

## **CHAPTER II**

## SCIENTIFIC AND TECHNICAL MANPOWER

Scientific and Technical (S&T) manpower constitutes one of the major input resources to scientific and technological activities. It is also an indirect measurement of the strength of the country because of its activities. The planning and formulation of science policy requires the knowledge of the total numerical strength of the qualified human resources namely the total stock and the economically active stock of scientific and technical personnel. It is, therefore necessary to study in depth the range and the extent of availability of S&T manpower and their deployment pattern.

The Government of India appointed a Scientific Manpower Committee in 1947 to advise on the best methods of utilizing and augmenting the scientific manpower resources in the country. A scheme on national register for scientific and technical personnel was introduced. Since this registration was voluntary and the response was not upto the mark, this scheme could not serve the purpose of getting information on the stock of S&T personnel. Another problem was that S&T personnel were not only engaged in S&T activities but also in multifarious activities like production, teaching, extension, management, administration, quality control, banking etc. They were employed in different types of organisations situated in far flung areas of the country. Keeping this in view, it was felt that a head count of total stock of S&T personnel at a frequent interval of time was not only time consuming and costly exercise but impracticable too.

Therefore, it was decided that this activity should be taken up along with the census survey. The first survey of S&T personnel was conducted along with the 1961 census of decennial population. As a result of this, particulars of 2.45 lakhs personnel were collected. The studies based on 1961 data on S&T personnel proved to be very useful in education and manpower planning. After a decade, in 1971, it was decided that the extent and coverage of this exercise be extended to all degree holders and technical personnel in all faculties. About 22 lakhs filled in questionnaires were received which helped to conduct a number of studies on S&T manpower planning.

The surveys of 1961 and 1971 were conducted on complete enumeration basis. However, at the time of 1981 census, it was considered not feasible to have complete enumeration. Consequently, efforts were made to collect data on 20% sample basis in 12 states, while a complete enumeration was conducted in other states/union territories except the state of Assam. The total number of schedules of S&T personnel collected through degree holders and technical personnel surveys (DHTP) conducted in 1961, 1971 and 1981 were 2.45 lakhs, 8.79 lakhs and 16.45 lakhs respectively. During 1991, post graduate degree holders and technical personnel survey (PGDHTP) was undertaken along with census survey but could not meet the success.

**Table 2.1**

### ESTIMATED STOCK OF S&T PERSONNEL IN 1999 AND 2001

(Thousands)

Field	Stock of S&T Personnel		Annual Rate of Growth (%)
	1999	2001	
Engineering Degree Holders	913.7	1024.4	5.9
Engineering Diploma Holders	1379.5	1531.7	5.4
Medical Graduates	391.7	415.9	3.0
Agricultural Graduates	223.8	238.6	3.3
Veterinary Graduates	44.0	46.7	3.0
Science Graduates	3655.4	4024.9	4.9
Science Post-Graduates	730.6	805.0	5.0
<b>Total</b>	<b>7338.7</b>	<b>8087.2</b>	<b>5.0</b>

The Planning Commission had undertaken exercises to estimate the stock of S&T personnel at the beginning and at the end of each plan period. The Institute of Applied Manpower Research (IAMR) has estimated the stock of various categories of educational manpower upto 2001. The estimated stock figures are, in general, the extension of the 1981 stock estimates. The same set of assumptions and attrition rates have been used in these reports. The only added dimension is the projection of outturn figures. The outturn figures are worked out by applying appropriate wastage/stagnation rates to the estimated enrolment at different levels of education. According to IAMR, the field wise estimated stock of S&T personnel for the years 1999 and 2001 is shown in Table 2.1.

It may be seen from Table 2.1 that engineering degree holders have the highest growth rate of 5.9%. This is followed by engineering diploma holders and science post graduates.

gives some indication on the unemployment status of S&T personnel though the data reported do not refer to the actual number of unemployed. This number was 12.1 lakhs in 1990 which increased to 20.6 lakhs in 2001. The discipline - wise break- up of registrants is given in Table 2.2.

It may be seen from Table 2.2 that nearly 48 % of the registrants were science graduates/post-graduates, followed by 37 % engineering diploma holders. In interpreting these figures it has to be borne in mind that all the persons registered with the Employment Exchanges are not necessarily unemployed. In addition all the unemployed persons may not be registered with the Employment Exchanges.

The Department of Science and Technology, Government of India has been collecting information since 1973 on the personnel employed in the R&D institutions and in house R&D units of public and private

**Table 2.2**

**BREAK-UP OF S&T PERSONNEL BORNE ON THE LIVE REGISTER OF EMPLOYMENT EXCHANGES - 2003**

(Thousands)

Descipling	Number on Live Register	Percentage
Science Graduates/Post-Graduates	993.8	48.1
Engineering Diploma Holders	762.5	36.9
Engineering Degree Holders /Post-graduates	218.2	10.6
Medical Graduates/Post-graduates	47.9	2.3
Agricultural Graduates/Post-graduates	36.3	1.8
Others (Veterinary Graduates/Post-graduates)	6.9	0.3
<b>Total</b>	<b>2065.6</b>	<b>100.0</b>

The stock of engineering degree and diploma holders are estimated to be 1.0 million and 1.5 million respectively in 2001. The science postgraduates are estimated to be 0.80 million in 2001.

As mentioned in Table 2.1, the total stock of S&T Manpower was estimated to be around 8.1 millions in 2001. The annual outturn of S&T personnel as per University Grants Commission (UGC) was 2.36 lakhs during 1995. Due to the limited job opportunities available in the country all the S&T personnel are not gainfully employed. The data on the S&T personnel borne on the Live Register of Employment Exchange

sectors in the country through a mail card survey. As on 1<sup>st</sup> April 2000, 2,96,343 personnel were employed in research and development establishments. Out of these, 31.7 % were primarily engaged in R&D activities. 30.4% were performing auxiliary (technical supporting) activities and 37.9% were providing administrative or non-technical support. The personnel engaged primarily in R&D activities and auxiliary activities are invariably S&T qualified. The information regarding the deployment of personnel in institutional sector and industrial sector of R&D establishments are provided in Table 2.3.

**Table 2.3**

**PERCENTAGE DISTRIBUTION OF PERSONNEL BY TYPE OF EMPLOYER/ACTIVITY AS ON 1st April 2000**

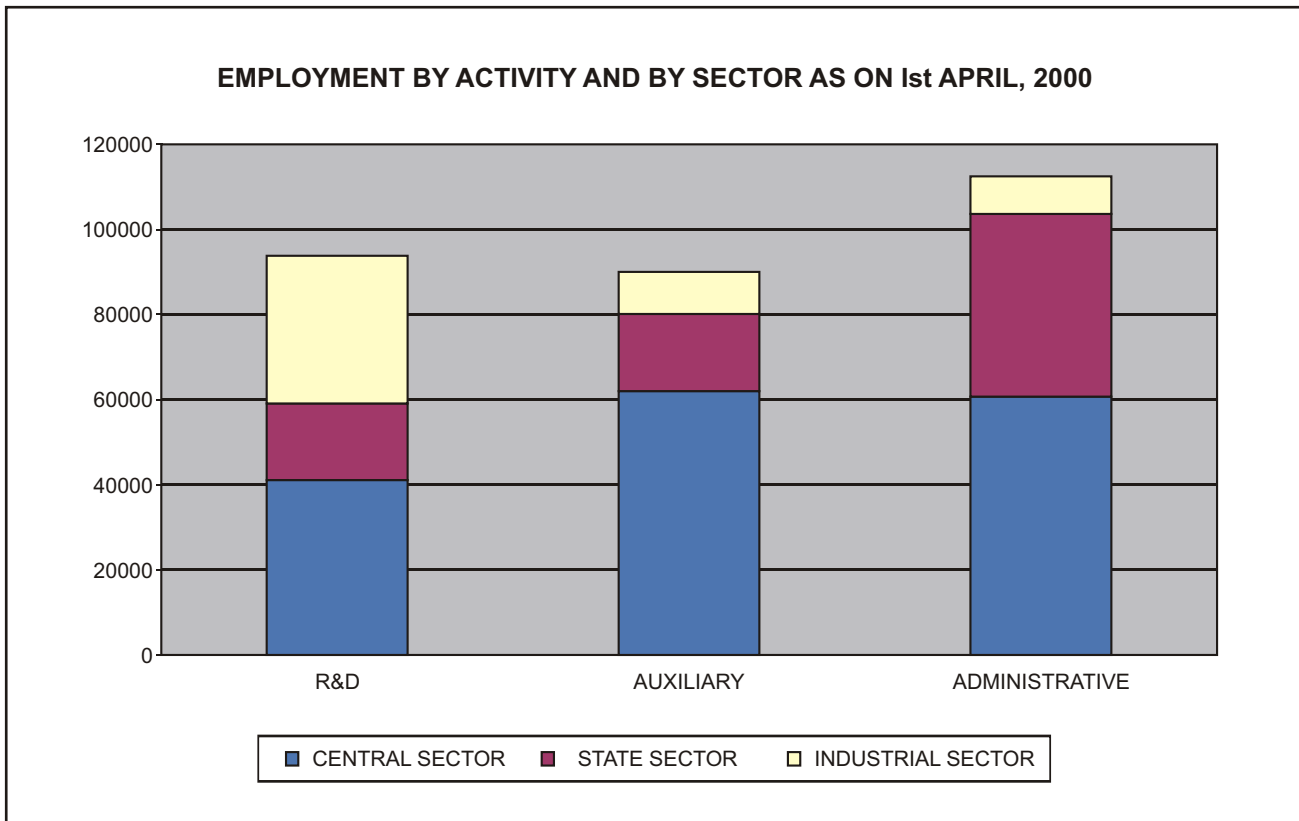
Percentage of Personnel employed				
Employer/Activity	R&D	Auxiliary	Administrative	Total
Institutional Sector	24	33	43	100
Industrial Sector	65	19	16	100

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.

Out of 93,836 R&D personnel (personnel primarily engaged in R&D activities), 59,112 (63%) were employed in the institutional sector and the rest 34,724 (37%) were employed in the industrial sector as on April 1, 2000. With regard to 90,045 auxiliary personnel, the distribution among the institutional and industrial sectors was 89% and 11%. Out of 1,12,462 personnel extending administrative support, 92 % belonged to institutional sector and only 12% of them were from industrial sector.

In all, there were 41,198 women employed in R&D establishments, which was 13.9% of the total employed in such establishments. The percentage of women by nature of activity was 12% (11,304) primarily engaged in R&D activities, 11.5% (10,363) in auxiliary activities and 17.4% (19,531) in administrative activities. 84% of the total women were employed in the institutional sector. The majority of them were engaged in administrative activities.

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 2.4



**Table 2.4****NUMBER OF AUXILIARY AND ADMINISTRATIVE PERSONNEL PER R&D PERSON AS ON 1.4.2000**

Agency	Number of supporting personnel per R&D Personnel*	
	Auxiliary	Administrative
Atomic Energy	1.84	1.02
CSIR	1.48	0.87
DRDO	1.12	1.18
ICAR	1.24	1.99
ICMR	2.65	1.48
Space	1.27	1.14
Other Ministries/Deptts.	2.05	2.41
State Governments	1.01	2.39
Public Sector	0.29	0.26
Private Sector	0.28	0.25
Overall R&D Sector	0.96	1.20

\* Based on response

It may be seen from Table 2.4 that the average number of auxiliary personnel per R&D person was 0.96, though it varied from 1.01 to 2.65 in the institutional sector. The figures for public and private sectors industry were 0.29 and 0.28 respectively. The number of administrative personnel per R&D personnel varied from 0.87 to 2.41 in the institutional sector and the same for public and private sector industry was 0.26 and 0.25 respectively. The number of administrative personnel per R&D personnel employed in State Governments was very high.

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

- As on 1<sup>st</sup> April, 2000, 2.96 lakhs personnel were employed in R&D establishments.
- By nature of work, 31.7% were primarily engaged in R&D activities, 30.4% were performing auxiliary activities and 37.9% were providing administrative support.
- 12.0% of the total R&D personnel were women.
- Out of 93,836 personnel primarily engaged in R&D activities, 59,112 were employed in the institutional sector and rest 34,724 were employed in the in- house R&D units of public and private sector industries
- 13.9% of the personnel employed in R&D establishments were women.