

## 'To be a techie or not to be' – Science and technology scenario in India

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At the end of the Indian Science Congress, held in the first week of January every year, serious debates and discussions take place between the academia and policy makers of our country on how best science programmes should be run and what should be best, funded-basic or applied research programmes. And every year, one question that arises in everyone's mind is – Should the purpose of funding every worthwhile project lead to educating a technologically literate people or to promote economic activity by developing new technologies?

As the policy makers of the country begin to increasingly talk about funding driven by the desire for better health and economic gain, it follows that such funding is more subject to political control. Some experts have felt that instead of allowing science policy and funding to be decided by the government, they should be allowed to have a say in what is researched and when. An example of this democratization has been the lobbies that work for increased funding for various bio-technological issues.

Many benefits would definitely arise from linking scientific research to economic growth and issues that concern the public, but can this connection be made while preserving scientific autonomy in pursuing research? If the scientific community expects to maintain funding levels in the current budget environment, it must demonstrate the value of its work to the public through education and outreach programmes. At the same time, it must be careful not to make unrealistic promises for economic or technological miracles or allow itself to be driven solely by public demand. This would then mean some tension between the need to present a case for science as returning meaningful results to the public and the need for scientific autonomy.

Often, political supporters of basic research view research as the foundation upon which a technologically strong nation can be built. They argue that research institutes must first seek a productive interaction between their traditional role as seekers of knowledge and the growing demand for technological applications that have an immediate economic impact.

Thus, increasingly, the concept of 'targeted research' is gaining ground. In biological research, in particular, biomedical area, we note a trend toward such targeted research. And this research does have the potential for gaining public support.

### Corporate funding for research

In recent years, private funding for R&D at the universities as well as other science institutes has been seen as being increasingly important as the role of the government declines. Partnership is a popular concept and in the US and Europe, both universities or organizations and corporations have benefited from combining their strengths and cooperating to gain a whole that is greater than the sum of its parts.

India, as yet does not have a similar strong industry-institute partnership and part of the reason for this is that our economy today is more a service economy, and service industries do not generate the R&D that manufacturing industries do. This could be considered simply an indicator of the type of industry that is strongest in this country and is not necessarily a negative point.

### Graduate science education

There now seems an increasing practice of putting caps on the amount of graduate student support for carrying out PhD programmes that can be covered by grants from several government funding agencies. In contrast to this situation, some scientists argue that Indian universities are producing too many Ph Ds, given the diminishing possibilities for academic jobs. In the globalization and market economy scenario today, where flexibility, change and mobility seem to be the buzzwords, we may need, not fewer Ph Ds, but more flexible ones. This requires changes in the way students are trained and also calls for closer ties between academia and industry. Universities, for example, should train students to be innovative and to work on solving problems of their own choosing, whereas in industry, researchers often are required

to work on predetermined problems rather than choosing their own goals. Preparing students for careers outside of the university might enhance partnerships with private industry, as companies begin to see PhDs as adaptable and capable of stepping into a variety of jobs.

Enhancing partnerships with private industry, educating the public about what research can accomplish through outreach programmes, preparing students for possibilities outside the university, and deciding the role and purpose of research universities in the next stage of science funding in this country will help the scientific community to adapt a changing environment.

But of late, there seems to be 'an unwillingness' to accept that basic research is necessary for innovation. To encourage excellent science, scientists need to be free to set up their own collaborations, based on research needs, rather than arbitrary funding requirements. The introduction of more investigator-driven projects should be enough to meet the challenge – the changes need not be very drastic, but they have to happen and if research funding is to become truly successful, it must focus on broader research areas, more investigator-initiated programme projects, less applied and more basic research. ... and less bureaucracy.

The high bureaucratic element of funding applications is also an issue that is sometimes discussed for particular criticism. An opinion voiced by both academics and the industrialists is that often the effort required to apply for funding does not justify the outcome; the process is too complicated and lengthy, the success rate too low and there is delay in disbursement of grants. Scientists also feel that research goals are over-ambitious for the little money available. Therefore, it is imperative that we stress the need to 'reduce bureaucratic overkill'.

### Fallacy and policy in science funding

Normally under competitive conditions organizations can actually overinvest in R&D, in the sense that private and social benefit are less than social cost. But, on the other hand, even if they do actually

underinvest in R&D, in the Indian conditions of centralized planning and distributed decision making, it becomes obvious that the government cannot and never will be able to determine the 'right' amount of money to be spent on research. And scientists would always want 'more'. Here one assumes that the government is a neutral agency, weighing costs and benefits in an attempt to achieve optimal outcomes. But, often, even if the right amount of research funding could be estimated, it should not be spent on non-appropriable research. Instead, it should be spent on politically useful research. Many scientists still believe steady fund-

ing to be a prerequisite and say 'automatic funding is a must if continuous research is necessary'.

Today, unlike 50 years ago, scientific research seems to be motivated not only by curiosity or love for science, but also by fads and the fixation that some areas of research are more rewarding than others. Although this may seem to stray from the traditional academic research, the truth is that science can accelerate progress in a nation.

Above everything, the transition of a country from developing to developed is a process that requires facing up to the established interests in society. The im-

petus for this has to come not only from scientists but from other sectors of society as well. In a world where globalization, open market and WTO have become the mantras; science and scientists can play an important role in determining and implementing progressive development strategies.

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## MEETINGS/SYMPOSIA/SEMINARS

### National Symposium on Applied Geochemistry of Energy Resources and Precious Metals

Date: 19–20 September 2007  
Place: Hyderabad

Themes include: Geochemistry of oil, natural gas and gas hydrates; Geochemistry of coal and coal bed methane (CBM); Geochemistry of nuclear fuels (with special emphasis on mining and waste disposal, modeling of nuclear waste and ground water interaction); Geochemistry of non-conventional energy resources; Geochemistry of precious metals; Environmental impact of exploitation of natural resources.

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### National Workshop on Wireless Communications

Date: 17–18 August 2007  
Place: Bangalore

Topics include: Wi-Fi, Wi-Max, RFID, Wireless Standards, Wireless Security Issues, Industrial Applications of Wireless

Technologies, Wireless Sensor Networks, Cognitive Radio Oriented Wireless Networks, Mobile Ad-hoc Networks, VOIP, WAP, New Computer Applications using Wireless Communications, Bluetooth Radio, Mobile TV, GPS for Consumer market, etc.

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### International Seminar with Field Excursion on 'Pan-African Imprints and Related Mineralisation in Gondwanaland'

Date: 26–30 November 2007  
Place: Thiruvananthapuram

Themes include: Magmatism; Metamorphism; Structure and Tectonism; Mineralisation; Geochemistry and Geochronology; and Correlation of Gondwana Segments.

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