

quotes with endorsement,

The more competition becomes global, ironically, the more important the home-base becomes<sup>36</sup>.

Notes

1. Dunkel Draft (in the text and in the Notes by this name we refer to 'Draft Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations'): Annexure III, Article 27.
2. Dunkel Draft: Annexure III, Article 28.
3. See Lautsch, J. C., (1985) for very readable and exhaustive accounts of the US Patent Act and of the US Copyright Protection Laws.
4. The position of the League for Programming Freedom with respect to software is stated in extenso by R. Stallman and S. Garfinkle in Viewpoint in the *Comm. A.C.M.* January 1992, pp. 17-22, 121. Their statement of their position has attracted reactions of various kinds; see *Comm. A.C.M.*, June 1992, pp. 13-16. Paul Heckel has an angry rejoinder in the same issue, pp. 121-140. He seems to miss the essential points of the League and manages to politicize the debate by bringing in irrelevant details.
5. This is true of science, in general, see in this connection the well-known remarks of Newton, 'If I have seen further it is by standing on the shoulders of giants'.
6. The often quoted illustration is a specific process of curing rubber where a piece of program computes the terminal conditions for terminating the curing process.
7. See Chisum, D., 1986.
8. See Newell, A., 1986.
9. See Samuelson, P., 1990.
10. See note 4, above.
11. 'Legally speaking' and similar columns regularly appear in journals such as *Comm. A.C.M.*, *IEEE Micro*, etc.
12. *The Economist*, August 22, 1992, p. 15.
13. Morita, A., 1986, p. 171.
14. Morita, A., 1986, p. 172.

15. Morita, A., 1986, pp. 174-175. According to *The Economist* (October 10, 1992) 'Until 1970 the number of lawyers per 100,000 Americans had remained at a fairly constant 120 or so. That number has since more than doubled, to over 300. Moreover, the number of federal lawsuits have roughly tripled in the past three decades' (p. 21).
16. See note 3 above.
17. Hart, R., 1989
18. Hart, R., 1989, p. 183.
19. The quotations in this para are taken from Samuelson, P., 1989.
20. See Note 19, above.
21. *The Economic Times*, Bangalore, September 14, 1992.
22. *The Economist*, March 3, 1992, p. 17.
23. See Note 22, above.
24. *The Economist*, May 16, 1992, p. 21.
25. Reference in Note 24, above, p. 24.
26. Reference in Note 24, above, p. 24.
27. Excerpted in *The Economic Times*, Bangalore.
28. *The Economist*, August 22, 1992, p. 56.
29. *The Economist*, August 22, 1992 cautions: 'America's zeal for extending the rights to intellectual property is causing confusion at home and abroad. Worse, it may be stifling rather than encouraging innovation.' p. 55.
30. *The Economist*, August 22, 1992: see 'The harm of patents', p. 15.
31. Personal communication dated September 5, 1991, from Mr. Shirish B. Patel. All quotations regarding InFAST are from this communication.
32. Personal Communication: Mr Shirish Patel's letter of November 2, 1992.
33. *The Financial Times*, London; December 10, 1991.
34. See J. Phipps, 1989.
35. See for instance Chisum's assertion (reference in Note 7): 'Policy considerations indicate that patent protection is appropriate for mathematical algorithms that are useful in computer programming as for other technological innovations', p. 120. In an appendix to his paper, he describes over 25 patents that have been

- already issued to software ideas and methods, pp. 1021-1022.
36. See Porter, M. E., 1990, p. 614.

References

1. Chisum, D., *Univ. of Pittsburgh Law Rev.*, 1986, 47, 959.
2. Gopinath, K., *Economic and Political Weekly*, August 29, 1992, pp. 101-104
3. Grover, D., (ed.), *The Protection of Computer Software: Its Technology and Applications*; Cambridge Univ. Press, 1989.
4. Hart, R., "Legal Protection: Patents, Copyright and Trade Marks"; in (3), 1989, pp. 177-229.
5. Lautsch, J. C., *American Standard Handbook of Software Business Law*, Reston Publishing Co., Reston, Virginia, 1985.
6. Morita, A., *Made in Japan*, E. P. Dutton, New York, 1986.
7. Newell, A., *Univ. of Pittsburgh Law Rev.*, 1986, 47, 1023.
8. Phipps, J., "Physical Protection Devices", in (3), 1989, pp. 58-78.
9. Porter, M. E., *The Comparative Advantage of Nations*, Macmillan, New York, 1990.
10. Samuelson, P., *Comm. A.C.M.*, 1989, 32, 563-572.
11. Samuelson, P., *Comm. A.C.M.*, 1990, 33, 23-27.

*Acknowledgements.* I would like to acknowledge the assistance of Mr R. Chandrasekar of NCST and Ms. T. Jacobson in accessing the relevant literature. I would also like to thank those who took the trouble to comment on an earlier draft of this paper.

Received 29 October 1992; revised accepted 11 November 1992

R. Narasimhan is in CMC Limited, Mitra Towers, 10/3, Kasturba Road, Bangalore 560 001, India

## Extra-mural funding of research: results from the work of the Inter-Agency Committee

V. Siddhartha

The Inter-Agency Committee on the management of R&D funding [extra-mural] was set-up by the Department of Science and Technology (DST) in December, 1989 with a term of two years. Its term was subsequently extended

till end-June, 1992. It had eighteen members drawn from various funding agencies and some individual members from the academic sector. The committee was serviced by DST and chaired by (since retired) P. J. Lavakare. The

committee held ten meetings at which, in pleasant contrast to attendance in other such large committees, there was high attendance reflecting both the eagerness and concern of the members for the work of the committee.

The terms of reference of the Inter-Agency Committee were:

- To discuss all managerial/administrative problems of common interest to all agencies regarding management of R&D funding/policies
- Exchange experience and information about the management of R&D funding schemes, e.g. peer review process, implementation, guidelines, including financial and administrative aspects
- To identify multi-disciplinary and inter-institutional R&D programmes/ areas of common interest to all agencies
- Evolve an integrated approach to assess the impact of R&D projects sponsored through development and analysis of suitable indicators
- To suggest specific policy studies required to be undertaken to get an insight into R&D management practices (equipment utilization, problems of young scientists, promotion of inter-disciplinary areas, etc.)
- Any other matter relevant to improving management of R&D funding practices in the country.

By the third meeting of this committee in July, 1990, it became clear that the laudable objectives of the committee could be furthered only if there was a commonly accepted definition of what constitutes 'extra-mural research'.

After working through some draft definitions provided on request of him by V. Siddhartha, the following definition of extra-mural research was unanimously adopted by the committee:

An agency-funded R&D activity shall be considered 'extra-mural' if all the following four conditions are simultaneously satisfied:

(i) The R&D activity, or part thereof, is conducted by personnel who are not agency employees.

#### Explanations:

- (a) An agency-employee is a person whose emoluments are debited to the salaries/wages budget head of the agency/department.
- (b) In cases where an agency employee is on deputation/lien/study leave/special leave to another agency/university/ industry or other establishment, agency funded R&D

work conducted by such an agency employee shall also be regarded as 'extra-mural', notwithstanding the fact that his emoluments are debited to the salaries/wages head of his parent agency/department.

(ii) The funding is not used for the *ab initio* development and supply to the funding agency of any equipment or services.

(iii) The funding is not used for the development and supply to the funding agency of more than sample quantities of materials, re-agents or services.

(iv) The funding is not the regular annual grant to any institution of the funding agency.

Although it is not intended as a definition which must necessarily be used by each agency for internal purposes of funding and managing extra-mural R&D (EMR) projects, the committee has urged that each agency use the above definition also for the purpose of EMR funding management within each agency as well.

Agencies have made available to DST data about their extra-mural R&D funding based on the above definition. Table 1 shows the pattern of funding of extra-mural research by the major agencies. One important omission from the table is the Central Board of Irrigation and Power; a consequence of it not being represented on the inter-agency committee.

Agency representatives on the inter-agency committee agree on the following matters in the management of extra-mural research funding:

- All the agencies are willing, even keen, to share available information, exchange views and incorporate commonly evolved changes, in their R&D funding schemes.
- Over the last decade or so, most of the S&T agencies/organizations have recognized the fact that in addition to using the inhouse expertise in terms of supporting scientists in the institutions directly funded by the funding agency, there is a need for using the wide expertise available in the country in the universities and other research institutions so that

the primary objective of the funding agencies is met, not only through their own intra-mural activities, but also through providing time-bound project support for extra-mural R&D activities. At the present moment, it is estimated that funding being made through extra-mural R&D schemes of all the agencies is much less than 10% of the total R&D funds being allocated nationally for R&D activities (though complete figures are yet not available). The special advantages of extra-mural funding need to be identified and appreciated. Schemes have basically been evolved from the western systems (such as NSF, NIH, SERC-UK, etc.) In this context, the role played by R&D funding schemes in India has to be properly examined.

- All the agencies have incorporated a peer review mechanism, involving assessment of research proposals received, but the vigour used by different agencies seems to show wide variety. In all the S&T agencies, there are active secretariates for their extra-mural funding schemes (which are also represented on the inter-agency committee) who are active R&D managers and are conscious of the role to be played by scientists, administrators, funding representatives as well as by R&D managers.
- There is a uniform feeling that the role being played by R&D managers who are part of the secretariates of the various extra-mural funding schemes has not been properly understood since it falls between the role played by a scientist and the role played by an administrator. The committee has felt that this issue should be discussed/addressed further. The role being played by R&D managers in fostering and promoting scientific research in the country should be highlighted. Some suggestions were also made that there will be advantages on R&D managers being exposed to activities in different scientific agencies, thus getting a wider perspective of the role of fostering and promoting scientific research.
- It was observed that some of the older agencies (say for example, ICMR) are facing difficulties in

Table 1. 'Extra-mural' R&D budgets of S&T agencies for the 7th and 8th Plan Period (PLAN) (Rs in lakhs)

Agency/ Department	Schemes (s)	Actual outlay during 7th Plan 1985-90	Proposed outlay during 8th Plan 1990-95	Actual outlay during 1990-91	Budget provision for 1991-92
DST	SERC + IRHPA	7035	11,500	1735	1850
DBT	R&D schemes	10,550	52,800 <sup>a</sup>	4028	5580
DSIR CSIR	General and emeritus schemes	2098	3500	720	750
DAE	BRNS	808	4426	289	385
DOS	RESPOND + STCs	340	1100	84	164
DOD	MRDF	210.11	1700	129.16	300
DRDO <sup>b</sup>	General schemes + research & training (electronics) + ARDB grant-in-aid	2448.84	3475	574.5	623
DOE	TDC, NRC, EMDC, CAD and other plan progs.	9222	58,851	2705	2900
DOEn	R&D including action programmes	2131	4120	329	350
DNES	R&D	5060.73	8483.6	1180.6 <sup>c</sup>	1366
ICAR	Adhoc cess fund schemes*	3538.37	6018	990.89	591.55
ICMR	Extramural	6615.73	12,630	1304.52	1489
UGC	**	12,634	25,315	3965	4582
DOEd	R&D	354.30 <sup>d</sup>	3000 <sup>e</sup>	200	350
Total		63,046.08	196,918.60	18,234.67	21,280.55

<sup>a</sup>To be revised; <sup>b</sup>Since all defence outlays come under Non-Plan, DRDO schemes are shown under 'Non-Plan'; <sup>c</sup>Figures on the basis of revised estimates; <sup>d</sup>Schemes started in 1987 only; <sup>e</sup>May be revised.

\*This scheme dates to British days. Under it, research is funded by the Indian Council of Agricultural Research from monies collected by levying customs duty on the export of about twenty agricultural commodities. The authority to levy the cess and to fund research from the proceeds therefrom is enshrined in the Agricultural Produce Cess Act (1940) as amended in 1970.

\*\*Special Assistance Programme, COSIST, Nuclear Science Centre, Inter-University Centre for Astronomy and Astrophysics, Inter-University Consortium, Fellowships, Research Associateships, Research Projects, University Science Instrumentation Centre.

*Abbreviations:*

ARDB, Aeronautics Research & Development Board (of DRDO); BRNS, Board of Research in Nuclear Sciences; CAD, Computer Aided Design; COSIST, Committee (of UGC) on Strengthening Infrastructure in Science & Technology; CSIR Council of Scientific & Industrial Research; DAE, Department of Atomic Energy; DBT, Department of Biotechnology; DNES, Department of Non-conventional Energy Sources; DOD, Department of Ocean Development; DOE, Department of Electronics; DOEd, Department of Education, Ministry of Human Resource Development; DOEn, Department of Environment; DOS, Department of Space; DRDO, Defence Research & Development Organization; DSIR, Department of Scientific & Industrial Research; DST, Department of Science & Technology; EMDC, Electronics Materials Development Council; ICAR, Indian Council of Agricultural Research; ICMR, Indian Council of Medical Research; IRHPA, Intensification of Research in High Priority Areas, MRDF, Marine Research & Development Fund (of DOD); NRC, National Radar Council; RESPOND, Research Sponsored by ISRO (Indian Space Research Organization); SERC, Science & Engineering Research Council (of DST); STCs, Joint ISRO-Institute Space Technology Cells; TDC, Technology Development Council; UGC, University Grants Commission.

sponsoring R&D projects in the field of medical research due to paucity of funds and also non-availability of young researchers. It was felt that there is a need to

examine how young researchers could be attracted to taking up problems relevant to biomedical sciences which are of relevance to the requirements of the country.

● A need has been felt by the R&D funding agencies to examine the availability (present and future) of technical manpower for various sectors of science and technology.

- There seems to be mismatch or non-availability of certain technical personnel in some disciplines. The scheme, National Technical Manpower Information System (NTMIS) under the Ministry of Human Resources Development needs to be carefully studied and utilized for promoting good scientific research.
- The question of availability of young research workers in the form of JRF/SRF was also debated and merits of the National Entrance Test (NET) organized under the auspices of CSIR/UGC were also discussed. Certain suggestions emerged as to how the selection of young researchers through the NET could be further improved.
  - Agencies take, on an average, anywhere between 6 and 9 months, for approving for funding a project received from the investigators. While it was recognized that projects should be supported only after a careful scrutiny and rigorous peer review, agencies would have to make efforts to help the scientific community and reduce the processing time while approving the research projects.
  - In view of the careful selection process used for approving projects, only 20–30% of the projects received are, on an average, approved by various funding agencies. This also reflects the fact that our scientific community is not coming forward with very good research proposals for consideration.
  - The outlay per funded project being supported by different agencies varied considerably, ranging from rupees ten thousand to more than Rs 20 lakhs. This goes to show the variety of project support being provided under extra-mural R&D funding.
  - Under many extra-mural R&D funding schemes, grants are being provided for equipment and the question of optimal utilization of the equipment during the progress of the project and after the completion of the project, has been a common concern of all the agencies.
  - There was a general consensus that considerable amount of new knowledge is being generated as a result of R&D funding provided by various agencies and appropriate means have to be found out as to how the information could be effectively disseminated, not only to the members of the scientific community, but also to R&D managers and other users of this information. Mechanisms such as the National Management Information System (NMIS) which could provide only 'information-on-information' were

noted. The use of well-known publishers for disseminating the reports, in the form of catalogued publications was emphasized, since the reports normally printed by the agencies are not available later for reference, as they are normally printed and distributed at one go.

In addition to the above issues which were discussed, the agency representatives were keen to establish such regular communication amongst themselves and have suggested several other issues [for example (a) support to private industry/organization, (b) the use of zero-based-budgeting (ZBB) technique for projecting the requirements of the R&D schemes, (c) follow-up of identified thrust areas, etc.] which should also be discussed in the inter-agency committee. The committee had desired that the information provided by all the funding agencies regarding their extramural R&D funding schemes should be suitably edited by DST and, if necessary, a report may be commissioned to the National Institute of Science, Technology and Development Studies (NISTADS) which report could then be made available to members of the scientific community generally.

V. Siddhartha lives at 51, Bharati Nagar, New Delhi 110 003, India

## NEWS

## DST issues revised guidelines on overhead expenses in R&D programmes of the Central Government Departments/Agencies

According to the 'guidelines on overhead expenses in R&D programmes of the Central Government Departments/Agencies' issued by the Department of Science and Technology in February 1990, 'an amount of 10% of the total cost of the project will be provided as part of the project subject to a maximum of Rs 1.00 lakh in each case', as benefit to the host Institute for overhead expenses. Owing to increase in the cost of providing infrastructural facilities and several other factors, various S&T agencies suggested to the Department of Science and Technology that the overhead expenses be increased from the present level. On the basis of the views expressed by these depart-

ments/agencies, and in partial modification of OM SP/ZOO/89 dated 19th February 1990 issued by the Department of Science and Technology, Government of India, the following amendment to para 2 of that Office Memorandum has been issued by DST in an OM dated November 27, 1992.

*Benefits to Host Institutes:* Towards meeting their costs for overhead expenses including infrastructural facilities, an amount of

- i. 15% of the total project cost without any upper limit -- for educational institutions; and
- ii. 15% of the total project cost with an upper limit of Rs 2.00 Lakhs -- for

other than educational institutions (e.g. laboratories and institutes under S&T Agencies, other Departments) will be provided as a part of the project.

- iii. On projects costing more than Rs 40 lakhs, the quantum will be decided on a case to case basis.

The above amendment will take effect in respect of new R&D projects to be sanctioned on or after April 1, 1993 and is subject to the condition that no additionality will be provided in the sanctioned budget provision of the Ministry/Department of the Government of India sponsoring R&D funding schemes.