in Medicine have been included in Doctorate of Science. Similarly Doctorates of Veterinary Science have been merged with Doctorates of Agricultural Science.
  4. Medicine includes degrees awarded in Indian Systems of Medicine, Pharmacy, Dentistry and Nursing.
  5. Agriculture includes Veterinary Science.
  6. Agr. : Agriculture.
  7. Engg. : Engineering and Technology.

Table 26

**M.Phil / DOCTORATE DEGREES AWARDED FACULTY-WISE (1990-91 TO 2010-11)**

Faculty	Years	Science & Technology Disciplines (A)										(Number)	
		1990-91	1995-96	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08		2008-09
Science		2950	3861	3727	3955	4497	5612	5549	6231	13196	9151	10066	9720
Engineering/Technology		629	374	778	734	779	882	968	971	1360	1292	1457	1728
Medicine		140	135	221	219	243	317	456	370	425	460	398	648
Agriculture		715	780	889	838	1042	1026	888	675	910	494	664	661
Veterinary Science		145	138	110	110	153	116	132	165	119	262	169	186
<b>Total (A)</b>		<b>4579</b>	<b>5288</b>	<b>5725</b>	<b>5856</b>	<b>6714</b>	<b>7953</b>	<b>7993</b>	<b>8412</b>	<b>16010</b>	<b>11659</b>	<b>12754</b>	<b>12943</b>
<b>Other Disciplines (B)</b>													
Arts		3210	3957	4398	4524	5034	7473	7532	9529	11636	9710	9916	9737
Commerce		290	612	621	728	857	1096	1010	1453	3160	2132	2821	2808
Education		188	295	399	420	554	613	491	758	1531	1222	1046	1128
Law		51	75	105	110	138	144	179	167	149	249	171	240
Others *		65	170	296	336	436	574	693	833	1521	1432	1512	1711
<b>Total (B)</b>		<b>3804</b>	<b>5109</b>	<b>5819</b>	<b>6118</b>	<b>7019</b>	<b>9900</b>	<b>9905</b>	<b>12740</b>	<b>17997</b>	<b>14745</b>	<b>15466</b>	<b>15624</b>
<b>Total (A+B)</b>		<b>8383</b>	<b>10397</b>	<b>11544</b>	<b>11974</b>	<b>13733</b>	<b>17853</b>	<b>17898</b>	<b>21152</b>	<b>34007</b>	<b>26404</b>	<b>28220</b>	<b>28567</b>

Source : University Grants Commission (UGC)

Note : 1. Others includes Library & Information Science, Music, Performing/Visual Arts, Journalism & Mass Communication, Physical Education & Social Work etc.

2. The data for the years 2008-09 is based on the response of 286 universities and 305 universities respectively.

3. The data for the years 2009-10 and 2010-11 are based on the response of 344 universities and 400 universities respectively.

Table 27

## DOCTORATE DEGREES AWARDED FACULTY-WISE (2006-07 TO 2010-11)

Years	2006-07	2007-08	2008-09	2009-10	2010-11	2006-07	2007-08	2008-09	2009-10	2010-11
<b>Faculty</b>	<b>Science &amp; Technology Disciplines (A) (Number)</b>					<b>% in Science Faculty</b>				
Science	4605	4915	5165	4619	5271	68.3	66.7	68.3	63.6	63.5
Engineering/Technology	969	1351	1278	1449	1682	14.4	18.3	16.9	19.9	20.3
Medicine	328	357	398	386	601	4.9	4.8	5.3	5.3	7.3
Agriculture	675	633	477	652	586	10.0	8.6	6.3	9.0	7.1
Veterinary Science	162	114	246	162	162	2.4	1.5	3.3	2.2	2.0
<b>Total (A)</b>	<b>6739</b>	<b>7370</b>	<b>7564</b>	<b>7268</b>	<b>8302</b>	<b>(100.0)</b>	<b>(100.0)</b>	<b>(100.0)</b>	<b>(100.0)</b>	<b>(100.0)</b>
	<b>Other Disciplines (B)</b>					<b>% in Other Disciplines</b>				
Arts	4946	5105	4674	4862	4998	71.5	71.0	66.5	67.4	64.2
Commerce	916	956	1071	980	1259	13.2	13.3	15.2	13.6	16.2
Education	430	480	526	588	645	6.2	6.7	7.5	8.2	8.3
Law	143	144	229	146	223	2.1	2.0	3.3	2.0	2.9
Others *	485	502	527	633	666	7.0	7.0	7.5	8.8	8.5
<b>Total (B)</b>	<b>6920</b>	<b>7187</b>	<b>7027</b>	<b>7209</b>	<b>7791</b>	<b>(100.0)</b>	<b>(100.0)</b>	<b>(100.0)</b>	<b>(100.0)</b>	<b>(100.0)</b>
<b>Total (A+B)</b>	<b>13659</b>	<b>14557</b>	<b>14591</b>	<b>14477</b>	<b>16093</b>					

Source : University Grants Commission (UGC)

Note : 1. Others includes Library & Information Science, Music, Performing/Visual Arts, Journalism & Mass Communication, Physical Education & Social Work etc.  
 2. The data for the years 2009-10 and 2010-11 is based on the response of 344 universities and 400 universities respectively.

**Table 28**

**EXPENDITURE ON EDUCATION BY CENTRE AND STATE GOVERNMENTS**

(Rs. Crores)

Source	1985-86 +	1990-91	1995-96	2000-01	2005-06	2006-07	2007-08	2008-09	2009-10 +	2010-11 *
Central Government	942.10	2420.45	5551.02	10196.06	23211.13	34236.52	39919.37	48727.59	58146.34	66552.34
State Government	8269.76	18340.88	33217.67	72683.10	91177.69	104490.51	117764.94	143667.41	188636.04	209956.40
<b>TOTAL</b>	<b>9211.86</b>	<b>20761.33</b>	<b>38768.69</b>	<b>82879.16</b>	<b>114388.82</b>	<b>138727.03</b>	<b>157684.31</b>	<b>192395.00</b>	<b>246782.38</b>	<b>276508.74</b>

Source : Analysis of Budgeted Expenditure on Education (various issues), Department of Education, Ministry of Human Resource Development.

Note : 1. The Centre and State Education Department budget is total of the Revenue, Capital, Loans and advances and other Departments for the respective years.

2. Total Expenditure on Education includes Expenditure by the Education Department and other Departments, Where Other Departments, Expenditure also includes Expenditure for training (formal/informal).

3. + Revised Estimate.

4. \* Budget Estimate.

5. State Government include States and Union Territories.



**Table 29**

**SECTOR-WISE EXPENDITURE ON EDUCATION BY CENTRAL AND STATE GOVERNMENTS (REVENUE ACCOUNT)**  
(Rs. Crores)

Sl. No.	Sector	1985-86+	1990-91	1995-96	2000-01	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10 +
1	Elementary Education	3310.01	7955.53	15217.76	29758.13	41874.17	50181.99	60062.84	68709.52	79000.85	98500.00
2	Secondary Education	2349.36	5531.11	10344.07	19743.17	25110.62	27804.63	31675.15	35587.49	45504.08	62231.16
3	Physical Education	%	18.8	31.73	45.32	50.18	47.57	71.93	102.28	85.42	110.19
4	University Education/DL/Scholarship	1106.59	2311.85	3871.33	9194.79	9503.21	11013.34	12541.08	14311.43	18605.01	24186.00
5	Adult Education	%	273.15	259.72	226.12	351.26	396.16	358.14	376.16	344.21	815.69
6	Language Development	%	111.73	160.84	334.27	420.82	392.82	531.64	575.79	714.44	868.52
7	Special Education	145.66	%	%	%	%	%	%	%	%	%
8	Technical Education	350.26	753.01	1290.25	2528.02	3146.22	3657.00	4041.75	4657.40	7266.46	9461.25
9	Sports and Youth Welfare	99.33	%	%	%	%	%	%	%	%	%
10	General	%	238.48	340.27	668.23	824.40	990.19	1057.81	1059.54	1301.92	1738.11
11	Other educational programmes	172.62	%	%	%	%	%	%	%	%	%
	<b>Total</b>	<b>7533.83</b>	<b>17193.66</b>	<b>31515.97</b>	<b>62498.05</b>	<b>81280.88</b>	<b>94483.70</b>	<b>110340.34</b>	<b>125379.61</b>	<b>152822.39</b>	<b>197910.92</b>

Source : Analysis of Budgeted Expenditure on Education (various issues), Department of Education, Ministry of Human Resource Development.

Note : 1. + Revised Estimate.

2. % Data included elsewhere with another category.

3. State include States and Union Territories.

Table 30

**SECTOR-WISE PLAN AND NON-PLAN BUDGET ESTIMATES (REVENUE ACCOUNT) FOR EDUCATION BY CENTRAL AND STATE GOVERNMENTS, 2010-11**

(Rs. Crores)

Sl. No.	SECTOR	PLAN			NON - PLAN			TOTAL		
		States	Central	Total	States	Central	Total	States	Central	Total
1	Elementary Education	14472.97	25061.00	39533.97	71051.90	5.70	71057.60	85524.87	25066.70	110591.57
2	Secondary Education	5831.31	4675.00	10506.31	57099.67	2168.82	59268.49	62930.98	6843.82	69774.80
3	Physical Education	19.66	0.00	19.66	90.51	0.00	90.51	110.17	0.00	110.17
4	University Education/DL/Scholarship	2287.85	6096.90	8384.75	16642.40	3761.03	20403.43	18930.25	9857.93	28788.18
5	Adult Education	361.29	1300.00	1661.29	217.74	3.48	221.22	579.03	1303.48	1882.51
6	Language Development	91.62	154.00	245.62	706.47	68.24	774.71	798.09	222.24	1020.33
7	Technical Education	1833.74	4706.00	6539.74	2724.51	1745.52	4470.03	4558.25	6451.52	11009.77
8	General	777.14	39.10	816.24	941.74	119.21	1060.95	1718.88	158.31	1877.19
		<b>25675.58</b>	<b>42032.00</b>	<b>67707.58</b>	<b>149474.94</b>	<b>7872.00</b>	<b>157346.94</b>	<b>175150.52</b>	<b>49904.00</b>	<b>225054.52</b>

Source : Analysis of Budgeted Expenditure on Education 2008-09 to 2010-11.

Department of Education, Ministry of Human Resource Development.

Note : State include States and Union Territories.

**Table 31**

**APPLICATIONS FOR PATENTS FROM PERSONS IN INDIA AND ABROAD IN THE YEAR 1985-86 TO 2010-11**

(Number)

Year	1985-86	1990-91	1995-96	2000-01	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
India	999	1180	1606	2179	4521	5314	6040	6161	7044	8312
Foreigners Resident in India	-	1	-	-	-	-	-	-	-	-
Foreigners Resident abroad	2527	2583	5430	6324 *	19984 *	23626 *	29178 *	30651 *	27243 *	31088 *
<b>Total</b>	<b>3526</b>	<b>3764</b>	<b>7036</b>	<b>8503</b>	<b>24505</b>	<b>28940</b>	<b>35218</b>	<b>36812</b>	<b>34287</b>	<b>39400</b>

Source : Annual Reports of the Controller General of Patents, Designs and Trade Marks.

Note : \* Includes Ordinary (8026), Convention (14) & National Phase Applications (236) under PCT.

Table 32

## APPLICATIONS FOR PATENTS FILED IN INDIA FROM 1980-81 TO 2010-11 BY FOREIGN COUNTRIES

Sl. No.	Country	Number of applications filed										
		1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
1.	U.S.A.	570	968	1130	2239	2271	8048	8389	10653	10978	9154	10405
2.	Germany*	274	277	294	676	829	1736	2329	2908	3323	3111	3653
3.	U.K.	210	278	230	405	359	796	933	1091	1178	972	965
4.	France	133	188	150	242	309	1022	1226	1522	1671	1394	1609
5.	Japan	96	140	134	431	787	1555	1887	2453	2962	3040	4117
6.	Switzerland	90	116	141	206	338	927	1330	1647	1685	1579	1651
7.	Italy	77	62	50	112	86	377	576	686	656	560	608
8.	Russia**	57	68	53	3	23	34	45	37	63	45	55
9.	Netherlands	50	56	66	157	202	837	1108	1332	1544	1316	1336
10.	Others	219	374	336	959	1120	4652	5803	6849	6591	6072	6689
	<b>Total #</b>	<b>1776</b>	<b>2527</b>	<b>2584</b>	<b>5430</b>	<b>6324</b>	<b>19984</b>	<b>23626</b>	<b>29178</b>	<b>30651</b>	<b>27243</b>	<b>31088</b>

Source : Annual Reports of the Controller General of Patents, Designs and Trade Marks.

Note : 1. \* Data prior to the year 1993-94 refers to FRG.

2. \*\* Data prior to the year 1994-95 refers to USSR.

3. # Includes Ordinary, Convention & National Phase Applications under PCT.



Table 33

## NUMBER OF ORDINARY APPLICATIONS FOR PATENTS FILED FROM 1980-81 TO 2010-11 BY DIFFERENT STATES

(Number)

Sl. No.	Name of the State/ Union Territory	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
1.	Delhi	333	230	364	499	663	1018	1310	812	702	868	877
2.	Maharashtra	296	291	283	381	545	1233	1607	1936	1990	2286	2595
3.	Tamil Nadu	112	81	109	125	174	433	2	708	783	813	1050
4.	West Bengal	110	110	96	192	143	214	244	303	358	364	429
5.	Gujarat	72	53	44	75	147	203	337	286	295	319	390
6.	Karnataka	38	53	69	57	112	428	596	814	872	755	915
7.	Uttar Pradesh	37	38	39	35	90	193	205	161	115	321	346
8.	Bihar	36	29	26	21	31	29	14	21	10	16	31
9.	Kerala	35	35	60	72	77	96	128	123	107	166	288
10.	Andhra Pradesh	34	14	35	53	100	408	385	414	411	553	734
11.	Haryana	15	3	9	7	20	93	93	123	126	144	161
12.	Punjab	17	9	9	16	15	29	74	44	61	75	55
13.	Rajasthan	10	15	3	17	7	17	44	36	40	55	74
14.	Madhya Pradesh	13	18	18	29	30	55	33	50	51	37	45
15.	Others	20	20	16	27	25	72	242	209	240	272	322
	<b>Total</b>	<b>1178</b>	<b>999</b>	<b>1180</b>	<b>1606</b>	<b>2179</b>	<b>4521</b>	<b>5314</b>	<b>6040</b>	<b>6161</b>	<b>7044</b>	<b>8312</b>

Source : Annual Reports of the Controller General of Patents, Designs and Trade Marks

**Table 34**

**PATENTS FILED AND SEALED IN THE YEARS 1976-77 TO 2010-11**

Year	No. of applications made	No. of applications brought forward from preceding year	Total No. of applications to be examined	No. of applications examined	No. of applications deemed to have been abandoned filing of complete specifications	Total No. of complete specifications notified as accepted during the year	No. of applications deemed to have been abandoned non-acceptance of Complete Specifications	No. of patents sealed		No. of patents in force	
								Indian	Foreign	Indian	Foreign
1	2	3	4	5	6	7	8	9	10	11	12
1976-77	3104	3876	6980	3612	295	2840	533	928	1964	11	19780
1977-78	2870	3067	5937	2369	378	2507	577	657	1857	3065	19795
1978-79	2932	3190	6122	1266	283	2070	498	281	499	2469	13966
1979-80	2980	4573	7533	1498	304	1210	429	516	1657	2786	14474
1980-81	2954	5751	8705	2301	325	1007	372	349	670	2757	14448
1981-82	2989	6079	9068	2984	274	1191	422	421	936	3038	14892
1982-83	3085	5810	8895	3165	310	1580	734	405	822	3329	15291
1983-84	3145	5420	8565	3043	295	1447	774	340	980	3523	15726
1984-85	3319	5227	8546	2270	224	3267	710	263	1206	3008	13162
1985-86	3526	6052	9578	2490	214	1495	824	451	1500	2549	10844
1986-87	3489	6874	10363	4846	267	1706	729	532	1594	2004	10059
1987-88	3457	5250	8707	3582	158	2966	912	588	1516	2150	10115
1988-89	3598	4967	8565	3650	166	2386	1049	795	2585	2584	11015
1989-90	3661	4746	8407	3333	225	1760	984	519	1371	2468	10941
1990-91	3764	4849	8613	2185	183	2170	878	379	1112	2238	8210
1991-92	3552	6255	9807	2431	213	2060	789	551	1125	1206	9093
1992-93	3467	7163	10630	2347	289	1600	567	251	1021	1034	8997
1993-94	3869	7994	11863	2590	224	1250	686	442	1304	1995	7281
1994-95	5330	9049	14379	2745	130	1590	765	476	1283	1923	7052
1995-96	7036	11504	18540	2862	204	1400	972	415	1118	2098	6694

(Number)

**Table 34 (Contd.)**

**PATENTS FILED AND SEALED IN THE YEARS 1976-77 TO 2010-11**

Year	No. of applications made	No. of applications brought forward from preceding year	Total No. of applications to be examined	No. of applications examined	No. of applications deemed to have been abandoned filling of complete specifications	Total No. of complete specifications notified as accepted during the year	No. of applications deemed to have been abandoned non-acceptance of Complete Specifications	No. of patents sealed		No. of patents in force	
								Indian	Foreign	Indian	Foreign
1	2	3	4	5	6	7	8	9	10	11	12
1996-97	8562	15474	24036	3042	375	2049	675	293	614	2003	7202
1997-98	10155	20619	30774	2688	59	2580	803	619	1225	2047	6882
1998-99	8954	28027	36981	2931	820	1600	804	645	1155	2088	6691
1999-00	4824	33230	38054	2824	362	1310	195	557	1324	2200	6458
2000-01	8503	34968	43471	4264	89	1950	460	399	919	1495	6530
2001-02	10592	39118	49710	5104	325	1669	1031	654	937	1578	6742
2002-03	11466	44281	55747	9538	290	2780	1633	494	885	1479	6519
2003-04	12613	NIL	12362	10709	933	2805	1695	945	1524	2075	4331
2004-05	17466	NA	19001	14813	267	3307	775	764	1147	2200	4657
2005-06	24505	NA	21926	11569	414	NA	894	1396	2924	4486	11933
2006-07	28940	NA	20645	14119	694	NA	1121	1907	5632	3473	13593
2007-08	35218	NA	22146	11751	1066	NA	479	3173	12088	7966	21722
2008-09	36812	NA	30595	10296	888	NA	1075	2541	13520	6158	24664
2009-10	34287	NA	28653	6069	2720	NA	5171	1725	4443	6781	30553
2010-11	39400	NA	31493	11208	185	NA	5186	1273	6236	7301	32293

Source : Annual Reports of the Controller General of Patents, Design and Trade Marks

**Table 35****YEAR WISE NUMBER OF APPLICATIONS FILED BY TOP INDIAN PATENTEES DURING  
2008-09 TO 2010-11**

Name of Organisation	Number of Applications		
	2008-09	2009-10	2010-11
Council of Scientific and Industrial Research	696	144	265
Hindustan Unilever Ltd.	#	103	57
Bharat Heavy Electricals Ltd.	28	67	52
Tata Steel Ltd.	#	30	36
TVS Motor Company Ltd.	#	#	28
Defence Research & Development Organisation (DRDO)	57	37	21
Steel Authority of India Ltd.	19	#	16
Cadila Healthcare Ltd.	#	#	13
Department of Biotechnology	#	#	13
Indian Institute of Technology, Bombay	14	25	11
Ranbaxy Laboratories Ltd.	10	#	#

Source : Annual Reports of the Controller General of Patents, Designs and Trade Marks (various issues)

Note : 1. # During the period under reference these organisations did not fall among top patentees.

2. The figures are arranged in decreasing order for 2010-11



**Table 36****NUMBER OF APPLICATIONS FILED BY TOP TEN FOREIGN RESIDENTS  
DURING 2008-09 TO 2010-11**

Name of Organisation	Number of Applications		
	2008-09	2009-10	2010-11
Qualcomm Incorporated	252	852	1153
Koninklijke Philips Electronics (N.V.)	#	725	627
Telefonaktiebolaget LM Ericsson (PUBL)	176	242	449
BASF SE	#	222	304
Sony Corporation	102	296	302
Microsoft Corporation	#	220	301
Robert Bosch GMBH	#	244	284
Sharp Kabushiki Kaisha	#	#	277
Alcatel Lucent	#	#	269
Siemens Aktiengesellschaft	#	234	249
Nokia Corporation	173	267	#
Novartis AG	226	203	#
Thomson Licensing	221	#	#
Astrazeneca AB	190	#	#
General Electric Company	174	#	#
The Procter & Gamble Company	157	#	#
Sony Ericsson Mobile Communications AB	104	#	#

Source : Annual Reports of the Controller General of Patents, Designs and Trade Marks (various issues).

Note : 1. # During the period under reference these organisations did not fall among top ten.

2. The figures are arranged in decreasing order for 2010-11

**Table 37****NUMBER OF PATENTS FILED BY TOP TEN FOREIGN RESIDENTS AT INDIAN PATENT OFFICE DURING THE YEARS 2008-09 TO 2010-11**

Name of Organisation	Number of Applications		
	2008-09	2009-10	2010-11
Qualcomm Incorporated	#	230	178
Honda Motor Co. Ltd.	#	47	96
Samsung Electronic Co. Ltd.	32	79	77
The Procter & Gamble Company	62	#	75
Thomson Licensing S.A.	#	62	73
Motorola, INC.	23	52	72
Honda Giken Kogyo Kabushiki Kaisha	47	#	55
Research in Motion Ltd.	#	#	48
Telefonaktiebolaget LM Ericsson (PUBL)	29	41	47
LG Electronic Inc.	#	49	45
BASF Aktiengesellschaft	#	66	#
Siemens Aktiengesellschaft	#	65	#
Koninklijke Philips Electronics N.V.	#	49	#
General Electric Company	77	#	#
Sony Corporation	73	#	#
Praxair Technology, Inc.	31	#	#
Astrazeneca AB	25	#	#
Telefonaktiebolaget 1M Ericsson	24	#	#

Source : Annual Reports of the Controller General of Patents, Designs and Trade Marks (various issues).

Note : 1. # During the period under reference these organisations did not fall among top ten.

2. The figures are arranged in decreasing order for 2010-11

**Table 38**

**NUMBER OF PATENT APPLICATIONS FILED IN INDIA FROM 2006-07 TO 2010-2011  
UNDER VARIOUS FIELDS OF INVENTIONS**

Year	Chemical	Drug	Food	Electrical	Mechanical	Computer/ Electronics	Biotechnology	General & Other fields	Total
2006-2007	6354	3239	1223	2371	5536	5822	2774	1621	28940
2007-2008	6375	4267	233	2210	6424	4842	1950	8917	35218
2008-2009	5884	3672	340	2319	6360	7063	1844	9330	36812
2009-2010	6014	3070	276	2376	6775	7646	1303	6827	34287
2010-2011	6911	3526	315	2719	7782	9594	1497	7056	39400

Source : Annual Report of the Controller General of Patents, Designs and Trade Marks (2010-11)

Note : 1. General & Other Fields includes Bio –Medical, Bio-Chemistry, Bio-Informatics, Physics, Civil, Textiles, Metallurgy / Material Science, Agriculture, Polymer Science, Veterinary and any other field.

2. Data includes Indian & Foreign Residents in India.

**Table 39**

**RESEARCHERS PER MILLION PEOPLE FOR SELECTED COUNTRIES**

Sl. No.	Country	No. of Researchers per million people	Population in Million (2009)	Total Researchers (Number) (2009)
1	Argentina	1091	40.1	43717
2	Australia	4208	22.0	92379 #
3	Austria	4144	8.4	34664
4	Brazil	668	193.2	129106
5	Canada	4470	33.7	148983 #
6	China	863	1331.4	1152311
7	Czech Republic	2742	10.5	28759
8	Denmark	6529	5.5	36062
9	Finland	7651	5.3	40849
10	France	3619	64.7	234201
11	Germany	3873	81.9	317226
12	Hungary	2002	10.0	20064
13	India*	164	1177.0	192819
14	Italy	1692	60.2	101825
15	Japan	5139	127.6	655530
16	Korea Republic	4963	49.2	244077
17	Mexico	384	112.0	42973
18	Netherlands	2841	16.5	46958
19	Norway	5441	4.8	26273
20	Pakistan	162	170.5	27602
21	Russian Fed.	3117	141.9	442263
22	Singapore	6121	5.0	30530
23	Spain	2915	45.9	133803
24	South Africa	396	49.0	19384
25	Sri Lanka	96	20.5	1972 #
26	Sweden	5053	9.3	46983
27	United Kingdom	4144	61.8	256124
28	United States	4605	306.8	1412639@
29	Venezuela	185	28.4	5261 #

Source : Researchers Per Million - UIS, UNESCO (Website accessed on August, 2013)

World Development Indicators database updated on August 08, 2013

Note : \* India - Data includes estimated 22,100 researchers employed in the Higher Education Sector.

# 2008 : @ 2007



**Table 40 (A)****R&D EXPENDITURE PER CAPITA AND AS PERCENTAGE OF GDP FOR SELECTED COUNTRIES 2009 (in PPP US\$)**

Sl.No	Country	Per Capita R&D in PPP\$	Per Capita GDP in PPP \$	R&D Exp. as % GDP	R&D Exp. in Billion PPP current US \$
1	Argentina	86.6	14583	0.60	3.5
2	Australia	869.7	40082	2.41 #	19.1 #
3	Austria	1101.4	38888	2.71	8.8
4	Brazil	122.8	10357	1.19	23.7
5	Canada	727.4	37801	1.95	24.9
6	China	115.5	6798	1.70	154.1
7	Czech Republic	396.0	25645	1.47	4.0
8	Denmark	1113.3	38268	3.16	6.7
9	Finland	1494.6	35541	3.94	7.5
10	France	767.8	33666	2.23	47.9
11	Germany	1018.8	35631	2.82	84.0
12	Hungary	236.9	20249	1.17	2.4
13	India	26.2	3133	0.87	30.8
14	Israel	1211.2	25933	4.27	8.8
15	Italy	408.5	32216	1.26	24.5
16	Japan	1083.5	31746	3.36	137.1
17	Korea Republic	919.8	26680	3.36	43.9
18	Mexico	54.7	13839	0.39	6.1
19	Netherlands	723.6	40986	1.82	12.3
20	Norway	930.2	54783	1.78	4.7
21	Pakistan	12.1	2587	0.46	2.1
22	Russian Fed.	234.5	19227	1.25	33.5
23	Singapore	1232.5	50809	2.43	6.2
24	South Africa	95.5	10248	0.93	4.7
25	Spain	444.4	32002	1.39	20.4
26	Sri Lanka	52.8	4711	0.11 #	1.1 #
27	Sweden	1384.6	37257	3.60	12.5
28	United Kingdom	658.6	34386	1.87	40.6
29	United States	1305.6	45305	2.79	398.2

Source : UIS, UNESCO (Website accessed on 11 August, 2013)

World Development Indicators database updated on August 08, 2013.

\* Main S&T Indicators vol. 2011/2.

Note : 1. # 2008

2. % Estimate based on 2009-10 exchange rate PPP\$, World Development Indicators, The World Bank

**Table 40 (B)****R&D EXPENDITURE PER CAPITA AND AS PERCENTAGE OF GDP FOR SELECTED COUNTRIES 2009 (in US\$)**

Sl.No	Country	Per Capita R&D in US \$	Per Capita GDP in US \$	R&D Exp. as % GDP	R&D Exp. in Billion Current US \$
1	Argentina	45.9	7679	0.60	1.8
2	Australia	1004.9	42038	2.41 #	22.1 #
3	Austria	1298.6	47636	2.71	10.4
4	Brazil	97.4	8219	1.19	18.9
5	Canada	765.2	39296	1.95	26.0
6	China	63.8	3746	1.70	85.0
7	Czech Republic	290.4	19027	1.47	2.9
8	Denmark	1636.0	51599	3.16	9.8
9	Finland	1885.1	47598	3.94	9.4
10	France	944.3	42054	2.23	59.5
11	Germany	1135.1	40610	2.82	93.1
12	Hungary	147.8	12896	1.17	1.5
13	India	9.5	1170	0.87	11.2
14	Israel	1250.9	27913	4.27	8.8
15	Italy	447.7	35213	1.26	26.7
16	Japan	1320.7	39602	3.36	169.0
17	Korea Republic	606.2	16990	3.36	29.7
18	Mexico	36.0	8176	0.39	3.9
19	Netherlands	850.3	46596	1.82	14.5
20	Norway	1331.8	76353	1.78	6.7
21	Pakistan	4.3	953	0.46	0.7
22	Russian Fed.	107.8	8675	1.25	15.3
23	Singapore	833.5	36446	2.43	4.2
24	South Africa	50.5	5824	0.93	2.5
25	Spain	440.3	31745	1.39	20.3
26	Sri Lanka	2.2	2099	0.11 #	0.04 #
27	Sweden	1622.7	45119	3.60	14.6
28	United Kingdom	651.8	35073	1.87	40.4
29	United States	1319.5	45990	2.79	405.1

Source : UIS, UNESCO (Website accessed on 11 August, 2013) World Development Indicators, The World Bank  
\* OECD Main S&T Indicators 2011/2.

Note : 1. # 2008

2. % Estimate based on 2009-10 exchange rate, Economic Survey 2010-11

Table 41

**COUNTRY OF CITIZENSHIP OF NON-U.S. CITIZENS AWARDED SCIENCE AND ENGINEERING DOCTORATES BY U.S. UNIVERSITIES 1990-2011**

Sl. No.	Country of Citizenship	Year										
		1990	1991	1995	2000	2005	2006	2007	2008	2009	2010	2011
1	Argentina	65	62	49	76	94	101	126	134	128	102	110
2	Brazil	98	119	137	126	180	167	157	157	160	162	149
3	Canada	252	297	274	289	463	465	511	499	516	468	454
4	China	1150	1793	2751	2358	3588	4445	4709	4521	4096	3737	3978
5	Egypt	159	112	78	79	147	128	113	106	72	74	115
6	France	65	67	83	82	126	126	152	149	133	109	125
7	Germany	123	118	208	228	194	182	173	193	208	192	203
8	India	711	752	1207	821	1186	1606	2072	2316	2265	2138	2161
9	Indonesia	53	69	83	61	71	52	47	64	52	61	67
10	Israel	74	89	86	45	102	98	108	104	92	104	90
11	Japan	147	125	155	197	263	270	276	256	256	236	243
12	Korea	971	1114	1005	746	1442	1545	1437	1439	1523	1377	1442
13	Nigeria	82	83	53	22	26	33	52	57	56	51	51
14	U.K.	104	132	132	99	113	113	113	116	101	101	103

Source : National Science Foundation/Division of Science Resources Statistics.

**Table 42**

**FOREIGN RECIPIENTS OF U.S. SCIENCE & ENGINEERING DOCTORATES,  
BY COUNTRY/ECONOMY OF ORIGIN: 1989–2009**

<b>Country/Economy</b>	<b>Number</b>	<b>Percentage</b>
All foreign recipients	223245	100
Top 10 total	149774	67.1
China	57705	25.8
India	24809	11.1
South Korea	21846	9.8
Taiwan	17848	8.0
Canada	7193	3.2
Turkey	5391	2.4
Thailand	4003	1.8
Japan	3806	1.7
Mexico	3589	1.6
Germany	3584	1.6
All others	73471	32.9

Source : Science and Engineering Indicators 2012.

Note : Foreign doctorate recipients include permanent and temporary residents.



Table 43

**PLAN - WISE PROGRESS OF EXPENDITURE FOR CENTRAL SCIENTIFIC DEPARTMENTS**

Sl. No.	Agency	8th Plan (1992-97)		9th Plan (1997-2002)		10th Plan (2002-07)		11th Plan (2007-12)		12th Plan (2012-17)	
		Outlay	Actual	Outlay	Actual	Outlay	Actual	Outlay	Actual	Outlay	Actual
1	DAE (R&D Sector)	600.00	663.91	1500.00	1525.60	3501.35	3187.06	11000.00	7922.10	19878.00	
2	MoES *	130.00	199.40	510.62	452.11	1125.00	1044.44	7004.00	3166.02	9506.00	
3	DST	640.00	936.71	1497.35	1502.32	3400.00	3998.12	11028.00	8551.79	21596.00	
4	DBT	265.00	395.84	675.00	621.72	1450.00	1646.49	6389.00	4664.63	11804.00	
5	DSIR/CSIR	655.00	774.93	1327.48	1356.02	2575.00	2894.27	9000.00	6939.10	17896.00	
6	DOS	1804.00	3154.85	6511.72	6610.11	13250.00	10870.88	30883.00	15187.87	39750.00	
	<b>Total</b>	<b>4094.00</b>	<b>6125.64</b>	<b>12022.17</b>	<b>12067.88</b>	<b>25301.35</b>	<b>23641.26</b>	<b>75304.00</b>	<b>46431.51</b>	<b>120430.00</b>	

(Rs. Crores)

Source : Five Year Plan Documents, Planning Commission.

1. DAE - Deptt. of Atomic Energy.
2. \* MoES - Ministry of Earth Sciences formerly Department of Ocean Development.
3. DST - Deptt. of Science & Technology.
4. DBT - Deptt. of Biotechnology
5. DSIR/CSIR - Deptt. of Scientific & Industrial Research/ Council of Scientific and Industrial Research.
6. DOS - Deptt. of Space.
7. Figures excludes Non-Plan Allocation/Expenditure

**Table 44**

**YEAR-WISE PROGRESS OF PLAN EXPENDITURE OF CENTRAL SCIENTIFIC DEPARTMENTS**

(Rs. Crores)

Sl. No.	Agency	Annual Plan 2002-03 Actual	Annual Plan 2003-04 Actual	Annual Plan 2004-05 Actual	Annual Plan 2005-06 Actual	Annual Plan 2006-07 Actual	Tenth Plan (2002-07) Actual	Annual Plan 2007-08 Actual	Annual Plan 2008-09 Actual	Annual Plan 2009-10 Actual	Annual Plan 2010-11 Actual	Annual Plan 2011-12 Actual	Eleventh Plan (2007-12) Actual	Annual Plan 2012-13 Actual
1	DAE (R&D Sector)	405.56	409.94	609.52	770.80	991.24	3187.06	978.07	1313.81	1619.27	1817.07	2193.88	7922.10	1920.00
2	MoES *	138.69	147.38	198.88	225.05	334.44	1044.44	359.05	469.56	754.37	764.32	818.72	3166.02	820.00
3	DST	527.10	602.37	896.26	1024.24	938.15	3998.12	1266.89	1517.42	1667.41	1932.89	2167.18	8551.79	2175.00
4	DBT	203.25	248.76	319.27	386.36	488.85	1646.49	616.68	869.98	882.78	1112.80	1182.39	4664.63	1300.00
5	DSIR/CSIR	366.96	380.15	596.25	730.33	820.58	2894.27	1054.98	1180.40	1278.87	1596.26	1828.59	6939.10	1555.00
6	DOS	1846.71	1941.00	2194.70	2294.30	2594.17	10870.88	2821.75	2810.02	3167.61	3603.41	2785.08	15187.87	3800.00
<b>Grand Total</b>		<b>3498.27</b>	<b>3729.60</b>	<b>4814.88</b>	<b>5431.08</b>	<b>6167.43</b>	<b>23641.26</b>	<b>7097.42</b>	<b>8161.19</b>	<b>9370.31</b>	<b>10826.75</b>	<b>10975.84</b>	<b>46431.51</b>	<b>11570.00</b>

Source : Five Year Plan Documents, Planning Commission.

Note : 1. DAE - Deptt. of Atomic Energy.

2. \* MoES - Ministry of Earth Sciences formerly Deptt. of Ocean Development.

3. DST - Deptt. of Science & Technology.

4. DBT - Deptt. of Biotechnology

5. DSIR/CSIR - Deptt. of Scientific & Industrial Research/ Council of Scientific and Industrial Research.

6. DOS - Deptt. of Space.

Table 45

## SELECTED STATISTICAL INDICATORS FOR INDIA

Indicator	Year 1950-51	1990-91	2000-01	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
<b>ECONOMIC INDICATORS</b>									
GNP at Factor Cost current prices (Rs. Crores)	9995	524268	1969249	3364387	3920042	4561574	5270644	6053585	7078512 <sup>a</sup>
Per Capita Net National Product current prices (Rs.)	264	5621	17295	27131	31206	35825	40775	46117 <sup>p</sup>	53331 <sup>a</sup>
GDP at factor cost:at current prices (Rs. Crores)	9719	515032	1925017	3402316	3952241	4582086	5303567	6091485 <sup>p</sup>	7157412 <sup>a</sup>
Per capita Net National Product at factor cost at constant prices (Rs.)	5708	11535	16172	25969	28083	30332	31754	33843 <sup>p</sup>	35993 <sup>a</sup>
Gross Domestic Capital Formation as percentage of GDP at current market prices (%)	8.4	26.0	24.3	34.3	35.7	38.1	34.3	36.6	35.1
Gross domestic savings as percentage of GDP at current market prices (%)	8.6	22.8	23.7	33.1	34.6	36.8	32	33.8	32.3
Index of agricultural production [base: triennium ending 1981-82]	46.2	148.4	165.7	191.9	200.7	207.1	194.1	191.4	215.3
Index of Industrial Production (Base:2004-05) <sup>b</sup>	7.9	91.6	162.6	221.5	247.1	141.7	145.2	152.9	165.5
Wholesale Price Index** (Base:2004-05) <sup>c</sup>	6.8	73.7	155.7	195.6	111.2	116.6	126.0	132.8	143.3
Consumer Price Index (Base 1982=100) and (Base 2001=100 from 2006-07) <sup>f</sup>	17	193	444	542	125	133	145	163	180
<b>AGRICULTURE PRODUCTION</b>									
Foodgrains (Million Tonnes)	50.8	176.4	196.8	208.6	217.3	230.8	234.4	218.1	241.6 <sup>e</sup>
Oilseeds (Million Tonnes) <sup>db</sup>	5.2	18.6	18.4	28.0	24.3	29.8	27.7	24.9	31.1 <sup>a</sup>
Pulses (Million Tonnes)	8.4	14.3	11.0	13.4	14.2	14.8	14.6	14.7	18.1 <sup>a</sup>
<b>Per Capita Net Availability</b>									
a) Cereals (Gms/day)	334.2	435.3	422.7	390.9	412.8	407.4	394.2	407.0	407 <sup>p</sup>
b) Pulses (Gms/day)	60.7	41.1	31.8	31.5	32.5	35.5	41.8	37.0	31.6 <sup>p</sup>
<b>POPULATION AND HEALTH</b>									
Population (Million)	359	839	1019	1106	1122	1138	1154	1177	1210 <sup>r</sup>
Birth Rate Per Thousand Population <sup>m</sup>	39.9	29.5	25.4	23.5	23.8	23.5	22.8	22.5	22.1 <sup>q</sup>
Death Rate Per Thousand Population <sup>m</sup>	27.4	9.8	8.4	7.5	7.6	7.4	7.4	7.3	7.2 <sup>q</sup>
Registered Medical Practitioners (R.M.P.) Thousand	61.8	393.6	587.2	n.a.	n.a.	n.a.	793.7	846.5	922.2
R.M.P Per Ten Thousand Population	1.7	4.7	5.7	n.a.	n.a.	n.a.	6.8	7.2	7.6
Beds All Types Per Ten Thousand Population <sup>p</sup>	3.2	9.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Table 45 (Contd.)

## SELECTED STATISTICAL INDICATORS FOR INDIA

Indicator	Year 1950-51	1990-91	2000-01	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Expectancy of Life at Birth Male (Years)	32.5	58.6	61.6	62.3	62.6	n.a.	n.a.	n.a.	62.6 <sup>q</sup>
Expectancy of Life at Birth Female (Years)	31.7	59	63.3	63.9	64.2	n.a.	n.a.	n.a.	64.2 <sup>q</sup>
<b>FOREIGN TRADE</b>									
Exports (Rs. Crores)	606	32553	203571	456418	571779	655864	840755	845534	1142649
Imports (Rs. Crores)	608	43198	230873	660409	840506	1012312	1374436	1363736	1683467
<b>EDUCATION</b>									
Literacy Rate (%)									
a) Male	18.3	52.2	64.8	67.6	n.a.	n.a.	n.a.	n.a.	74.0
b) Female	27.2	64.1	75.3	n.a.	n.a.	n.a.	n.a.	n.a.	82.1
Number of University/Deemed University	8.9	39.3	53.7	n.a.	n.a.	n.a.	n.a.	n.a.	65.5
Number of Colleges	27	179	240	342	358	375	428	493	574
Number of High/Higher Secondary Schools	542	7346	12806	19327	21170	23206	25951	31812 <sup>p</sup>	35539
Number of Primary/Junior Basic Schools	7288	79000	126047	159667	169568	172990	179109*	190643	200184
Number of Middle/Senior Basic Schools	209671	558000	638738	772568	784852	805667	809108	809974	827244
Education Expenditure (Rs. Crores)	13590	147000	206269	288493	305584	325174	333403	367745	447600
<b>RESEARCH &amp; DEVELOPMENT</b>									
R & D Expenditure (Rs. Crores)	114.4	20761.3	82486.5	94483.7	110340.4	130557.8	152822.4	197910.9	225054.5
R & D as Percentage of GNP (%)	4.7	3974.17	16198.80	29932.58	34238.39	39437.77	47353.38	53041.30	62053.47 <sup>p</sup>
R & D as Percentage of GDP (%)	0.05	0.76	0.82	0.89	0.87	0.86	0.90	0.88	0.88 <sup>p</sup>
R & D as Percentage of GDP (%)	n.a.	0.75	0.81	0.88	0.87	0.86	0.89	0.87	0.87 <sup>p</sup>

Source : Economic Surveys, UGC Annual Reports, Ministry of HRD (Department of Education) and Elementary Education in India DISE.

Note : P Provisional; Q : Quick Estimates; \* Estimated. n.a. Not Available.

a - Fourth Advance Estimates as on 19.07.2011.

b - The Index of Industrial Production has been revised since 2005-06 on base (2004-05=100). The figures for the year 2007-08 onwards are on the new base.

c - New series of WPI has been released from 2004-05 with base 2004-05=100.

d - 4th Advance Estimates.

db - Includes groundnut, rapeseed & mustard, sesame, linseed, castorseed, nigerseed, safflower, sunflower and soyabean.

e - 4th Advance Estimates.

f - CPI-IW: New series is based on 2001=100.

m - For calendar year. Figure shown against 1990-91 is for calendar year 1991 and so on. Source : Office of R.G.I.

p - Includes beds in hospitals, dispensaries, P.H.Cs, clinics, sanatoriums, etc.

q - Abridged Life Table 2002-06, RGI.

r - Sample Registration Survey (SRS), Registrar General of India (R.G.I.).



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**Department of Science & Technology**

**(National Science & Technology Management Information System Division)**  
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**The Scheme:** The Division sponsors research projects/studies to interested investigators/organisations under the NSTMIS Scheme. The broader areas where studies could be taken up in the sponsored mode are **S&T manpower, S&T investment, S&T infrastructure, S&T output, S&T databases, R&D productivity/efficiency** etc.

**Some of the sub-areas in which the research proposals/studies could be submitted are given as below:**

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1. Estimation of Full-Time-Equivalents (FTEs) of R&D personnel in public/private sector in the country.
2. Strategies/ approaches to enhance Full-Time-Equivalents (FTEs) of R&D personnel in public/ private sector
3. Enhancing R&D professional strength/capacity through latent mode
4. Estimation of women R&D personnel in S&T and strategies to promote their participation
5. Performance related incentive system for professionals in public research and Government establishments
6. Study of S&T fellowships and their impact
7. Harnessing the potential of superannuated scientists for enhancing the research capabilities in the country

***R&D Infrastructure/ Resources***

8. Emerging/ Frontier areas in S&T: Identification, infrastructure requirements, databases, manpower etc for future advancements
9. Role of tax incentives in promoting R&D in the country
10. Successful models of commercial application of R&D and establishment of new PPP structures
11. Investments required for translating R&D outputs to commercial outcomes
12. Role of MNCs R&D in India

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13. Career profile of Ph D degree holders in S&T
14. Stimulating research in universities
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***Mobility of S&T Professionals***

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26. Innovation in Public Research Organisations

### ***IPR Management***

27. Appropriability of IPR in Indian firms in S&T sectors
28. Technology transfer and commercialization of patents in public and private sector R&D

### ***Scientometric Studies in S&T***

29. India's position in global research output in S&T and its comparison with select countries
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**Head (NSTMIS)  
Department of Science and Technology  
Technology Bhawan, New Mehrauli Road,  
New Delhi – 110 016**

**For any other clarification, please contact**

**Smt. Namita Gupta, Member Secretary, Programme Advisory Committee (PAC) at  
Tel. No. 011-26587373/ Extn. 371 or 011-26523432  
E-Mail: [namita@nic.in](mailto:namita@nic.in) or [parora@nic.in](mailto:parora@nic.in)**



Web site **[www.nstmis-dst.org](http://www.nstmis-dst.org)**

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**Department of Science & Technology**

**[www.nstmis-dst.org](http://www.nstmis-dst.org)**

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नेशनल साइंस एण्ड टेक्नोलॉजी मैनेजमेंट इन्फार्मेशन सिस्टम (एन.एस.टी.एम.आई.एस)  
विज्ञान और प्रौद्योगिकी विभाग,

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इस वेब साइट का उद्देश्य देश में विज्ञान एवं प्रौद्योगिकी संबंधी गतिविधियों के प्रति मानव शक्ति एवं वित्तीय संसाधनों पर सतत जानकारी उपलब्ध कराना है।

## संभावित उपयोगकर्ता

- : नीति-निर्धारक, नियोजक, शोधकर्ता, अकादमीविद्, वैज्ञानिक एवं प्रौद्योगिकीविद्, विज्ञान और प्रौद्योगिकी संस्थान, वेन्डर्स (विक्रेता) और उपकरण आपूर्तिकर्ताओं के साथ-साथ विज्ञान एवं प्रौद्योगिकी के क्षेत्र में अंतर्राष्ट्रीय संगठन इत्यादि।

## फीचर्स

## एन.एस.टी.एम.आई.एस. के बारे में

- : यह देश में विज्ञान एवं प्रौद्योगिकी के नीति नियोजन में नेशनल साइंस एण्ड टेक्नोलॉजी मैनेजमेंट इन्फार्मेशन सिस्टम की उत्पत्ति, गतिविधियों तथा भूमिका की जानकारी देता है।

## प्रकाशन

- : यह राष्ट्रीय विज्ञान एवं प्रौद्योगिकी के विभिन्न आयामों की जानकारी कराता है।

- रिसर्च एण्ड डेवलपमेंट स्टैटिस्टिक्स
- आर. एण्ड डी. इन इंडस्ट्री
- एस. एण्ड टी डाटा बुक
- डायरेक्ट्री ऑफ एक्सट्राम्यूरल आर. एण्ड डी. प्रोजेक्ट्स
- डायरेक्ट्री ऑफ आर. एण्ड डी. इंस्टिच्यूशन्स
- अन्य प्रकाशन / रिपोर्ट्स

## डाटाबेस सर्च

- : यह उपयोगकर्ता को डाटाबेस सर्च में आसानी एवं सुगम्यता प्रदान कराता है।
  - (i) **डायरेक्ट्री ऑफ आर. एण्ड डी. इंस्टिच्यूशन्स डेटाबेस** : सर्च के पैरामीटर्स—अल्फाबेटिकल, एरिया एवं स्टेट वाइज।
  - (ii) **एक्सट्राम्यूरल आर. एण्ड डी. प्रोजेक्ट्स डेटाबेस** : सर्च के पैरामीटर्स—अल्फाबेटिकल, इंस्टिच्यूशनल, प्रिंसीपल इन्वेस्टीगेटर एवं स्टेट वाइज।

## प्रायोजित अनुसंधान

- : परियोजना प्रस्ताव का विशेष प्रपत्र और उसे प्रस्तुत करने संबंधी दिशा-निर्देश।

## प्रोजेक्ट रिपोर्ट

- : नेशनल साइंस एण्ड टेक्नोलॉजी मैनेजमेंट इन्फार्मेशन सिस्टम द्वारा प्रायोजित योजना के तहत चुनिंदा प्रायोजित परियोजना के पूरा होने की रिपोर्ट की सारांश।

## उपयोगी एस. एण्ड टी. संसाधन

- : भारत सरकार की विज्ञान एवं प्रौद्योगिकी नीति संबंधी दस्तावेजों का संग्रह।

## लिंक्स

- : अंतर्राष्ट्रीय वेबसाइटों सहित विज्ञान एवं प्रौद्योगिकी प्रबंधन के क्षेत्र में उपयोगी वेबसाइटों से संबंध स्थापित करना।

## अन्य

- : नवीनतम जानकारी / प्रतिक्रिया



उपयोगकर्ता द्वारा देश में विज्ञान एवं प्रौद्योगिकी संसाधनों पर नवीनतम जानकारी के लिए [www.nstmis-dst.org](http://www.nstmis-dst.org) पर लॉग ऑन करें या सम्पर्क करें—  
विभाग प्रमुख, एन.एस.टी.एम.आई.एस. प्रभाग, विज्ञान और प्रौद्योगिकी विभाग  
टेक्नोलॉजी भवन, नई दिल्ली— 110 016  
टेली / फक्स : 26510686