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GUEST EDITORIAL

Crisis in the Universities: Increasing funding gap between Universities and National Laboratories/Scientific Research Institutions

India is gradually positioning itself to become a global power economically, technologically and politically. It is endeavouring to emerge as a knowledge economy in the coming years. Looking at our demographic structure, compared to the developed countries, we have far less burden of an aging population. Our population comprises of an overwhelming majority of youth below the age of 25 years. This feature coupled with our deep-rooted education system with early focus on mathematics and sciences, which are perhaps unique to our country, will play a critical and important role in our vision of India as a global power by 2020.

It is a universally accepted fact that science and technology are extremely vital for any country. Investment in science is directly proportional to the rate of emergence of a nation as a global economic and political power. S&T expenditure should not be considered by our economists and planners as a simple budget item and non-productive expenditure, rather it should be viewed as an investment whose growth, if funded beyond the critical threshold, will be logarithmic with unprecedented returns. No wonder countries in the world, both developing and developed wanting to be global players, are increasingly investing in science as they firmly believe that scientific supremacy is the key to technological innovation and development. Our political decision makers took the right decision after independence, in sharp contrast to our immediate neighbour, to make major investments in institutions dedicated to scientific research and technology development. Our acknowledged strength in nuclear technology, space sciences and satellite launch capabilities, not to mention our global leadership in Information Technology, success of the green revolution and food sufficiency, the white revolution which catapulted India as the world's largest producer of milk and dairy products in the world, etc. are tangible gains of this policy implemented by our visionary leaders of the past. Our initial investments in higher education have paid equally rich dividends – the IITs and IIMs are global brand names, with the former ranked at the third position in a recent global ranking.

University funding: A matter of serious concern

Much of our higher education is imparted by the Universities and institutions of higher learning and these are almost invariably funded by tax-payers' money. Most of the private institutions which have come up during the last few years claim to provide 'higher education' but are nothing more than educational shops. These are outright commercial establishments which attract students, who otherwise could not find admission in our best universities and colleges, by flaunting glamour and facade of infrastructure. Despite being an epitome of success in imparting higher education, Universities in India are today faced with enormous funding crisis threatening their very existence as temples of learning. When one compares the Universities with National Research Institutions, one is amazed to find that the Research Institutions are funded perhaps several orders of magnitude higher than the average Universities. So evident is the imbalance in funding that if a comparison is made in terms of funding per University faculty member with that of a scientist working in a National Laboratory or R&D institution (say of the CSIR, DBT, ICMR, etc.) the difference would be even higher than 1000 fold. A closer analysis of the total R&D expenditure on advanced research in any University by just one Govt Department under the Ministry of Science and Technology, Govt of India reveals a depressing fact. The Universities received an abysmally small percentage ($\leq$1%) of the total extra-mural research budget whereas the overwhelming majority was spent on funding research projects in its own Institution or those under other scientific departments. This heavily biased funding for research institutions naturally serves as a 'chemo-attractant' to our young students who prefer to enrol for Ph D research at such institutions as opposed to the Universities for obvious reasons. Unfortunately, this further adversely affects the Universities in not being able to attract, with some exceptions, bright young scientists wanting to return to India after a very successful post-doctoral career abroad, as faculty. Those who still prefer to work at the Universities,

for personal or other reasons, eventually feel 'cheated' or disillusioned in their later years as their 'performance' (read scientific publications/patents, etc.) is never comparable to that of scientists working in National Laboratories/ Research Institutions. Unlike their privileged counterparts in the National Laboratories, the University-based scientists have to spend at least 50% of their time in teaching. When they do spend time in research the biggest handicap is lack of appropriate state-of-art infrastructure. The net result is that these University scientists are very rarely able to compete, if at all, for prestigious national scientific recognitions such as Shanti Swarup Bhatnagar Prize, G. D. Birla Award, election to the Fellowship of National Science Academies such as INSA, IASc, etc.

So adverse has been the impact of this anomaly that majority of our publicly funded Universities have been reduced to the status of a degree providing entity with hardly any focus on quality education or research. Naturally the Universities, with some exceptions, are turning out to be 'establishments' which are not capable of producing good science or generating knowledge and therefore cannot be a source of innovation and, as a consequence are starved of research funding (a very convenient circular argument). The situation is just the opposite in the West. For example, the National Institutes of Health (NIH) in USA, which is the largest extramural funding body for biomedical research with billions of dollar research budget, funded the Universities so much so that in 2004, nine of the top 10 recipients of NIH grants were Universities (*The Scientist*, 2006, **20**, 27033). There was, nonetheless, evidence of inequality of funding with top ranking Universities taking away the largest chunk, leaving the bulk of the lesser known Universities compete for the remaining funds.

One can argue that the University Grants Commission (UGC) of the Govt of India should support scientific R&D in Universities because it is its mandate and not the job of the Ministry of Science & Technology, Govt of India to fund the Universities. To put the records straight, the UGC funds over 350 academic institutions which include 217 State-funded Universities, 19 Central Universities created by various Acts of Parliament, 103 Deemed to be Universities and more than a dozen Institutions of National importance. At current budget support, UGC funding to the Universities for Scientific R&D at globally competitive levels will have to be at the cost of other equally important disciplines in Humanities and Social Sciences and this would be a dangerous thing to do.

It is most unfortunate that the infrastructure and technology gap between Universities and Government Research Institutions is increasing day-by-day and today has reached a situation where unless we intervene to bridge this gap, India's reputation as a scientifically enlightened and proficient country with a dream to emerge as a global power would remain but a dream.

C. N. R. Rao, Chairman of the Scientific Advisory Council to the Prime Minister of India (SAC-PM), in a presentation to the Prime Minister highlighted the state of Indian science, notably the impending crisis of India's rapidly dwindling presence in science globally and made a fervent plea for intervention. He cautioned about India losing its position as a potential leader in science 'globally'. Leaving aside countries like US, Japan and Germany, a country like China which was far behind India in terms of scientific contribution few years ago is today much ahead of us by at least a factor of 40 (DTIC Technical Report ADA 2006). Even South Korea, Taiwan and Singapore are fast catching up or have already exceeded India's scientific research productivity in terms of scientific publication, impact factor, citation or even sheer number of Ph Ds. For every 100 US or Japanese nationals there are three R&D scientists/engineers. For South Korea this number is two whereas the OECD benchmark is 0.5%. What is the statistics for India? Currently for every million Indian we have just 157 R&D scientists/engineers, which mean just a meagre 0.0157%!.

The SAC-PM, taking serious note of the decline of the higher education and scientific R&D within the University system, had constituted a Committee under the Chairmanship of M. M. Sharma, former Director of the then UDCT-Bombay, to objectively assess the problems and suggest major recommendations. This committee has submitted its final report in which it has reiterated the need for Universities to emerge as Centres of Excellence. Select Universities with a proven track record, representing both State and Central Universities, must be provided with modern state-of-art laboratories which should be built by taking lessons from the private sectors which have established such laboratories. Besides other recommendations which include the creation of 1000 faculty positions (this should have been much higher), revision of qualifications, administrative and management reforms of the select Universities, the major recommendations of a budget outlay of Rs 600 crores for supporting the University system has been accepted by the Ministry of Human Resource Development (MHRD). The MHRD has commissioned the M. M. Sharma Committee into an Empowered Committee to implement these recommendations.

While these recommendations will certainly ameliorate some of the issues raised earlier, in order to comprehensively address the fast paced decline of science and technology research and innovations within the Universities much larger efforts will have to be made.

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