

road quite successfully and is doing both good science and ensuring its own future.

In this regard it would help if the government accorded weighted (133%) deduction to R&D expenditure, including that incurred on supporting projects undertaken by approved research institutions. Such a provision existed till the mid-80s. There was also a similar provision for investments made for productionizing products using indigenous technology. That too needs to be restored.

Though our perspectives may be different, our interests are common.

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It is not only the reduction in the budget allocation for S&T in the 8th Plan from 1.1% of GNP to 0.9%, but a general neglect reflected in the failure of even a consultative machinery between the scientists and the Government. On several occasions during the past two years, I have expressed these very concerns which are genuine. Unfortunately the policy makers, finding themselves in a tight corner in respect to the economy of the country, are now obsessed by the so-called 'open market economy'. They think of everything in terms of 'market-pulls', and for obvious political reasons, 'S&T for rural development'. It is possible though hard to believe that they are not aware of the contributions of Indian science to development. Nevertheless some of the statements from responsible dignitaries of the Government tend to imply that Indian science has failed to contribute to economic and especially rural development, and that the investments made in it have not provided the expected results. Secondly the philosophy of free-market economy has been construed to imply that scientific institutions should generate their own funds. It is often overlooked that even in USA, Western Europe and Japan state funding for S&T runs into billions of dollars not withstanding the significant contributions made by industry and private philanthropic organizations and foundations. In India, the industry is neither motivated, nor sensitized enough to

make any sizeable contributions to research. The fiscal policies of the country over the years failed to provide any incentive in this direction. The Government and Industry seem to be concerned with acquisition of technology. But it is not appreciated that a well-trained scientific community, actively engaged in basic science, is necessary even for buying or transfer of desirable technology permitting its maximal exploitation. The need for this would be even more so, if we are hoping to become internationally competitive in the market place.

It is, therefore, really disheartening to see the current 'benign neglect', if not true antipathy, towards basic science in the country. It will serve no useful purpose repeating or reiterating what has so eloquently been done by others, however, I will like to see, if we could make the adversity as an ally, something I have been forced to learn as an essential element of my professional work. I feel that as a community we have obviously failed to present to the people and policy makers alike, i) the precise contributions of Indian science since independence, ii) the potentialities that exist even today, iii) the consequences of neglecting support to S&T, and iv) a concrete plan of action with well-defined goals for future. Ever since our Independence, we have been fortunate in having Government's responsive to S&T, powerful spokesmen with access to the highest, and in more recent years some formal structure (NCST, SACC, SAC-PM) to advise the Government on S&T-related issues. In the absence of

any existing mechanism for this currently, I feel that responsibility lies on the scientific community itself. I have during the past two years made several attempts to point this out to my colleagues and friends, but I must confess, I could not elicit anything more than a polite acceptance of the need to do so and no more. I sincerely feel that the Science Academies of the country, representing the very best in Indian science, should come together and prepare an objective, shall I say scientific document to be presented to the policy makers and even more so to the people of the country, covering the above mentioned elements. This need not be an encyclopaedic volume but a realistic, unquestionable comprehensive document easily understandable by the lay people. Any delay in doing so, can only be at the cost of future of science in the country. It has been unfortunate that with all goodwill and intentions, we failed to get together last year. Maybe in the New Year, we could assign this as our top priority task. I shall be only too happy, if I can be of any service towards such a venture. At the same time we should also amongst ourselves critically evaluate our work and working to bring more credibility to our claims and promises. We could then approach the people and the Government with greater confidence.

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Malaise in Indian science

If, in a country where majority of the people have to struggle very hard for food and shelter and almost half the population is illiterate, the leading scientists get alarmed by apparent cuts in government funding for science and technology (S&T), though still enjoying relatively luxurious living, then there must be something terribly wrong with the science establishment. Despite emotional rhetorics no worth-while questions on the state of Indian science have been raised by Rao¹. I intend to express the

perceptions of an ordinary physicist in this respect, realizing fully well that I owe it to my country for whatever little I am contributing to science.

Even after four decades we have to import precision equipment, components for instruments, pure chemicals and high quality (-device grade) materials for scientific research. Thousands of young Ph.D's in science are unemployed, and the laboratory and library facilities in most of the colleges and the universities are extremely poor. A large share out of

the total funding on S&T has regularly been going to some premier institutions like the Indian Institute of Science, Bangalore. Have the IISc scientists done anything extra-ordinary during the post-independence era to justify such a disproportionate allocation of funds? Is the uneven distribution of funds not irrational and unjustified? What has been achieved after investing huge public money on the proton decay experiment and high temperature superconductivity mission? Whereas utilization of minor research grant for a research scholar is strictly scrutinized, there is no accountability for the big research projects. Why? On the one hand, there are so-called few highly talented, rare and delicate species who have to be placated by politicians and administrators. On the other hand, there are millions of potentially talented, neglected lot who are crushed by the system. Whose problem deserves urgent attention? I think compared to these issues the problem of reduced funding is insignificant. The leading scientists who are responsible for S&T policies should address these questions, and do honest introspection.

Ironically, though frequent comparisons with the advanced countries occur in Rao's article, no mention is made of recent funding and sociological problems there, see e.g. ref. 2. Public perception of scientists as self-serving and socially irresponsible, squandering of public money, priority of science versus eradication of poverty and scientific fraud figure prominently in these discussions on American science². Obviously re-analysis of the aim and value of science as an organized activity has global significance.

We often hear that scientific temper should be inculcated in the masses. Does this phrase not reflect ignorance and intellectual arrogance? Why not appreciation for art, aesthetic values and sense of history? Does science make one an enlightened, socially responsible and a reasonable person? Let us first seek answers from the life of scientists. In his early life, for his Jewish origin,

Einstein faced persecution by political power as well as by fellow scientists. Racial discrimination in science institutions is experienced by Chandrasekhar³. Feynman's thoughts on women are insulting to womanhood⁴, and Hawking as a person appears more like a Hollywood star⁵. Sudarshan recounts his experiences to conclude that 'universality of science does not imply unbiased acclaim for scientific truth and a true history of science'⁶. Recent widely publicized disputes of personal nature at the Institute of Mathematical Sciences, Madras and Raman Research Institute, Bangalore do not inspire confidence. It is not uncommon to find that prejudices of scientists obstruct publication of new ideas. Sociology of scientific research highlighted by Romer⁷, shows that scientists are no different than other professionals. In contrast to this I have found that most of the illiterate rural people in our country possess some of the best human qualities. It is reasonable to conclude that there is no sufficient evidence to suggest that science makes one a better, free and fair human being.

Development, progress and defense are keywords to justify S&T. However, I can foresee that in coming years philosophy and value of science would be put to severe test world-over. We, in India, may as usual wait to follow belatedly the West in this respect also. Or else, with a background of profound abstract ancient thoughts we could give serious consideration to the basic issues pertaining to relevance and limitations of science.

Money, social-status, power and fame motivate one to do science. Organized scientific activity is supported by the society with the belief that it can be used to exploit and to control nature for their benefit. There are very few scientists who pursue science as truth seekers, they even also aspire for fame and honour. Modern science originated in Europe, and there evolved a science culture with institutional norms and professional ethics. A scientist is free to contemplate on a fundamental problem which may not appear to be useful,

however, the society is justified in not providing support for such an endeavour if it needs heavy funding. Dedicated scientists with least requirements from others have single-mindedly pursued their goals irrespective of derision from fellow scientists.

In India the indigenous institutions got demolished during foreign rule for various reasons, and we started borrowing Western models. The most unfortunate part of this process has been that we have not assimilated science culture, i.e. we import models minus the values and work-ethics. We have not created institutions; we have formed groups around some individuals. Naturally this has resulted into unchecked growth of self-serving scientists. In the absence of institutional values occasional ad hoc reforms have proved to be ineffective. This, in my view, is the root cause of the gloomy state of the Indian science, and the only way to remedy this situation lies in radically overhauling the system giving priority to institutional values rather than serving the interests of few individuals.

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