

JRD Tata Corporate Leadership Award Lecture

On Launching Indian Innovation Movement

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Dr. R. A. Mashelkar, FRS, DG, CSIR receiving the
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Shri Krishan Kant, Vice-President of India on 21st February 1999

I deem it a great privilege and honour to have received the JRD Corporate Leadership Award. This is a moment of great joy, happiness and pride for me. I am indeed overwhelmed.

As I stand before you this evening, my mind goes back to the late fifties with images of a poor boy in the streets of Bombay, who went to the school barefoot until he was twelve years old. My mind goes back to 1960, when this boy was contemplating to leave studies, inspite of securing a position in the top thirty in the Maharashtra State Board in SSC examination, since his widowed mother could not support his college education. And then I remember the helping hand, the support by Dorab Tata Trust of sixty rupees per month that came his way, saw this boy complete the education. My mind goes back to those days in the House of Tatas, namely the Bombay House, where with special care and affection, this boy was given a hope for his future, by offering help which went far beyond the financial help. My mind also goes back to the glimpse one had, in that young impressionable age, of JRD Tata, a majestic figure, who then looked so distant but yet so close with his warm smile. Little did this boy realise that a day will come when he will be honoured with the JRD Tata Corporate Leadership Award at a glittering function in the presence of the Hon'ble Vice President of India and in the presence of the leading figures of the Corporate World. You may now see as to why this is a particularly illuminating moment in my life. I want to thank the All India Management Association for the great honour that they have done to me and the distinguished jury, who found me to be worthy of this honour.

I feel overwhelmed today because I find that all my predecessors were men of such great eminence and distinction in the business world; each pioneering in his own way a unique leadership that left an indelible mark on the Indian corporate world. I feel overwhelmed also because this is probably the first time that a scientist has been given an award for corporate leadership and I am not sure that such a major corporate recognition has ever come the way of a scientist in Independent India. I interpret this as an explicit recognition by the Corporate World of the role of science & technology in economic development. I take it as a tacit recognition of the role of knowledge, innovation and creativity in creating wealth. I also take it as the recognition by the corporate world of the changing face of this great

organisation, namely CSIR, a chain of forty laboratories. I accept this honour on behalf of the entire family of twenty three thousand members of CSIR, since the recognition is really theirs and not mine.

I was appointed the Director General of Council of Scientific & Industrial Research on 1st July 1995. Someone then asked me as to what was my dream for CSIR and I remember saying "CSIR incorporated". Then I was asked as to what was my dream for myself and I said that I wanted to be the "Chief Executive Officer of CSIR". In fact, I remember a nice clipping in a newspaper referring to me as a corporate scientist, a scientist, who thought corporate and talked corporate. In a way, I suppose this award is being given, not to the Director General of CSIR, but to the Chief Executive Officer of CSIR Inc. To me, therefore, it is a dream come true. I feel doubly gratified.

We see today that there has been a sea change in the economic, political and technological environment the world over. Age old attitudes and mindsets are being discarded everywhere. India has been no exception; its economy has been unshackled and the forces of competition have been unleashed. A new vision of India as a major player in the global setting has been articulated. The wave of change sweeping the country and the world has thrown up myriad opportunities and challenges.

In order to meet these challenges, just as we had launched a national freedom movement to unshackle ourselves from the foreign powers, we need to launch a national innovation movement. The role of science and technology in this movement is the theme that I want to pursue in this lecture. To fulfill this role of S&T would mean unleashing the power of India's full intellectual infrastructure, including its publicly funded R&D institutions. Indeed, we recall the great hope with which our leaders had built a massive chain of publicly funded R&D institutions, CSIR being only one of them. They were built in a context, and as the context changes, so does the content. As Darwin says, "It is not the strongest of the species that survives, not the most intelligent; it is the one that is most adaptable to change". Going further than Darwin, it is fair to say that only those who can anticipate the change, can lead the change. I want to begin initially by referring to the first determined steps that CSIR took to herald this change process.

We began the process of change in CSIR to build an enduring science-business link. But then we saw a big cultural divide between the R&D institutions and the industry. The fact that science has to make an economic and social sense had not dawned on large number of our institutions, whereas demand on science from industry was sadly missing. The institutions worked on the basis of scientific novelties and perceived needs, whereas the business units worked on the basis of attractiveness in the market and potential for profit. The products from our institutions invariably came out as some sort of packages containing knowledge and information, whereas the business units were looking for only finished goods and services, which were saleable.

Our campaign was to see that industry viewed our institutions as idea generators, providers of new concepts and windows on knowledge on the rest of the world. We tried to persuade the Indian industry to assume the role of partners, who had the technical, financial and marketing strengths to take ideas to the market place. We tried to convince the industry that they should not look at institutions as super markets, where off the shelf technologies were sold, but on the other hand, in the true spirit of partnership, they should willingly integrate national R&D resources into their business strategy. We tried to create a climate of improved communication and understanding, faith in mutual growth and development of healthy working relationships. But to build this trust and confidence, we had to show that CSIR itself was willing to change.

In early January 1996, we prepared **CSIR 2001: Vision & Strategy**, a white paper, which was an announcement of CSIR's will to change. It was an explicit agenda for CSIR with a detailed road map for attaining the true potential of CSIR, visualized not in relation to what it used to do in the past but in relation to what others, the world over, were likely to do in the future. We defined a new product and a new process in CSIR. The new product was research as a business. The new process was doing research in a business like manner. We were enthused when the corporate world appreciated the white paper. I remember Mr. Ratan Tata, in a private conversation with me, called it a unique corporate like document from a publicly funded organization.

We made conscious efforts to ensure that the power was not centred in Delhi at the Headquarters. It was where the action was. We thus empowered the Directors in the laboratories allowing them greater freedom in decision making. Autonomy goes with accountability. We built performance based budgeting systems for the laboratories. Each laboratory was asked to develop a business plan, not just a research plan. We set targets not only on the external earnings but also on the new production to be catalysed in industry, new jobs to be created etc. The tangible impact on industry & society had to be assessed and measured.

In a corporate like approach, we set quantitative goals for ourselves. But we soon realised that it was not enough to realise our target of earnings from our customers. It was important to know whether they were satisfied and would come to us again. What were the gaps in our delivery of the product to them – what changes and improvement would they like. We, therefore, set up a Customer Satisfaction Evaluation Cell – I believe a first by any Indian publicly funded R&D institution. The way ahead was not clear, there were no techniques and text books to go by. We had to chart out our own methods and techniques. Last year we completed customer satisfaction evaluation of 100 projects. This year we would do over 400 projects. Eventually we will be evaluating all the 1200 to 1400 projects that we undertake in a year for our customers. The feedback has given us valuable lessons that are helping us align our processes to customer preferences.

Our effort was to awaken the scientist in an entrepreneur and an entrepreneur in a scientist. If a scientist created wealth for the nation through the economic exploitation of the technologies developed by him, then we felt that he should also get a share of this wealth. So we created incentive schemes for these scientists, both at individual and institutional level. At institutional level, we allowed the laboratories to build a corpus through the net surpluses that they generated by offering their processes, products and technology to industry and we allowed full freedom for them to use the surpluses in the way they wanted. This meant autonomy and freedom, but only to the performers, who generated surpluses. We allowed our laboratories to set up commercial arms and also to take equity in start up companies by using knowledge as an equity. We also allowed our scientists to be on the

boards of directors of both public sector and private sector companies, thereby bringing in some of the corporate culture and thinking from the boardrooms to the precincts of the laboratories.

CSIR believes in progress through partnership at all levels; local, national & global. For this, we had to build strong internal knowledge networks within CSIR by building a TEAM CSIR spirit. We launched such major TEAM CSIR efforts in areas, where India can emerge as a global leader. For instance, India is described as a rich country, where poor people live. Our richness is due to our rich biodiversity and wisdom of traditional knowledgebase including traditional medicinal systems. We have so far not been able to exploit this advantage and create wealth. For this purpose we have launched a programme on discovery and development of bioactives based on plant and other sources. Twenty of the CSIR laboratories have been networked together in this exciting endeavour. This is the first time in the history of CSIR that such massive networking and synergy has been built. We are hoping that in three years we will come up with at least five new molecules of global importance and erase the image of India as only a copier of new molecules developed in the West.

Going further, while forging strong linkages with the corporate world in India, CSIR forged global partnerships by realising that the chain of concept to commercialisation necessarily crosses transnational boundaries today. In an era of global connectivity through modern information technology, the concept of virtual laboratory is gaining ground. As a part of the global innovation strategy, several companies world over are scouting for new ideas and patents. External technology acquisition is assuming importance within leading corporations. The ability to assemble and manage an effective global knowledge network in a short time, rather than developing in-house capability is becoming the key determinant of competitiveness. Taking advantage of this strategic shift, CSIR has become a partner of industry around the world today. Mobil & IIP have joined hands to develop and market the Mobil/IIP technologies worldwide. Stone & Webster of USA is implementing IIP's technologies on visbreaking. In Latin America, SmithKline Beecham has joined hands with IICT in some new exciting projects on drugs. Boeing relies on NAL for some crucial fatigue research. NAL's software supplied to Civil Aviation Authority in U.K determines the landing frequency of aircrafts at

Heathrow airport today. NCL's partnerships with giants such as General Electric, a company with an R&D budget higher than India's R&D budget, was declared as a model for external R&D alliances by General Electric in 1998. Rather than being a perennial seeker of knowledge from the western world, we are emerging as an exporter of knowledge. We do believe that India has a tremendous comparative advantage, due to its great intellectual infrastructure, to emerge as a hub of R&D in the new global context and we are proud that, in a small way, CSIR is showing the way on opportunities in export of knowledge.

While CSIR is forging global corporate level partnerships, it is also forging unusual local partnerships by reaching the unreached in the remote corners of India. A village called Athaoni, on the border of Maharashtra and Karnataka is the place from where Kolhapuri chappo's come to us. They were till recently made by age-old traditional technique. Our scientists from CLRI studied this and helped to reduce the processing time from 30 days to 10 days through application of some good science, the stamping process was standardised, certain innovative changes in design, based on computer aided techniques, were made to give more comfort to the wearer. But this was not a top down process. The oldest man in the village was consulted, he was convinced that the age old traditions must change. Today several hundred artisans have been trained by CLRI. This has not only enhanced the family incomes of the villagers but also changed their perception of science, development and change - in short a micro social transformation. For CSIR, it has realised that it is not techno-economics alone, but also socio-economical & socio-cultural aspects, that it needs to be conscious about.

The daunting task before publicly funded R&D institutions is always that of optimum coupling with industry. If the coupling is too strong, then the laboratory continues to do what the industry wants today, thus sometimes losing a long distance vision. On the other hand, if there is little or no coupling, then the institutions solve problems that may have no relevance at all to the industry's needs. A good institution develops an optimum coupling. CSIR will have to seek such optimum coupling. In this context a question is often asked as to how far should a national laboratory go in terms of self-financing. I feel it is more important for a laboratory to balance the budget of India

rather than balance its own budget. I wish to give an example. When 400 out of 800 tanneries in Tamil Nadu were closed down by the High Court due to environmental pollution consideration, it was CSIR through its CLRI and NEERI which came up to put them back in action with green technologies. CSIR thus saved export loss of a few thousand crores for India; whereas the laboratories themselves might not have earned even a few crores. In other words, through this, and several such examples, CSIR's contributions to balancing the national budget through both tangible and intangible contributions are immense. It is in the spirit to make a difference to India that CSIR will be moving in future.

Let me take this point further by adhering to the examples from the leather industry only. CLRI launched a "Leather Technology Mission" with emphasis on technology. This was one of the highly successful endeavours of CSIR, which contributed so much to the growth of the Indian leather sector. CLRI has now proposed a "Leather 2010" vision for India, going far beyond its technology mandate. It is trying to set the pace for Indian leather industry itself by urging it to raise its ambition and stimulating a bold and visionary thinking. CSIR scientists will be increasingly moving out of their labs, moving into industry boardrooms, in the corridors of the several Bhawans in Delhi where decisions are made, standing shoulder to shoulder with the industry to fight their battles nationally as well as globally. CSIR will be increasingly proactive whether in setting up a new agenda for the civil aviation industry through the launch of its SARAS aircraft, or in sourcing the next century energy sources for India in the form of gas hydrates as it has done recently, or pioneering the export of knowledge to the advanced countries as it has done in the area of industrial catalysts, an area dominated by multinational cartels so far. On another front, an Indian innovation movement embodies in itself the launch of an intellectual property movement in India, and it was CSIR that did it in a proactive way.

India has been concerned about the protection of its traditional knowledgebase. When a patent on the wound healing properties of turmeric was given by the United States Patents Office, it was CSIR, which made it its business to fight this battle and win it. It was a pioneering effort, since this was the first time that a wrong patent on traditional knowledge given in the western world was fought success-

fully by the third world. In the CSIR society meeting last month, the Prime Minister had this to say: *"Its winning initiative to challenge the patent on turmeric in the USA made every Indian proud - and also more aware of the importance of a strong patents regime to both safeguard and promote India's interests in intellectual property. The country today is actively debating the right legal framework for patents to advance India's interests in the global arena. Our laws in this regard have to be consistent with the best international practices, so that the innovations by Indian scientists are protected and commercialised in the best possible manner. I compliment the CSIR for creating an intellectual climate supportive of the early passage of the Bill to amend the Patents Act."*

I can confidently say that CSIR will continue to reach out, and lead the movement in the intellectual property arena in India.

I have spoken so far about how an organisation like CSIR is showing the will to change and contributing to the Indian innovation movement. But let me move on to the bigger picture now. Let me speak about a dream that I have. This is 1999, the last year of the century, indeed the millennium. Next century is the century of the mind, it is the century of knowledge. I feel, therefore, that India has a big chance to lead in the next century. We should declare 1999 as the year of the national debate and set up, at the end, a national agenda for the twenty-first century to build the new India of our dreams. I place before you a ten point agenda, centered around knowledge and innovation, which could form the basis of a debate.

1. Making India a world class knowledge society is the biggest challenge for the twenty-first century. For this, every Indian must become a knowledge worker. Education is the crucial key. Therefore, make primary and middle school education compulsory and see that every child goes to school. Create a new creative education system, which is child centered and where the message of science reaches all the school children. Create a new curriculum, which is flexible and is knowledge and creativity based not merely information based. Achieve world level educational systems and build world class institutions to make India a leading knowledge society.

2. Restructure, modernise and debureaucratise the universities and publicly funded R&D institutions giving them flexibility, freedom of operation and also financial autonomy. It is not the sanctions from outside but it is the self-imposed sanctions that are hurting these institutions of learning and knowledge. Emphasise that in science, there are more unequals than equals. Identify those scientists and institutions that can become world class and hold their own in the twenty-first century and give them support on a sustained basis.
3. Enhance in a stagewise manner the national investment in education and R&D. Carry forward the powerful 'JAI VIGYAN' slogan by instilling a new sense of confidence in the Indian S&T community. Minimise brain drain, maximise brain gain, and create Indian brain banks around the world by creating an Indian Knowledge Network (IKN), both in cyberspace and physical space.
4. Let industry look at technology as an instrument of growth rather than just market as an instrument of growth. Create a massive 'demand pull' on the Indian academia and R&D laboratories and forge organic linkages with them. Take corporate initiatives to set up on cost sharing basis, common world class facilities with national R&D systems, which could be run autonomously and professionally.
5. For a cash starved but intellectual capital rich country like India, emergence of knowledge industry is a great news. In these industries, the traditional factors of production such as land, labour and capital become less important, when compared to knowledge; indeed this industry is dominated by intellectual capital and intangible assets. Launch major initiatives to build these knowledge assets in India by facilitating the growth of knowledge industries with bold and visionary policy frameworks and speedy implementation.
6. Launch an aggressive Intellectual Property Policy, in the government, in the institutions and in the industries. Erase the impression of India as a country that is ducking and avoiding to one where it is willing to aggressively face the global competition by leading with a positive intellectual property policy. Launch a 'poet literacy mission'. Invest heavily in both physi-

cal and intellectual infrastructure, which will meet the new challenges of generation of world class intellectual property, its capture, documentation, protection, evaluation and exploitation.

7. It is only by unleashing the creative potential of our masses and ability to add value to their indigenous knowledge, innovation and practices that we can make India self-reliant and a leader in sustainable technologies. Promote a national fund to support grass root innovators, with the aim of building a national register of innovators, converting these innovations into viable business plans and disseminating the knowledge of indigenous innovations across the nation to enthuse them about the innovative potential of our society. Visualise through this action the potential of a job led growth.
8. Change India's image as producing and exporting low-technology products. Launch a massive programme to create value added knowledge based exports by networking Indian R&D and business enterprises. Create incentives for export of knowledge and also knowledge based products.
9. Announce a new Technology Policy, by bringing together all the stakeholders; the previous one is decades old. The new Technology Policy, should be in consonance with the dreams and aspirations of our people. It should be a bold and visionary policy fully integrated with our new needs, economic, educational, environmental policies; clearly articulating the vision of technology savvy India, that will lead and not follow.
10. Finally, 1999 should be the year, where we should launch a powerful national innovation movement to propel us into the next millennium. It is only through the process of innovation that knowledge can be converted into wealth and social good. Through this movement, every citizen, every constituent of India must become an innovator. The 'I' in India, should not stand for imitation and inhibition, it must stand for innovation. The 'I' in IT must stand for innovation. The 'I' in industry, the 'I' in CSIR must stand for innovation. The I in every individual Indian must stand for innovation. It is only this innovative India that will signal to the rest of the world, that we are not a hesitant nation, unsure of our place in the new global order, but a confident one, that is raring to go and be a leader in the comity of nations.

Finally, while receiving this Corporate Leadership Award, perhaps I should have added some words about what makes a good leader. To my mind, there is a genericity and universality in what makes a good leader and even a good organisation, a good society, a good nation. Interestingly, these attributes are linked to the three parts of the human anatomy. The first is innovation, which emanates from the brain, the mind. The second is compassion, which emanates from the heart. The third is the passion in the belly. The CSIR of my dream will be an organization that will have all these attributes; innovation, compassion and passion. It will be an innovative organization, using the latest tools of science and technology in the innovation process. It will have compassion at its heart; it will make sure that it contributes to social development, worries about the down-trodden, and tries to bring quality to their life. Finally, it will be an organization showing an unusual passion in the way it works and delivers. Ladies and gentlemen, it is as CEO of this CSIR Inc., an organisation full of innovation, compassion & passion, that I accept this JRD Tata Corporate Leadership Award with great joy and pride. Thank you very much.