

CONVOCATION ADDRESS

26 July 1996

***Wealth Creation Through Knowledge:
The Emerging Indian Challenge***

Dr. R A Mashelkar
Director General
Council of Scientific & Industrial Research
New Delhi-110 001

**Indian Institute of Technology
Madras**

**Wealth Creation Through Knowledge:
The Emerging Indian Challenge**

Dr. R A Mashelkar

Director General

*Council of Scientific & Industrial Research,
New Delhi-110 001*

Mr. Chairman, Mr. Director, Graduates of the Year, Distinguished Guests, Ladies & Gentlemen.

I consider it to be a great honour and a special privilege to have been invited to deliver the Convocation Address. This institute is unquestionably the pride of India. This institute has been built assiduously by some of the most eminent men of India. The rich traditions of scholarship and academic excellence of this institute have been sustained for several decades. The graduates of this Institute have done the nation proud. There are enormous expectations from everyone about this institute's role in building the new India.

Let me begin by extending my congratulations and my very best wishes to the young graduates. You entered this institute when the decade of nineties had barely begun. The world was very different then. As you leave this institute, you will find that the new world that you will now face is a very different one indeed. What a dramatic turn around it has been in the span of just last five years! There has been a sea-change in the economic, political and technological environment the world over. Age old attitudes and mind sets are being discarded everywhere. The wave of change sweeping the country and the world has thrown up myriad of challenges and at the same time it has posed enormous challenges. In this new world, there will be extra-ordinary opportunities for those, who are prepared to face these challenges. Indeed only those of us will survive and succeed, who will be able to anticipate the change and also

exploit the change. And those who do this will one day lead the change. We should have the ambition of leading the change and make things happen on our own terms. I firmly believe that all this will be possible.

Many say that 21st Century will belong to Asia and India will have a chance to lead. Our own dream and vision is that India will become the intellectual capital of the world. But will this mean that it will become an economic power? The answer is that it will not be possible to become one, unless we are able to use India's great attribute, namely, the intellectual prowess, to create wealth. The theme of my address centres around the paradigm of wealth creation through knowledge.

There is a new definition of wealth today. Wealth is no more measured in terms of fixed assets such as buildings, land, bank account, etc. It is measured in terms of those knowledge based systems, which add value. In today's world, goods, services, data, people etc. cross the physical borders of different nations freely. However, adding value through knowledge gives nations a competitive advantage. Many countries realise the value of the intellectual prowess of its people. For instance, witness the interesting recent developments in Japan, which is considering a legislation, where intellectual property can be considered as a security against loan.

Where does India stand in this context? Jack Welch, the Chief Executive Office of General Electric Company from USA was here some time ago. He said that India is a developing country but it was one of the most developed countries as far as its intellectual infrastructure was concerned. In that sense then, we should be a rich country, but we are not. Why is this so? It is because, among other things, the wealth creation potential of knowledge is something that we have not fully understood. We have still not learnt to build the bridge between discovery and market place. Ability to

built this bridge is a pre-requisite for Indian science to make economic sense. I wish to speak to you today about a heady dream of not only making India the intellectual capital of the world but also an economic power to reckon with.

The Inevitability of Indian Technology Movement

Let us deal with one myth quickly before we move on. As we know, opening up of the economy and integration of the Indian economy with the global economy is a process that has already gained momentum over the last five years. There is a mistaken notion that opening up will result in our having unlimited inflow of technology and therefore we do not have to now worry about developing technological strength by sweating it out! After all technologies will be available on platter. All that we have to do is to acquire them and adapt them. Nothing can be further from truth. I will like to give concrete examples to illustrate as to why such thinking is wrong.

In the first instance, the technology game has become very complex. Technology will be available to Indian companies only if it fits in with the global scheme of a supplier. If Mark-III technology is available, then we might negotiate for Mark-II and in most case we may get Mark-I. This is because India will be looked at not as a bottomless pit of demand, but as a competitor in the global market.

The technology game is already becoming very complex. The days of straight forward technology licensing are over. Technology-cum-product swap, technology-cum-stake holding, etc. are the new equations. Marketing territory restrictions are being put up. Even technology is being broken into pieces and each part is being made available separately. Straight forward technical services contracts are also becoming difficult to negotiate.

New non-tariff barriers are beginning to come in. Restrictions due to dual use technology are already familiar to us. Demand on

removal of all subsidies are other forms of non-tariff barriers. The same health and safety standards for our labour will be demanded so that the obvious advantage of the cheaper labour that we had always talked about in the context of India will be lost. The only way we can fight these battles is through the means of continuous innovation and technology development.

Let me also correct another impression and that is about joint ventures. Why not form joint ventures and, then of course, technology will be available to us from our foreign partners. This is not quite right again. It needs to be emphasised that equality in equity based joint ventures will have to be earned and not demanded. This equality can be earned only when we have a strong technological muscle ourselves.

What I am really trying to emphasise is that there is no substitute for creating a technology movement in the country. Unfortunately this movement has not taken place so far. There is no substitute for our industry itself investing heavily in in-house R&D and synergising with our national institutions like IIT (Madras). Let me pursue this crucial science-business partnership.

Science-Business Links : Need for Change

Science can make economic sense only when we wake up the scientist in an entrepreneur and also the entrepreneur in a scientist. Nations that occupy leading positions have successfully done this but in India we have not done it so successfully. Further our science-business links have been traditionally very poor.

How do we build a strong bridge between discovery and market place? The battles in the market place are fought, of course, by our industry. What has been their attitude to establishing a link between science and business? I am afraid, their attitude has not been very positive. Our industry had enjoyed the presence of a seller's market for many decades. The heat of the competition in the market place

was not felt by them. With opening up, the picture is changing. It is becoming clear to the industry that only those will survive and succeed, who understand the market dynamics and consumer needs, who have a sustained commitment to world class R&D, who are able to develop and market superior products ahead of their competitors and who understand the key role of the intellectual property in trade and commerce. But it will be some time before this realisation will materially transform the scenario in India. What are the ground realities today and how quickly can we pass through this transition? Let me address this issue first.

The fundamental problem that we have today is that the institutions and the business units in industry have different cultures. The fact that science has to make an economic sense has not dawned on our institutions. On the other hand, the fact that competitive advantage in business can only be reached by using cutting edge science and engineering alone has not been realised by our industry. There are basic incompatibilities between our institutions and industry. The institutions have a long term horizon on R&D, whereas the business units have a short term horizon. As regards the financial structure, R&D units are considered as cost centres whereas the business units would want them to be profit making centres. As regards the products emerging from R&D laboratories, these invariably come out as some sort of packages containing knowledge and information, whereas the business units would want to convert these into goods and services, which are saleable. There is even a difference in the basic orientation between the institutions and the industry. The institutions work on the basis of scientific novelties and perceived needs, whereas the business units work on the basis of attractiveness in the market and potential for profit. There is a need for both the R&D institutions as well as industry to change their mind sets.

What changes of mind sets will be required if the science- business link in India has to be strengthened? Firstly, our Indian industry

will have to champion R&D with a vigour. Apart from its willingness to invest in R&D, the industry should be willing to take risks and should; have patience to wait for returns. Publicly funded institutions, such as this institute, should be used as *idea generators and providers of new concepts* by our industry. Industry should not simply look at the institutions as super markets, where off the shelf technologies are sold. Indian industry should be prepared to assume the role of partners, who have the technical, financial and marketing strengths to take ideas to the market place. In the true spirit of partnership, the industry should willingly integrate national R&D resources into their business strategy. All this would be possible only when we can change the climate for an interaction between our institutions and the industry with an improved communication and understanding, faith in mutual growth and development of healthy working relationships.

Trans-national Bridges Between Discovery and Market Place

I want to take this issue further and emphasise that science- business links pass transnational boundaries today. Indeed, the dynamics of the new corporate world is decided by selective competition and co-operation, which is not only national but trans-national. There is a great opportunity to forge strategic relationships with international partners. Indeed many major multinational corporations in USA and Europe, whose R&D budgets are larger than even India's R&D budget, are becoming partners of Indian R&D laboratories. We should not take a narrow and timid view of such opportunities that are unfolding but go out aggressively to forge such partnerships and create a win-win situation on our own terms. Several companies believe that the surest way of becoming technically strong is through networking with premier organisations across the world. In an era of global connectivity through modern information technology, the concept of virtual laboratory is gaining ground.

I want to emphasise the several factors will help accelerate these new partnerships through globalisation of industrial R&D, but the most important factor that will help the process of creation of seamless laboratories around the world will be the evolution of a global information network. Indeed these networks will allow the real-time management and operation of laboratories in any part of the world. Thus, companies will be seeking to gain a competitive advantage by using the global knowledge resource and working with a global time clock. Realisation of the power of this major paradigm shift means enormous opportunities for Indian institutes to become lead players in the global knowledge market, including IIT (Madras). We have to aggressively spot these opportunities.

I also want to alert you by emphasising that the window of opportunity for global partnerships will be limited. We will have to worry about competition, which is emerging in Asia itself. Philippines, Taiwan and China are making serious bids to enter the global software industry. In biotechnology, Taiwan and Singapore are much ahead of us. We also should not under-estimate China in the long run as far as process technology is concerned. Sooner rather than later, some of these countries will cover up their deficiencies like language problems, modern management practice, etc. and surge ahead of us. To seek a lead initially may be easy but to maintain it is going to be tough. If we focus, innovate and keep our ambitions of leadership through technology high, then I see no reason as to why India cannot emerge as a global R&D platform.

Intellectual Property Management for Wealth Creation

The potential of knowledge as a creator of wealth is gaining currency all around the world, but only usable knowledge that is protected or protectable can have the potential of wealth creation. The inclusion of IPR in the GATT agreement is an indication of this realisation. We will have to pay urgent attention to enhancing our levels of innovation and creativity substantially. A major

change in the offing is due to India's accession to World Trade Organisation (WTO). Generation of intellectual property, its capture, documentation, protection, evaluation and its exploitation assumes a crucial importance in the new context. Indeed, there will have to be a sea-change in our ability to manage our intellectual property - be it patents, copy rights, designs, and so on. The greatest challenge will be posed by patents.

The basic criterion for the grant of a patent is that the innovation must have elements of novelty, non-obviousness and utility. A fundamental issue pertains to the quality of the research itself that we need to do. Many of the Indian R&D institutions and industrial firms have so far focussed on imitative research or reverse engineering. How do we change our mind sets so that we move on to doing truly innovative research or in other words doing forward engineering rather than reverse engineering? This is the first big challenge.

Skills in filing, reading and exploiting patents will be most crucial in the years to come. Our ability to read or write patents is very poor. In that sense, patent literacy in India is lacking to a great extent. A patent literacy mission will have to be launched with a sense of urgency. Neither can we properly protect our inventions nor can we understand the implications of the patents granted to our competitors.

Manpower planning for IPR protection will need emergency measures. A number of steps will have to be taken by our institutes including this institute. IPR must be made a compulsory subject matter in the law courses in the Universities in India. Our graduates coming out of engineering and technology streams have no idea about IPR, and yet it is these young people, who will have to generate and exploit the intellectual property. We will have to introduce key elements of IPR in their courses. A number of patent training institutes will have to be set up. China has set up 5000

patent training institutes, whereas we have none in India at the moment! It is a matter of deep concern that with a 100-year old system on patents, in India 4000 patents were filed last year, whereas with just a 10-year old system, China had 90,000 patents last year.

Judicious management of patent information will require well-structured functioning of information creating centres, information documenters and retrievers, information users, IPR specialists and information technology experts. The appropriate and selective use of information aided by state-of-the-art tools of information technology is absolutely essential in the management of this process. However, patent information scientists will have to be trained to make the best use of information technology and local and international data bases effectively and provide service to potential users in all sectors of a business. IIT (Madras) can play a major role in this endeavour.

Wealth Creation & Partnership with Nature

Many say that India is a rich country, where poor people stay. The richness is due to our intellectual prowess and biodiversity. The powerful synergy of our intellectual prowess and India's rich biodiversity will give India the competitive edge. Conserving, preserving and protecting our biodiversity and value adding is the need of the hour.

There are deep issues involved about the role of indigenous communities in conservation and sustainable use of biodiversity and sharing of the benefits flowing from commercial uses of these resources. A link between the formal system of innovation (like in our laboratories and IITs) and informal systems of innovation (in our villages) need to be established. A rationale for biodiversity based enterprises in India needs to be established. Reliable and accessible biodiversity information systems is the need of the hour too.

While on the issue of creating wealth through our rich biodiversity, I wish to stress that the future economies must expand within ecosystems which have limited regenerative capacities. Contrary to the neo-classical theory of continuous material growth, economic activities can undermine the potential for development through over-exploitation of natural resources, and indirectly compromise future production through the discharge of residuals. The old ideas of quantitative growth must give way to the idea of qualitative growth within the limits of the ecosystems. We will have to reconcile developmental goals with ecological capabilities.

While we pursue the goal of making economic sense out of the science we do, we need to take a relook at the conventional indicators of economic growth measured in terms of Gross National Product, Gross Domestic Product, etc. Should we not think in terms of new indicators such as Gross Natural Product or even Gross Ecological Product? Such indicators will not only themselves measure growth but be indicative of ecologically-sound structural changes in economy. The acceptance of these indicators will also send strong signals about the respect we have for partnership with Nature. After all our future is intrinsically linked to this basic realisation.

The Final Word

I want to thank you once again for doing me this great honour. Let me end by saying that I strongly believe that we are at a critical juncture in our life. I view India's future with great optimism and hope. I believe that the twenty first century will belong to Asia and India will have a chance to lead. I believe that India will be counted among the top economic powers of the world by 2020. I believe that we will pride ourselves about our intellectual prowess and intellectual infrastructure. I believe that India will be an intellectual capital of the world by then. Equally importantly, we will pride ourselves as a nation which will do science that will lead and not

follow. We will also be known as a nation that leads the rest of the world in making the most innovative economic sense of the science it does. The graduates from this great institute entering this new world today have the responsibility of sharing this grand dream and make it happen. Thank you.