Developing “The Pyramid” in Indian Science - Need for a Paradigm Shift in Policy – Manish A. Mamtani, Department of Geology and Geophysics, Indian Institute of Technology, Kharagpur - 721 302 (Email: mamtani@gg.iitkgp.ernet.in)

The growth of Science in any Nation is governed by the work that is done by its scientists and academicians, teachers and researchers. Countries that have been able to create an environment that induces good scientific temperament amongst its citizens have gone on to become technologically advanced, and have become “the developed countries”. Therefore, there cannot be two thoughts about the fact that the growth of a Nation is directly linked to its scientific and technological advancement, and this is linked to the opportunities that a country creates to encourage its people to do good science. This brings us to the issue of “Policy”, which obviously has to be formulated by the Government of a country.

India, a country of 1.2 billion people is variously referred to as “developing country” or “threshold country”. We are still not “developed”, which implies that there is something missing in our system that has failed to take us to greater heights. So, where have we gone wrong and what could be a possible solution? Obviously, a debatable and deeply rooted issue such as this cannot have a single reason or a single solution. But a quick look at the structuring of our teaching centres of higher education (Universities/Institutes) indicates that the absence of motivated scientists in them could be an important reason for this. A major chunk of scientific and technological advancement in developed countries comes from the research activities of academicians who are based in Universities and teaching Institutes. These centres of higher education are well-funded, well-equipped and have a well-trained team of dedicated academicians (teachers, scientists and researchers) who maintain and run the various laboratories and facilities. With the Indian economy in a reasonably healthy state, today funding for setting up state-of-the-art facilities is not a major problem. Also, with India’s demographic dividend, it is not too difficult to find several young and talented well-educated researchers. Hence the problem must lie somewhere in our system to tap this young talent at the right time, the right stage in their career, and utilize as well as channelize their talent in a direction that will benefit the growth of Indian science, and eventually the Nation. The Government of India, through programmes of Council of Scientific and Industrial Research (CSIR), Department of Science & Technology (DST) etc. has taken several initiatives to create opportunities for young doctorates to continue their research after obtaining a Ph.D. There are research Institutes funded by the Government of India, where young Ph.D.s get permanent jobs as “Scientist”. In Earth Sciences, the National Geophysical Research Institute, Wadia Institute of Himalayan Geology, Indian Institute of Geomagnetism, amongst others, are leading examples of such research Institutes. However, despite these initiatives, there is a general lack of scientific drive in the country. One of the causes for our slow scientific growth is the absence of permanent positions of scientists and/or researchers in our teaching Institutes.

It is not uncommon to find several Universities in developed countries having permanent positions of “Research Faculty” (categorized as Assistant Research Professor, Associate Research Professor and Research Professor) or simply “Researcher”. These academicians have minimum teaching load and their main job is to do research. If they desire, they may offer specialized theory or laboratory courses for the benefit of the student/scientific community. They get all the facilities of the Institute/University and have the independence to guide Ph.D. students, write their own projects and generate funds for their laboratories (and institute). In most cases, these researchers are associated with a Professor (who has teaching and administrative responsibilities along with research), and together with post-doctoral researchers and graduate students they form “The Pyramid” that yields excellent results in terms of teaching as well as research output. Unfortunately, in India, such a well-defined “Pyramid” structure is missing in Universities and other teaching Institutes of higher education. Some teaching Institutes have permanent positions of Scientific Officer (SO), where the requisite qualification is a graduate degree. SO’s generally have a very low teaching load, and their main job is to maintain laboratories and day-to-day running of equipments. They get promoted to Senior Scientific Officer (SSO) if they complete a Ph.D. with their job profile remaining almost same. Our system does not encourage SSO’s to submit independent research projects, and guide Ph.D. students. Also, there is no scope for further career advancement for SSO’s – a person appointed as SSO at the age of 35 will retire as SSO after 25 odd years! As a consequence, such officers remain demotivated and get reduced to being treated as instrument-operators, which is not only humiliating, but also a total waste of their talent. Therefore, it would not be wrong to conclude that the SO/SSO experiment is a failure that has not yielded the desired results. This brings us to the main issue of this article – there is a need for evolving a policy that will encourage young talented Indian doctorates to be permanently absorbed in our teaching Institutes as scientists or researchers (research faculty) who will (i) have minimum teaching load (ii) be responsible for maintaining labs and equipments, (iii) have the independence to write their own research projects, guide Ph.D. students and generate their own funds, and (iv) have opportunity for career progression. This necessitates a paradigm shift in policy.

Figure 1 shows a two dimensional section of “The Pyramid” structure that needs to be developed in our teaching Institutes/Universities. In an ideal situation, every teaching department must be divided into a team of Professors based on similarity of research areas (part A of the pyramid in Fig. 1). “Research Faculty” (preferably more than one; B in Fig. 1) must be associated with the Professor/team of...
Professors. These must be of three categories – Assistant Research Professor, Associate Research Professor and Research Professor; alternately they could be named Scientist – A, B, and C respectively or something similar. Importantly, these positions have to be permanent and the “Research Faculty” should not have any major teaching load. The main job would be to do research with a well-defined path to allow their career progress/promotion (as listed against i-iv above). A team of “Post-Doctoral Fellows/Research Associates” (part C in Fig. 1) must be associated with the above team of Professors and Research Faculty. These would be temporary positions (such as CSIR-RA or institute/project funded post-doctoral fellows/RA’s) and their main job would be to pursue research, help in running equipments and also assist the Professor/s of the group in teaching. A team of “Research Fellows” (such as CSIR-JRF or University/Institute Research Scholar) who pursue research towards a Ph.D. degree, and graduate students doing projects for their Master’s degree (M.Sc/M.Tech) form part-D and E respectively (Fig. 1) to complete “The Pyramid”. Indian Universities and teaching Institutes do not at all have part-B of “The Pyramid” and part-C is also quite weak. With most of the teaching Institutes of higher education being funded by the Government of India, the onus lies on the Government to frame a policy that will solve this problem. If India has to move up-the-ladder from a “developing” to a “developed” country, it is necessary to strengthen part B+C of “The Pyramid”. Otherwise, generation after generation of Indian scientists will only keep repeating the lines penned by Robert Frost “…I have promises to keep, and miles to go before I sleep…” that seem to have become a common expression for not reaching even close to the desired higher destination because the miles never seem to end!