

## Science, technology and innovation for the future of India – an earnest appeal to planners, policy makers and concerned citizens

In the last few years India has begun to emerge as a more significant global player in many areas of science and technology (S&T). The country is respected for the outstanding professionals it has produced and for the contributions it has made to various important sectors of S&T. In parallel, India has improved its infrastructure in S&T substantially in the last two or three decades. Thus, several areas of S&T have been reorganized (e.g. in earth sciences and medical research) and new educational institutions have been set up (e.g. IISERS and more IITs). New Fellowships such as the Ramanujan Fellowship have been created to encourage young talent. And there are several institutions with research and development programmes that could contribute to the solution of some of the societal problems facing India. While there are many positive changes in the S&T scenario, the rate of change could be faster. This is partly because our national aspirations are rising fast. At the same time, international competition in S&T has grown, and indeed become severe. Global Innovation Index 2013 places India at the 66th position amongst 142 nations. In scientific research, while India's contribution to the global output has increased, it still remains only at a modest level with no sign of a major upward swing in quantity or quality. While India is progressing, others are progressing faster. Thus, some of our neighbouring countries have invested much more in people, institutions and infrastructure, and harvested the benefits of science, technology and innovation (STI) to achieve dramatic economic growth and to provide for better education and health-care, and have moved ahead rapidly towards becoming members of the developed world. India's performance in higher education has also not been altogether satisfactory, and we have very few institutions that can be found in the top category in international rankings. Clearly, we have to make a serious effort to improve the situation, if we have to move towards becoming a global player.

Since STI are essential ingredients of growth and development as well as the

general well-being of our society as a whole, it is necessary to seriously ponder over the greater demands being made on our STI efforts in the present world scenario. Science-led innovation has to dominate our developmental efforts, providing the necessary strong base to become competitive internationally, and to become economically strong and socially just. While one may find reasons to be satisfied with the progress that has occurred in the S&T sector since we gained freedom, it is necessary to keep in mind the high aspirations of young India and the constant demand for a better quality of life for all our citizens, both of which require more purposeful effort and committed investment in STI.

With the belief that STI form the very foundation of all national efforts, the Science Advisory Council to the Prime Minister strongly recommends that much greater attention be paid to this sector in the years to come. This requires not a mere increase in investment in S&T from the present roughly 1% of the GDP to the promised 2% of the GDP, but also the moral and intellectual support of society as a whole to STI. With such support and the conviction that our national interests will be greatly served by integrating STI into economic and societal policies, the country should be able to succeed in solving the serious problems that it faces in the next two or three decades, and be counted as a major contributor to STI. We may then be able to have several of our institutions in the top 50 or 100 in the world.

The Science Advisory Council to the Prime Minister strongly recommends that the following steps be taken with a sense of urgency.

1. *Create a strong innovation ecosystem that nurtures science-led innovation, which would include among other things a policy that encourages strong interactions between S&T and industry, so that new Indian products and systems based on new ideas emerge in a competitive world market and India emerges as a global leader in STI.*

2. *Increase investment in S&T and education, including higher education in*

*general. In all such efforts, it is important that the private sector contributes significantly. Increase in private sector investment in R&D and its partnership with the public sector in translational research is crucial. It is necessary that dialogues on new technologies and mega projects are based on reliable evidence and experience rather than emotions and individual preferences.*

3. *Support outstanding individuals, groups and institutions with sufficient long-term funding so that they are able to contribute significantly and become internationally competitive.*

4. *Identify and generously support major national S&T initiatives that can lead to game-changing solutions to our pressing problems.*

5. *Eliminate bureaucracy and outdated procedures which dominate the management of education, S&T today so that these sectors are freed from serious impediments. Governance reforms are badly needed in our universities, specially state universities which carry the excessive burden of affiliated colleges.*

If we embark on focused efforts to accomplish the objectives stated above, we will not remain spectators in a world that will be progressing at a fast pace in economic, social and educational sectors, but will carve for ourselves a position in the league of global leaders. There is every reason to believe that the S&T sector will gladly bear the increased responsibility needed today.

**Science Advisory Council to the Prime Minister:** C. N. R. Rao (Chairman), S. Ayyappan, P. Balaram, Baldev Raj, Mustansir Barma, M. K. Bhan, S. K. Brahmachari, Avinash Chander, R. Chidambaram, S. E. Hasnain, Ashok Jhunjhunwala, Kiran Karnik, V. M. Katoch, D. V. Khakhar, R. A. Mashelkar, Goverdhan Mehta, Shailesh Naik, Roddam Narasimha, Swati Piramal, K. Radhakrishnan, Sujatha Ramadorai, T. V. Ramakrishnan, P. Rama Rao, T. Ramasami (Secretary), M. M. Sharma, V. K. Singh, Bikash Sinha, R. K. Sinha, A. K. Sood, Venu Srinivasan, B. K. Thelma, K. VijayRaghavan