

search activity now demands sophisticated and expensive techniques, with the result that the importance of monetary funds and funding agencies is rapidly growing. The funding agencies in their turn have to make a direct and foolproof assessment of the returns that would flow from an investment in the research activity. And the scientists are faced with the problem of how to sell their research work as if it were necessarily a consumer product. It must not be ignored that management and control of science research is gradually slipping into the hands of multinational commercial organizations and the patenting of all applicable knowledge is becoming a harsh reality. Basic science research does sometimes result in new technological advancements as by-products, but that happens when such research demands new techniques and instrumentation and this demand is fulfilled by indigenous means. In our country basic research often means data collection and analysis using imported instruments, so that there is hardly any question of achieving a technical breakthrough and even a refinement in instrumentation (defence and space research being exceptions). At present, understanding newer phenomena and thereby building newer concepts is not as serious a problem before us as achieving a higher level of sophistication in existing technologies. I think something significant cannot be attained unless research with indigenously developed methods and apparatuses is encouraged. Will the NSU take due care in selecting the research problems and the methods to be adopted? Or will it justify in the name of progress every piece of work using imported apparatus?

Any hopes?

We are now living in the age of hypocrisy and pretensions and the gap between precept and practice is rapidly growing. I am not quite sure if the concern being expressed by many of my colleagues is genuine. My skepticism is based on what I have been experiencing for about the last two decades as a university teacher. It is being openly admitted that almost all the universities are plagued with a variety of problems. Research journals are either not available in these universities, or are available rarely in time. The libraries are mostly in shambles. Their examination processes very often take three to four months. Admission processes are also equally and unnecessarily slow. Vacations and holidays are available in plenty. Many of these are on trivial occasions and can be avoided. Add to these the number of days lost when these universities get closed on account of one agitation or the other. The actual number of working days available for teaching some of the courses is much smaller than what the UGC demands in principle. Admission rules go on changing, not to encourage and to attract bright students but to suit the convenience of the university students and employees. Selection committee meetings are not held regularly, and in many departments vacancies continue to remain unfilled for several years altogether. Indiscipline amidst students and employees has been recording a growth in majority of these places of learning. The list of problems is not small. Ironically, some of these universities have on their faculties FNAs, FAScs, FNAScs, Bhatnagar awardees, etc., and others recognized nationally and internationally. Many of them have been serving on a variety of national-level

committees and are also strong advocates of excellence in Indian science. Perhaps they are contributing significantly at the national level, but back home in their respective places of academic activity, these top-ranking faculty members have almost always failed to make concerted efforts to help their universities to get rid of the problems. The apathy of these colleagues is understandable: in most of the affairs there is nothing much of their personal interest. In such a situation, I wonder if proposers of NSU would be fortunate enough to get a different breed of teacher scientists – people who are not only experts in their respective fields of activity but are also genuinely concerned with the problems of their institutions in particular and the society in general.

A closing remark

Whenever a society is faced with serious problems, there appear on the scene two types of forces. The first comprises individuals, usually small in number, who feel deeply concerned with the state of affairs and get involved in easing the situation, demanding little in return from the society. The second includes those whose concern is rather superficial and who do not hesitate in exploiting the situation to their advantage. While doing so, they have to pose before the masses as if they were the real saviours. It is hard to know who belongs to which one.

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The National Science University and the politics of science in India

S. R. Valluri

The scientific community owes much to the editor of *Current Science* for initiating a debate in its pages in the 10 October 1994 issue by publishing a proposal to start a National Science University (NSU). The issues raised go far beyond the case of NSU and indicate that not

only the scientific community but society at large is concerned about the S&T scene in the country.

The general view that emerged from the debate about the Mahajan/Srivastava proposal to start the NSU was that it deserved to be buried. However, few, if

any, cared to analyse his critical observations. Mahajan's proposal was to correct these distortions. The contributors to the debate either ignored or practically denied them in passing remarks. Perhaps our awareness and perceptions of the politics of science

depend upon the institutions to which we belong and where we function in the hierarchical levels of practice, management and administration of science.

To deny the distortions in the system is to pretend that we are purer than others in this regard. On the other hand, to quote the biblical injunction "Let he without sin cast the first stone" implies a tacit acceptance of its existence and a surrender. We have to face it if we wish to build science on strong ethical and enduring foundations.

Mahajan's solution of creating the NSU is simplistic. It will be manned by people from the same culture. It will surely follow others in its practices sooner or later as the NRIs will only be part-time visiting scientists and will not be able to influence the critical policy decisions. Perhaps Bhabha had similar aspirations when he started TIFR. It is arguable as to what extent TIFR made an impact on the rest of the science education and research system, while retaining its original culture. We have to face the observations of Mahajan head on. They have mainly to do with the unhealthy ways practised by some senior scientists to control and remain in power.

Indian practice of science

To pretend that there are no malpractices and malafides in the practice and management of science in India is to ignore the obvious. Perhaps one can argue about the extent of such practices but not about their existence. Honest errors in judgement are always possible. But where there is a repetitive pattern in these, involving obvious improprieties, it is time to get worried about them and people who indulge in them. Broadly speaking, the persons who commit such acts may be expected to be aware of what they were doing, but not sensitive enough (if not callous) to their unfortunate consequences to the cause of science itself and its public image. The higher the level at which the malpractices occur, the greater the damage to the community. As far as the society which supports us is concerned, the sins of these few are the sins of all. What is more, scandalous news spreads much more rapidly than good news. We are all tarred by the same brush. In a class by itself is a research institution which declares scientists with record of achievements from other institutions and

working elsewhere as concurrent 'honorary staff' and records their publications based on work done elsewhere as its own – a rather unusual and amusing effort to project the image of instant excellence and achievements. While earlier it was individuals who could have been held responsible for 'unhealthy practices', this is perhaps the first time where an institution is taking credit for work done elsewhere without mentioning the association of the author with the institution where the work was actually conducted. By bestowing such an 'honour', the institution would also seem to be buying silence from these scientists who could have been otherwise critical. There is a moral and ethical obligation on the part of such honorary staff as well as the institutions to follow well-established conventions in such matters to avoid projecting a misleading picture of the functioning of such institutions. The record should be a reflection of a true joint activity or a simple financial support for research or an honorary association. Otherwise, the government and the public may be presented with a false picture about the achievements of such research institutions.

Scientists who lead clean professional lives (there are many) have an unstated contempt for those who indulge in such practices. The tragedy is that they choose not to express their reservations publicly or give leadership for removing malpractices. To paraphrase a comment by Burke, 'All that is needed for evil to take over the world is for good to do nothing about it'. There is no surer way of destroying institutions than such silence. In a very real sense, therefore, the S&T community itself invited the present situation by its silence, if not acquiescence.

The scientific community will be ultimately judged for what it passionately believes in and is willing to defend. These scientists with conscience do not wish to speak, as in their professional lives they could be hurt badly by people at higher levels of the hierarchy of science. It is this ability to hurt others that acts as the cleft stick in the hands of the callous. This fear of being hurt and the ability of some to hurt must be removed if things are to change. The scientific community does not seem to have realized that there is strength among them if their cause is right and they act together. One would not worry very much by what the S&T community does but for the fact that their functioning deci-

sively influences the ability of this nation to join the developed world.

Feudalistic Indian society and republic of science

Pursuit of science is the most democratic of all human endeavours. In spite of all the trappings of democracy, we are basically a feudalistic society and these attitudes tend to take their toll in science at senior levels. Committees designed to make the elite function in a democratic manner while evolving policy through bodies such as senates and senior staff committees tend to be frequently ignored by institution heads in such a scenario. These institutions are public trusts and not the personal fiefs of people who head them. Lord Acton's aphorism about power seems to be true for scientists also: 'Power corrupts and absolute power corrupts absolutely'. If we wish to establish a republic for science, not only do we need talented people to embrace science but also scientific culture and traditions must be nurtured in which such people can grow. Not all the money that the public invests on us will amount to anything if these are not nurtured and made to endure.

Funding of science and technology

The less the amount of public money available for science, the greater will be the desire to influence if not control its distribution. There has been no real accountability in the expenditure on science through public funds, except possibly in space and atomic energy; whose plan budgets are mainly project specific. It is this lack of accountability that seems to have caused the distortions in the practice of science in India.

Scientists may complain that the government is not spending enough money on science. The picture for a poor country like ours looks somewhat different from the other side. Government certainly has an obligation to nurture and encourage education as a matter of enlightened self-interest. Universities also have the obligation to add to this knowledge through basic research. However, even in advanced countries like the US, funds that are spent on basic research are rarely more than 15% of the government outlay on R&D. Even such investments are a relatively recent phenomenon. The balance and the bulk

of the research support in the developed countries, even to universities, is highly directed, with the projects having clear end objectives and is rarely an end in itself.

There are reasons to believe that the government will not hesitate to support programmes that are clearly seen to serve a national purpose. However, we took recourse mostly to the path of grants-in-aid schemes for supporting R&D. By definition, grant-in-aid is support for research a scientist wanted to do anyway and it was only assistance to him to carry on with his work. Thus, there is no inherent accountability in such grants except to the extent planned by the scientist himself. More often than not, reports on results of such research seem to have been filed if and when they were submitted or got published as papers in journals. The research that was taken up was more inspired by what is happening in the developed world and which was driven by their needs and not necessarily ours. If some produced high-quality research, it stood isolated, without becoming a desirable input downstream, as it was neither inspired nor driven by our requirements.

If the manner in which CSIR budgets are determined by the Planning Commission is any indication, there is little relationship between the proposed plan programmes and the sanctioned budgets of the S&T agencies. The Commission seems to determine the budgets based upon previous years' actuals and a nominal increase on them except for a few departments which propose project-specific programmes. After meeting the inescapable commitments, there is not much money available to implement any long-term plans the S&T agencies may have conceived. This seems to have resulted in an *ad hoc* sanctioning of grant-in-aid projects which do not necessarily have clear input-output relations to nationally felt urgent needs. In this background, the scientists seek funds for research conceived by them. In turn, members of the same scientific community are asked to review such proposals. The system has thus become inward-looking. It was not that their intentions were not honourable. They were specialists in their fields and could not take a detached overview about the relevance of their work in the broader perspective of national purpose. It almost seems that instead of first defining national priorities and deriving strategically targeted R&D programmes out of

them, they ended up taking the viewpoint that 'what we wish to do will be good for the country'. Thus, the activities of the S&T departments, and the projects supported by them rarely considered their economic implications and maximization of benefits for the country. Broadly speaking, they remained somewhat isolated from the mainstream of planning in the country. An attempt was made to integrate planning for S&T with the planning as a whole while evolving the Fifth Plan. The R&D statistics for 1991 issued by DST indicate the relative abundance of research papers, etc., compared to R&D output by way of patents, products and process developments (Figures 7.3 and 7.4, p. 37). It is seen that there were about 16,000 publications, including books and technical reports, compared to about 1400 patents, products and processes developed, etc., from direct central support. They are an eloquent commentary on the results of Indian R&D from direct central support to academic and research institutions.

Mahajan was not correct in suggesting that the research institutions were set up as the 'universities were deemed to be generally unsuitable for conducting high-calibre scientific research'. Except in a few isolated instances, they were conceived and structured to function as an interface between the university system and the industry by taking up more applied research and technology development to help the industry. These are activities for which the universities are not structured. However, the Planning Commission seems to have left the bulk of the S&T departments alone, without serious consideration of the roles they have to play in national plans to maximize benefits. The industry was not too keen either to interact or to spend money on R&D as they could easily obtain production technologies from abroad. This led to the R&D institutions which have somewhat better facilities taking up work similar to that being taken up in the academic institutions and in a sense competing with them for the limited plan funds for research. This has certainly been helped by migration of the academics who have flair for basic research to the research institutes.

In this scenario, with too many projects chasing too few funds, the demand far exceeded the supply. This situation led to the now familiar manoeuvring by some scientists to have access to and, if

possible, control or influence the distribution of these limited funds. The leverage is through membership in committees for sanctioning of grants, awards and honours or even for appointment of senior staff in S&T departments. It helped to have a record of publications, honours and awards to become members of such committees. The cycle of the politics of science thus got its start. It had its ramifications on virtually all aspects of the practice and the management and administration of science, whether in academic institutions or in the research laboratories or even in government S&T departments. Repetitive inclusion of a few scientists in the committees by the S&T departments which have funds to sanction led to the inevitable. It is not hard for some to develop vested interests. Not too infrequently, this led to the situation where whom you know became more important than what you know. Thus were born the godfathers of post-independent Indian scientific community.

The recent budgets for S&T reflect the government assessment of our contributions to national wealth. As a percentage of GNP they have been going down. We seem to have forgotten that we are a poor country, that we are trustees of the public funds to do public good, that we cannot do as we please; that there should be an element of predictability based on well-defined conventions in our practice, management and administration of science. We have to realize that the government does not really owe us a living. We have to establish our credentials and explicitly answer the question of how the country is going to be benefited by our research activities and how much is the added value to the nation for every rupee invested on us. For example, selling a bill of goods to the government on an expensive project such as superconductivity estimated to have cost the nation about Rs 50 crores without spelling out the technological end objectives worthy of such expenditure was less than responsible. As long as we continue to use our access to the political arm of the government to sell a bill of goods on which we do not or cannot deliver, we cannot expect the public to support us.

Responsibilities of S&T personnel

We may reject Mahajan's proposal. But if we are honest to ourselves, we cannot

question his underlying premise. We have to accept that all is not well with Indian science. We are responsible for it and we have in a sense become fallen idols. We have taken the government and public sympathy for granted for a long time and virtually done as it pleased us while the government thought that investments in science were good for the country and the scientists may be trusted to do good for the public in return, sooner or later. This faith in a very real sense was enunciated in the Scientific Policy Resolution, as early as 1958.

Each one of us has to do some introspection and ask ourselves how well we lived up to these expectations. It would seem that the government has passed its judgement on us that we have not been accountable to the extent desired. It has now started insisting that we take up sponsored research to build accountability and cover part of the cost of running these institutions.

There will always be exceptions. One notes with a sense of pleasure the integrity demonstrated by the director of a research laboratory when he withdrew a proposal for an award when the technology did not prove itself at the industry level. But, by and large, the picture that seems to emerge is not complimentary to us. Mahajan's comments have substance and can only be ignored by us at our peril as a nation aspiring to join the developed world.

True, as a body, the scientific community deserves more funds but not for us to keep on doing what we like. The truly gifted with aptitude for research must be supported without question. We have to make efforts to find them and nurture them. But for the rest of us, support can only be on the basis of competitive bidding on projects which are determined to contribute to the nation's growth in a discernible and direct manner, or better still, as matching grants when an industry sponsors an R&D programme in an academic or a research institution. It is better for the government to set apart specific funds for such a purpose. The heads of government S&T departments bear a major responsibility in this regard.

Need for a code of ethics

To establish our credibility, we have to remove all traces of feudalism

in our functioning and avoid practices that encourage development of vested interests. In this, the scientific community as a body has an important role to play. A representative cross-section of staff in the academic institutions and research laboratories have to evolve through consensus, a self-regulating code of ethics for the practice, management and administration of science. It could perhaps be one along the lines of the honour code at one of the most well-known American institutions: 'No member of the community shall take unfair advantage of any fellow member of the community'. This honour code is all encompassing. Elected peer groups monitor the functioning of their colleagues at each level with the provision of an appellate authority. There should also be an Office of Research Integrity to function where the issues transcend institutional barriers. It would seem that only those scientists who indulge in unethical practices in science can object to these proposals. The very existence of these codes and offices is bound to have a salutary effect on the functioning of the scientific community. It would seem that no scientist (except on an *ex-officio* basis) should be included in any committee more than once or at the most twice to avoid the development of vested interests among them. No scientist should be considered so indispensable, least of all, science administrators with executive authority in their hands, beyond the age of 60. Over the years, they will have developed too many vested interests and likes and dislikes to be impartial in their judgement.

Suggested solutions

People in any society find it convenient to function at the level of the lowest common denominator, if they can get away with it. Pursuit of excellence and maintaining high standards and building enduring traditions for them demand eternal vigilance and hard work. As these are not easily achievable objectives, there is some merit in Mahajan's suggestion for pursuit of excellence in science in only one institution to start with. In any case, it is too expensive to attempt it across the board. If it is proposed to create the NSU with entirely private funds, there is no reason why the experiment should not be tried. It is a

noble objective for the NRIs to get together to start such a university, if they care enough. American ethos is replete with examples of private contributions to the causes of public good, especially for education. In recent times they have been collecting billions of dollars for education from the private sources. One would hope that the proposed new UGC guidelines for private universities would not impose constraints on their maintaining high standards even in recruitment of staff or admission of students. The NRIs may well soon have the doors open to try out such an experiment.

However, as far as the public funds for education are concerned, it is more desirable that substantial additional funds be given to the centrally administered educational institutions such as the IITs, IISc, etc., where a good base for science already exists, to nurture them as centres of scientific excellence. Such investments go much farther in strengthening them for high-level teaching and research. Close relations between them and research institutions must be established. These institutions may be prevailed upon to set in place a self-regulating code of ethics for practice, management and administration of science to build accountability in the system at all levels. Successful implementation of such practices in the centrally administered institutions will certainly form a model for others to emulate. Together they offer the critical mass to sustain a revolution in the ethics of Indian science education and research if they take the ideas seriously. It is the lack of these that Mahajan really pointed out in his proposal for the NSU.

The Academies may wish to consider convening jointly a conference of the interested parties from all levels, including students and junior staff, to evolve such a code and help bring into existence an Office of Research Integrity also at the government level to deal with malpractices that transcend institutional and national barriers. In a very real sense, we have to establish our credentials if we expect the government to listen to us. We are condemned otherwise in our efforts to become a scientifically and technologically advanced nation

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