VIDYASAGAR UNIVERSITY

Sixth Convocation

Address by

Professor V. S. Ramamurthy

Secretary to the Government of India

Department of Science and Technology

New Delhi

5 March 2001

SAHEED PRADYUT SMRITI BHAVAN, ZILLA PARISHAD

MIDNAPORE 721 102

WEST BENGAL

Your Excellency the Chancellor, Esteemed Vice-Chancellor, Members of the Court and the Executive Council, my dear students, distinguished guests,

I feel greatly honoured on being invited to give the convocation address today at this University.

We are just two months into the first year of the new millennium. Considering the revolutionary changes which have taken place during the recent years, it is difficult to predict what the future holds for us. We can however be certain that Science and Technology are going to play a major role in shaping our future. Science and Technology have always been intimately connected with the evolution of the human civilization since time immemorial. What distinguishes the coming years from the past is the rate at which new scientific discoveries are made, the speed with which these are converted into new technologies and the extent to which they influence the day to day lives of the population. The winners of tomorrow are clearly those who are able to comprehend quickly the technological changes and exploit them for their benefits in real time. This will involve not only competitive scientific research but also the capability to identify and develop appropriate technologies suited to one's own requirements, assimilate technologies developed elsewhere and take these technologies to the end user. While the need for increasing investments in Research and Development is a matter of concern for resource limited countries like India, a window of opportunity can also be seen. All S&T based activities, be it scientific research, Technology development, high-tech industries, or even building a techno-savvy society, are people centric. More than resources, it is the ready availability of trained manpower, scientists, technologists, skilled workers and a well-informed population, which is going to decide the scientific strength of a nation. A population need not be a burden but a resource, a truly renewable resource and it is education which converts the population into a human resource. Some proactive steps are however required to make this possible.

The Technology Development and Transfer Process, starting from conceptualization to commercialization, has many phases and milestones. The first phase is naturally Basic Research, curiosity driven,

adds to the knowledge pool and has very little direct linkage with the end product. The second phase is also predominantly research but with a strong orientation towards the end-use. The third phase involves not only design of specific products and services involving multiple technologies but also up-scaling to industrial levels. The fourth and the last phase involves large scale manufacture and marketing. The success of this phase is not purely dependent on the Technology alone but many other external factors such as the ready availability of raw materials and infrastructure, skilled manpower, enabling regulatory and fiscal policies, marketing and after-sales network etc. For any new Technology to be introduced in the marketplace, not only do we need to support its development in the laboratory but it is also necessary to strengthen the last two phases. For a sustained success of the Technology, it is also necessary to put in place strong feed back mechanisms across the entire Technology Development and Transfer Chain. Developing countries with limited resources need to develop their own enabling mechanisms to suit their requirements.

Where does India stand in facing this challenge of moulding our future? You may recall that when India attained its freedom from foreign rule fifty years ago, the challenges facing the country were indeed stupendous - a large under-nourished population, poor infrastructure and a fledgling democratic political system. We did have in our favour a tradition of science and a broad educational infrastructure. It is to the credit of the national leaders of that time that they chose the path of Science and Technology to address the problems of the country. Thanks to the sustained effort, the first two decades after independence saw the establishment of a strong educational and S&T infrastructure. The establishment of the IITs, RECs, a large number research Institutes, they all belong to this phase of development of the country. Simultaneously, the foundations were also laid for a number of heavy industries and strategic technologies like Agriculture, Nuclear and Space technologies. The industries in the private sector also turned to more and more manufacturing in place of simple trading. This infrastructure not only enabled the country to surmount the biggest challenge faced by free India, the chronic food shortages of the sixties, but also turned the country into a major manufacturer of finished goods though primarily by reverse engineering. The globalization of world trade in the early nineties opened up yet another phase in the S&T

scene. The challenge is how to make India globally competitive. Our successes in the core technologies and more recently in the Software market give us the confidence that India can. But it requires sustained efforts to convert our educational, scientific and industrial resources into our strengths.

During the last few years, the Department of Science and Technology (DST) has gone through several learning and implementing experiences not only in funding Basic Research in the Universities and R&D Institutions but also in creation of Infrastructure Facilities, Technology Development and Commercialization and in the development of trained human resource. I will like to share with you some of these experiences.

You all know that the Science and Engineering Research Council (SERC) of DST is the major source of extramural funding for research in the Universities and other R&D Institutions in the country cutting across disciplines and other organizational barriers. Funding decisions are taken purely on the basis of the scientific merit of the proposal and the competence of the scientists to implement the proposal. However, this mechanism of support often skirts the process of Technology Development and Transfer which is a complex, interactive and often iterative process involving not only new scientific knowledge but also the needs of the user, affordability and often the national will. Security concerns and economic considerations often play crucial roles in the development of specific technologies. Relevance in addition to Excellence becomes the criterion for support. Need-based Technology Development can be driven either by advances in scientific knowledge or by specific user needs. Irrespective of the driving force, the need for a close linkage between the Technology developer and the user is obvious. Mechanisms have to be put in place to establish such linkages. While SERC encourages such linkages, targeted programs like the Home Grown Technology Program and the Drugs and Pharmaceuticals Research Program demand a close linkage between the research group and the user group right from the project formulation phase with sharing of costs and efforts during project implementation.

Another mode of implementation of Technology Development for specific end use is the "Mission Mode" programs. The missions are launched after detailed studies of the requirements and the available technology options and the modalities of implementation vary. Three

major Missions implemented by the department relate to Fly Ash Utilization, Use of Advanced Composites in non-defence applications and Modernization of Sugar Technology. A number of "JAI VIGYAN MISSIONS" and "INDIA MILLENIUM MISSIONS" on topics of national importance have also been recently launched by the DST. In most missions, the role of the department is primarily promotional with catalytic inputs for confidence building.

Another recent initiative of DST towards Technology Commercialization is the establishment of the Technology Development Board which extends financial assistance to industries to commercialize new and indigenous technologies. During the last three years of its operation, the Board has supported more than seventy enterprises and nearly thirty new products have appeared in the market based on this support.

DST has also been putting in place several facilitating mechanisms to promote Technology Development. As was mentioned earlier, Technology Development is often a continuing exercise. One has to take into account not only existing alternate technology options but also assess emerging technologies and user needs. The Technology Information and Assessment Council (TIFAC) was established by DST in 1988 with the main objective of conducting technology forecasting and assessment studies in key areas of national importance in order to provide information for enabling decision making on technology choices and policies for the country. Apart from a large number of technology and market status reports, TIFAC recently brought out a series of "TECHNOLOGY VISION FOR INDIA 2020" documents in 25 volumes in 16 core technology areas after a detailed exercise carried out with the participation of a large number of experts from the academia, R&D Institutions, Industry and the Government. They set a road map for India to become a developed nation by the year 2020. The INDIA MILLENIUM MISSIONS are indeed based on this VISION documents.

The new World Order heralded by the formation of the World Trade Organization (WTO) has placed new demands on the developers and users of new technologies. Not only is it necessary to respect the rights of Intellectual Property Rights (IPR) holders but it is also necessary to protect one's own Intellectual Property. While the legal aspects of protection of Intellectual Property rest with mandated departments, DST

is taking special efforts to create an awareness about IPR among the scientists and the Industry. The Patent Facilitating Center functions as a "May I Help You" center - a single window source of comprehensive information on Intellectual Property and its protection.

Technology Development in all its phases presumes ready availability of trained manpower. In the knowledge era of coming years, the best investment a country can make is in education - not only in primary and secondary education but also in higher and specialized education and skill development. If India could attain world recognition in Computer Software and Information Technology today, it is because of our past investments in education. If we have to maintain this lead and become globally competitive in other emerging areas of technology also, we must continue to strengthen our educational system to suit the changing needs.

The experience of several developed countries has shown that the Higher Educational Institutions, besides their conventional role in the development of trained manpower, can also play a more direct role for the economic growth of the nation. It is needless to say that these institutions are not only major repositories of knowledge but are also the seed beds of new ideas, technologies and innovations. This will however require strong linkages of these institutions with the industries and a spirit of entrepreneurship among the students so that more of them would venture into technology based enterprises. As many of you may be aware, the growth and development of the Silicon Valley in USA is indeed the outcome of an initiative taken by Stanford University and other institutions in the region to promote technology based enterprises based on their research outputs. The National Science and Technology Entrepreneurship Development Board (NSTEDB) of DST is engaged in evolving programs and schemes to promote the spirit of entrepreneurship and innovation among the science and engineering students through well structured programs. The Board has set up a number of Science and Technology Entrepreneurship Parks (STEPS) and Entrepreneurship Development Cells (EDCs) in leading educational institutions across the country one of which is indeed located in this very University. It is also proposed to establish a number of Technology Business Incubators (TBIs) to provide facilities for the development and growth of technology based small enterprises.

In a new initiative "REACH", we are making efforts to make Engineering Colleges respond to the needs of the industries. Under a tripartite Memorandum of Understanding, involving the College, one or more industrial partners and TIFAC, Centers of Relevance and Excellence (COREs) are being established in identified areas. These COREs will design, teach and carry out research in areas identified by the industrial partners as their requirements.

Only through sustained and multi-pronged efforts as described above, India can hope to achieve the necessary skills in knowledge generation, through scientific research, development and assimilation of relevant technologies and exploitation of the technologies for economic development.

Before I conclude, I wish to congratulate and offer my best wishes to all of you who will be receiving their degrees today. Today is an important milestone in your lives. It is the education which you have received during the last few years in the classrooms and outside which will be the foundation on which your future will be built. Irrespective of what you choose to do for your career, my message to you is simply to do it well and make your country and your alma mater proud.

Let me once again thank the University for giving me this opportunity to be with you today and share some of my thoughts.

THANK YOU

JAI HIND