

**REPORT OF THE WORKING GROUP ON SCIENCE AND TECHNOLOGY
FOR THE SIXTH PLAN (1980-85)—AN OVERVIEW***

V. RAO AIYAGARI AND ASHOK JAIN

Department of Science and Technology, New Delhi, India

INTRODUCTION

STARTING with the First Five-Year Plan (1951-56), till the Sixth Plan period (1980-85), the financial resources provided for Science (S) and Technology (T) activities in the country have shown an increasing trend as can be seen from Table I.

Realising the need for an integrated S & T Plan linked to the socio-economic planning, the National Committee on Science and Technology (NCST), set up in 1971, formulated for the first time, a comprehensive S & T Plan for the 5th Plan period (1974-79), based on a sectoral approach. About 2,000 scientists and technologists were involved in this exercise. This was an important step towards the formulation of an integrated S & T Plan, as the earlier planning exercises were essentially confined to S & T Plan of individual institutions and agencies. The 1974-79 S & T Plan, though a commendable exercise in itself, did not pay due attention to the implementational aspects. With the change in the Government in 1977, a new Rolling Plan (1978-83) for the country was evolved. This rolling Plan had an S & T chapter where, in addition to broad policy issues and approach to S & T Planning, implementational aspects were also indicated. Specifically, the need for setting up S & T Groups in each economic Ministry/Depart-

ment to ensure implementation of the S & T Plan was identified. Unfortunately this could not be achieved during the limited tenure of the 1978-83 Plan.

In January 1980, the reconstituted Planning Commission decided to prepare the Sixth Five-Year Plan covering the period 1980-85. The S & T Plan for 1980-85 was also to be prepared as part of this overall Plan to reaffirm Government's appreciation of the role and importance of Science and Technology in the country's socio-economic progress. In this context, an integrated Working Group in Science and Technology was constituted in September 1980; the present article presents an overview of the Report of this Working Group on Science and Technology for the Sixth Plan (1980-85). The report has now been suitably incorporated as a separate chapter in the country's Sixth Five-Year Plan (1980-85) brought out recently by the Planning Commission.

THE 1980-85 S & T PLAN—CONSULTATIVE PROCESS

In order to evolve the S & T Plan framework for 1980-85, consultations were initiated by the Planning Commission during April 1980. Working Groups were set up in selected Core Sectors of the economy having science and technology component. Simultaneously, the Planning Commission also held discussions with the heads of scientific agencies to identify new S and T proposals. Further, the Prime Minister directed Prof. S. Nurul Hassan, Vice-President, CSIR, to organise a series of meetings all around the country with scientists belonging to different fields and different age groups, to seek views of the scientific community on the S & T component of the plan. A number of meetings were organised in this connection, at the end of which, on 2-3 August 1980, a concluding meeting of scientists and technologists was organised in New Delhi, and was addressed by the Prime Minister. The main objective of this meeting was to evolve a broad plan framework for the S & T Plan 1980-85. During this meeting special attention was paid to (i) Organisational and institutional mechanisms for more purposeful activities in science and technology sectors, (ii) Better living and working conditions for scientists, (iii) Fiscal incentives and (iv) Industrial and import policies.

TABLE I

Financial resources provided for S & T activities in successive plans

	(Rs. in crores)		
	Plan	Non-plan	Total
1st Plan (1951-56)	14	6	20
2nd Plan (1956-61)	33	34	67
3rd Plan (1961-66)	71	73	144
4th Plan (1969-74)	142	231	373
5th Plan (1974-78)	502	515	1017
(Truncated)			
6th Plan (1978-83)	1376	1069	2445
New 6th Plan (1980-85)	1919	1448	3367

* The views expressed are those of the authors and not necessarily of the Department of Science and Technology.

As a follow-up of the above developments, the Planning Commission constituted the S and T Working Group in September 1980 to recommend a detailed concrete framework for the 1980-85 S & T Plan. The Working Group chaired by Prof. M. G. K. Menon, Secretary, Department of Science and Technology, consisted of scientists and technologists from universities, scientific institutions and industry, besides officials from the Planning Commission. The Report of the Working Group was submitted to the Planning Commission in December, 1980.

APPROACH AND OBJECTIVES

One of the important considerations before the Working Group was the urgent need to mobilise, for national development, the considerable amount of infrastructure in science and technology in the form of manpower and institutional structure already created over the years, through increasing amount of financial resources. The Group also took note of the existing imbalance in the overall growth of science and technology at the global level between the developed and the developing countries (97% of the world's R and D activities are carried out in developed countries) and therefore emphasised an urgent need to give special thrust in carefully identified areas of science and technology, as India could not afford to lag behind in its march towards the development of science and technology. Keeping in view the present position and the perspective for the future, the Working Group has suggested the following major objectives for science and technology in the Sixth Plan:—

- (a) Human resources development.
- (b) Removal of regional imbalances; and
- (c) Price stability.

Commensurate with the objectives, some of the criteria which had a bearing on setting the goals and character for S & T Plan are stated as:

- (a) Maximising the returns from investments already made in several sectors of the economy and thereby bringing about fuller utilization of the capacities through increased efficiency and productivity.
- (b) Ensuring appropriate steps to achieve technological self-reliance through the application of modern science and upgradation of technology.
- (c) Structuring the application of science and technology in different sectors around the theme of conservation and efficiency in the use of energy and appropriate materials systems, and contributing to alternative and additional energy availability.

- (d) Bringing about conditions which enable the adoption of science and adaptation of technology, oriented towards the benefits to the society.
- (e) Ensuring that the development programmes based on science and technology are compatible with the goal of protection and improvement of ecological and environmental assets.
- (f) Ensuring its potential for securing a faster growth in the economy commensurate with the improvement in the quality of life of the people and the inculcation in them of a scientific method of thinking.
- (g) Evolving of new techniques of crop and animal production so that the country's enormous resources of sunshine, water, soil fertility, and above all the human resources, can fully be harnessed to increase agricultural production for the triple purpose of improving the nutritional standards of people, for the generation of employment through Food for Work Programmes, and generating a massive export potential. All these had to be achieved without damaging the various life-support systems.

The Working Group further identified major objectives for S & T in the various sectors such as Energy, Chemical Industry, Instrumentation, Electronics, Heavy Engineering, Machine Tools, Mining and Minerals, Telecommunication and Broadcasting, Food and Agriculture, Transport, Training and Education, Information Systems, Medical Care, Urban System, Atomic Energy, Space Science and Technology, etc. It has also emphasised other important S & T elements which need specific attention, e.g., science communicators and critics, technological and industrial intelligence, manpower training for R & D management and policy, planning for S & T, and technological forecasting. The Working Group has also identified a list of indicative thrust areas for science and technology and has suggested selective intensification of research in thrust areas so that our existing manpower resources can be utilized fully and infrastructure of our institutions can be strengthened, enabling the country to leap-frog into advanced areas of science and technology.

With regard to the policy formulation, S & T planning and implementation, the Working Group has emphasised the importance of creating, on an urgent basis, appropriate structures and the need has been reiterated for having, in the economic ministries, properly structured Information Planning and Analysis Groups manned by professional scientists and technologists and headed by senior scientists/technologists who will function as Scientific Advisers to the

Minister. The report recommends that in all the areas of priorities in the plan, where large investments are to be made, the S & T component should be clearly identified and broken down into specific tasks that could be assigned to institutions capable of working on them (whether coming under the concerned ministry or otherwise) and, wherever necessary, new capabilities are built up. Some of the measures outlined in the report relate to :—

- Creation of scientific temper essential for the growth of science and its utilization in the development process.
- Provision of better facilities and amenities for scientists, including better salary structures and avenues of promotion.
- Providing improved linkages between the scientific community, R & D Institutions, Industry, Technology acquisition and adaptation, foreign collaboration in S & T, etc.
- Provision of enhanced support for university research in order to improve the research output. A mandatory requirement could be imposed on the scientific agencies/industry to spend a certain percentage of their R & D budget in the academic sector, to promote adequate linkages.
- Adequate support to be provided for the support of basic research not only for its own sake, but also because of the solid foundation it provides for applied research and development.
- Selective intensification of research work in high priority areas of importance to scientific development and/or to national development.
- Involvement of young and bright scientists in promoting an interest in science in the youth.
- Building up a national rural resources corps of young professionals.
- Involvement of national science academies and professional bodies in the S & T development process.
- Development of S & T programmes for Scheduled Castes and Scheduled Tribes and other weaker sections of the society.
- Development of State Councils on Science and Technology in order to promote and coordinate S & T activities at the State level.
- Provision of flexibility of operations to the S & T agencies and the delegation of financial powers to them.
- Promotion of scientific and technical cooperation particularly with the developing countries in order to identify and take up programmes of collaborative nature for collective self-reliance of the developing countries.

FOLLOW-UP

The major recommendations contained in the Working Group report have been approved by the National Development Council (NDC) and incorporated in the plan document (1980-85).

An important development relating to S & T policy formulation and implementation has been the constitution of a Cabinet Committee on Science and Technology, headed by the Prime Minister and a Science Advisory Committee to Cabinet (SACC), headed by Member (Science), in the Planning Commission. It is expected that these committees would give necessary directions towards successful implementation of the S & T Plan (1980-85) as recommended by the Working Group. The Department of Science and Technology is expected to coordinate and follow up this activity. Various scientific agencies, ministries, and departments of Government are to initiate action on measures and suggestions given in the report. DST has already initiated action on some specific programmes entrusted to it. Some of these are the following :

- (1) Intensification of research in high priority areas.
- (2) Assistance for the establishment of S & T Councils in States.
- (3) A scheme for involvement of young scientists and encouraging interest in science in the youth.
- (4) S & T for women.
- (5) The role of Schedule Castes/Schedule Tribes and weaker sections of the society in S & T areas.
- (6) Assistance for science academies and professional bodies.
- (7) Technical cooperation with developing countries.

CONCLUDING REMARKS

While the 1980-85 S & T Plan is on the anvil, its major objectives can only be achieved through efficient use of the resources and through its integration with the socio-economic plan. The fact that the S & T Plan provides an opportunity to the scientific community for contributing significantly towards national development is clearly brought out in the concluding paragraph of Prof. M. G. K. Menon's letter to Minister, Planning, while forwarding the Working Group report.

"India has built up a large and highly capable infrastructure in the field of science and technology. The scientific community has already contributed tangibly to national development over this period. The problems that we face are such that solutions for these would have to include massive and sustained efforts in the field of science and technology. If the recommendations made in this Report are implemented, it is our conviction that science and

technology could become a major force for economic and social change; we are at the point where a real break-through and a take-off are possible. It is the hope of the scientific community that this opportunity will not be missed."

ACKNOWLEDGEMENTS

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1. *The Fifth Five-Year Plan* (1974-79), Planning Commission, New Delhi.
2. *The Sixth Five-Year Plan* (1978-83), Planning Commission, New Delhi.
3. *The Report of the Working Group on Science and Technology for the Sixth Plan* (1980-85), Planning Commission, New Delhi, Dec. 1980.
4. *The Sixth Five-Year Plan* (1980-85), Planning Commission, New Delhi (1981).
5. *Annual Report 1980-81*, Department of Science and Technology, New Delhi (1981).

A WELCOME DIRECTIVE FROM UGC

THE scientific community in India has been bestowing considerable thought on the development of scientific publications of international standards, within the country. The struggle has been hard but some progress has been made.

The communication of the results of a piece of scientific research is an essential part of research itself; and the building up of well-run scientific periodicals, backed by an enlightened and rigorous scientific refereeing system is a pre-requisite for the creation of a healthy scientific climate at home.

The habit amongst several Indian scientists of sending their papers abroad still continues. The scientific community has been concerned about the means for breaking this habit. Bringing up high quality theme journals, which can match some of the best ones abroad, publishing research papers with the minimum delay commensurate with the requirements of a good and healthy refereeing system, and producing the journals at costs which are considerably cheaper than those of foreign journals, are some of the important steps taken.

Till now some organisations persist in the habit of requiring candidates for faculty positions and fellowships to list separately their research papers published in foreign journals and those in Indian journals, thereby creating an impression in the minds of the young scientific workers that the former carry greater weight. Habits die hard.

We are happy that when this was brought to the notice of the Chairman of the University Grants Commission by a senior scientist, UGC promptly issued a circular to all universities advising them not to do so. The notification has rightly emphasised that the publications in Indian journals are as important as those published in outside journals; and that the selection of a candidate should among other things be judged on the intrinsic merit of his publications and not where they were published. The scientific community is aware of a tendency among some of the scientists, even senior ones, to attach undue impor-

tance to the number of papers published rather than to the quality of the papers and the scientific advance made by their contributions. Scientific workers (young and old) split up one good paper into several small ones to push up the number of papers published. We are glad that UGC has also emphasised that the mere number of papers should not form the basis of selection. The prompt directions of UGC on these two important issues are quite appropriate and most welcome. We give below the relevant extracts from the UGC circular.

"It has been brought to the notice of the Commission that some universities, while inviting applications from candidates for faculty positions/fellowships ask them to list separately in the application forms their research publication in (a) foreign journals and (b) in Indian journals. This creates an inevitable impression amongst research workers that the publications in foreign journals carry greater weight thereby adding to the disincentives to publications in Indian research journals.

It may be emphasised that publications in Indian journals are as important as publications in foreign journals. The selection of a candidate is judged by the Selection Committee amongst others on the merit of his publications and not on the basis of the number and place of publication.

It is, therefore, requested that the relevant column in the application form where provision is made regarding list of research publications separately in foreign journals and in Indian journals for recruitment to faculty positions/fellowships may be omitted ..."

We heartily support the directions given by UGC and congratulate them for their prompt action. We urge that other agencies at the national level which recruit and employ scientists in a variety of disciplines also follow this practice if they are not already doing so. This is an important step in support of the efforts by the scientific community to establish good journals in the country.