

CORRESPONDENCE

Basic science

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As a concerned citizen as well as a person heading a leading Indian organization, I am equally disturbed about the inadequate support and encouragement—not merely financial—that research receives in our country and as a consequence of which the gap between us and other nations continues to widen.

While the financial inadequacies have been stressed, to me as an outsider, the problem seems as much organizational because the few contacts that I have had with the research labs and institutions in the country *do not* give the impression of vitality, excitement and commitment that one expects and which one occasionally sees—as in a recent visit to the Astra Labs at Bangalore.

While industry can support basic research to a limited extent it could certainly benefit from the applications of the research done in the premier institutes in India and it could sponsor research in specific problems with which industry is faced. However, there has not been a serious effort by the research organizations to identify the companies within India which could benefit directly or indirectly from the work already completed or in progress. Also there have been some questions about the confidentiality maintained by the research institutes in respect of sponsored research without affecting the need for free exchange of information between scientific and research establishments.

While I have seen a listing of scientists and research workers I am not aware of any data bank which would enable an operating company to identify scientific and research personnel who might be appropriately assigned specific projects. I hope the situation will change and would like to assure you

that companies such as Voltas are interested in upgrading of research in those areas which are either of immediate or of long-term interest to them. Some of the fields covered by the articles would have little significance to operating companies, however important they may be nationally.

Incidentally, referring to the figures of research given in one of the papers Voltas, a small company in the light engineering and trading field, did incur R&D expenditure last year of Rs. 2.49 crores representing approximately 0.6% of the turnover of its own manufactured products. The comparative figures for the previous year were Rs. 3.29 crores and 1.4%.

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We in industry are clear that Science and Technology and what C. N. R. Rao rightly calls 'Intellectual competitiveness' are essential for Indian industry's long term growth. Buying technology may not be the answer in the longer term, especially now that foreign companies can have a majority stake in their Indian ventures. However, industry has to take a long term but feasible view of the balance between buying technology and developing it. In the long run the latter is preferable and perhaps more cost effective but carries a higher risk and takes much more time.

We in Bajaj Auto have been developing our own products since the 70s. Almost half our existing line-up consists of products developed by our own

R&D. Our R&D expenditure exceeds 1% of our turnover and is growing (exclusive of know-how fees paid to collaborators). While our international competitors spend 3–4%, the gap in spending is not as large as it looks because in R&D, manpower costs predominate, and Indian salaries are much lower. The automobile industry also pays a R&D cess which supports research organizations like ARAI and VRDE.

In future there is going to be room for greater mutual support between industry and scientists, provided scientists adapt creativity to the realities of the industrial situation.

Our national spending on R&D at 0.8% is not a small figure, if we take into account the lower cost of manpower in India. G7 countries spend 2–3% of which, other than in Japan, 45–50% is funded by the government.

The scientific community needs to introspect on why returns from this investment have been poor. While industry has a role to play, I think the larger responsibility lies with the community. We have perhaps not focused our scientific effort adequately on our needs. Also, perhaps there has been a proliferation of scientific laboratories and research institutions. A very strong culture and leadership are required within the scientific institutions to develop a system that has to by definition, have looser 'accountability'. The values and integrity of members are crucial.

I think that scientific institutions should refocus themselves on work that is creative and, at the same time, meets societal or industrial needs. They should work towards earning some share of their revenue from industry, hopefully up to 50% over a ten-year period. There is now a pool of industrialists in the country who will back such efforts. NCL, Pune has travelled down this

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