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PM's speech at the 99th Annual Session of the Indian Science Congress on 3rd January 2012 at Bhubaneswar

January 3, 2012

I am delighted to be here in Bhubaneswar for the 99th Annual Session of the Indian Science Congress. Odisha is a most appropriate venue for the Congress as this year we celebrate the 60th anniversary of the UNESCO-Kalinga Prize set up by the Late Shri Biju Patnaik. Indian science owes much to the vision of our early nation builders who gave science a prominent place in our development planning processes.

I congratulate Professor Geetha Bali for choosing, as the theme for the Congress, the role of Science and Technology for Inclusive Innovation with special reference to the role of women.

It was a hundred years ago that Madame Marie Curie, one of the most outstanding scientists of the 20th century, won her first Nobel Prize. To honour her achievements, last year was declared as the International Year of Chemistry.

Marie Curie blazed a trail for women in the world of science. But her work also exemplified her belief that science should, in the end, contribute to tangible social good. She helped to set up X-ray stations during the First World War and established the Curie Foundation which became a major force for the treatment of the dreaded disease of cancer.

I have often spoken about the commitment of our Government to give a boost to the science and technology sector in the country. We have taken several steps towards this end.

- We have greatly expanded the higher education infrastructure for Science and Technology by establishing new institutions.
- Public investment in Research and Development has been growing at 20-25% per year during the 11th Plan period.
- We have funded a number of schemes to rejuvenate research and scientific excellence in universities.
- We have introduced a large number of scholarships; most notably, the Innovation in Science Pursuit for Inspired Research or INSPIRE scheme which gives awards to one million science students.

There is also some evidence that these efforts are beginning to produce results.

Over the last few years, the number of scientific publications by Indian scientists working in India has increased at more than 12% per annum

against the global average of 4%. India has moved from the 15th rank in 2003 to the 9th rank in 2010 with respect to the number of publications in peer-valued journals.

The university research system is also showing signs of rejuvenation. In 2008, I gave away incentive awards to 14 universities under the Promotion of University Research and Scientific Excellence (PURSE) scheme. In 2010, 30 more universities have qualified under the same criteria. The University of Rajasthan leads among the top 50 Indian scientific institutions in citations per paper under international collaboration. We produce, I have been told, 8,900 Ph.Ds annually in science and engineering, three thousand more than five years ago.

The INSPIRE scheme is doing well and is also responding to our concerns about inclusiveness. The enrolment of weaker sections in the scheme is good and 49.6% of the INSPIRE awardees are women. More than 60% of INSPIRE fellows pursuing doctoral research happen to be women.

Over the past few decades, India's relative position in the world of science had been declining and we have been overtaken by countries like China. Things are changing but we cannot be satisfied with what has been achieved. We need to do much more to change the face of Indian science. We must strengthen the supply chain of the science sector. While it is true that science and engineering continue to attract some of our best students, many of them later opt for other careers because of relatively poorer prospects in science.

We must also make scientific output more relevant to our stage of development. It is said that science is often pre-occupied with problems of the rich, ignoring the enormous and in many ways more challenging problems of the poor and the under-privileged.

As we head into the Twelfth Plan, there are some objectives we must try to achieve in the Science and Technology sector.

First, we must ensure a major increase in investment in R&D, including by industry and strategic sectors.

Second, we must ensure creation of a new innovation ecosystem.

Third, we must achieve greater alignment of the Science and Technology sector with the inclusive development needs of our nation.

Fourth, we must expand basic science infrastructure.

Fifth, we must encourage greater research collaboration among universities and national laboratories. We hope to use the National Knowledge Network to this end.

Finally, we must enlarge the reach of international collaboration.

As far as resources are concerned, the fraction of GDP spent on R&D in India has been too low and stagnant. We must aim to increase the total R&D spending as a percentage of GDP to at least 2 per cent by the end of the XII Plan Period from the current level of about 1 per cent. This

can only be achieved if industry, which contributes about one-third of the total R&D expenditure today, increases its contribution significantly. I sincerely believe that Public Sector Undertakings, particularly those in the energy sector should also play a major role in this expansion.

We have to increase public private partnerships and catalyse significantly increased interaction between publicly owned Science and Technology institutions and industry. It is in some ways ironic that General Electric and Motorola have created world-class technology hubs in India, while our own industry has not done so, except perhaps in the pharmaceutical sector. We need therefore, to look at ways of incentivising private Research and Development investment under Indian conditions.

At present, publicly funded R&D is skewed in favour of fundamental rather than applied research. It is easier to attract industrial funds into applied research areas and a set of principles should be formulated to push such funding and to drive Public-Private-Partnerships in Research and Development. The Biopolis in Singapore is an interesting example of a cluster approach that has brought together 2,000 scientists and researchers in the area of bio-sciences from public laboratories and private industry in one place. In India, we have our own Open Source Drug Discovery project, which is a 'virtual' cluster enabling the creation of affordable and effective solutions which would not be likely with a conventional 'in-lab' approach.

While research generates new knowledge, we need innovation to use this knowledge creatively and productively for social benefit. Our Government has declared 2010-20 as the "Decade of Innovations". We need to give practical meaning to innovation so that it does not end up being just a buzz word.

I understand that the National Innovation Council is proposing to set up an India Inclusive Innovation Fund that will drive and catalyse enterprise, entrepreneurship, and venture capital, while targeting solutions for the bottom of the national pyramid.

In this context, it is important that we explore and rejuvenate traditional knowledge systems found all over our country in areas such as agriculture, architecture, handicrafts and textiles. One need go no further than the tribal communities of the Kharia, Santhals, Gonds and Kolhas who live in the deep forest areas of Mayurbhanj and have a reservoir of knowledge on medicinal usage of locally available plants.

I congratulate the tribal community of Koraput for the global recognition they have received for their contribution to conserving bio-diversity and developing climate-change resilient farming systems.

An occasion like the present one should be used to revisit a fundamental question: what is the role of science in a country like India? There is no simple answer. But for a country grappling with the challenges of poverty and development, the over-riding objective of a comprehensive and well-considered policy for science, technology and innovation should be to support the national objective of faster, sustainable and inclusive development.

There is much that the scientific community can do to achieve these objectives. Research should be directed to providing 'frugal' solutions to our chronic problems of providing food, energy and water security to our people. Science should help us understand how to give practical meaning to the concept of sustainable development and green growth. Science should help us shift our mindsets from the allocation of resources to their more efficient use. Technology and process engineering should help us reach the benefits of development to those who need it most.

Under the National Action Plan on Climate Change, our government has launched eight National Missions in important areas such as Sustainable Agriculture, Water, Energy Efficiency, Solar Energy and Forestry. All the Missions have strong components of science and technology. I would urge the scientific community to pool their knowledge and wisdom to contribute to the success of these critical National Missions.

Several initiatives have already been taken. The Solar Energy Corporation of India headed by Dr. Anil Kakodkar has been established and is now a functional entity. A National Water Policy is under active preparation. The National Mission on Strategic Knowledge for Climate Change has already identified two centres of excellence at IIT, Mumbai and ICRISAT, at Hyderabad to build capacities in climate science.

Increasing food production and nutritional security are critically important and our agricultural scientists should therefore work towards scientific breakthroughs that can enable a second green revolution to become a living reality.

We are examining a proposal to build national capacity and capability in supercomputing which will be implemented by the Indian Institute of Science Bangalore at an estimated cost of Rs. 5000 crore.

The Government is also considering a proposal to establish a Neutrino Observatory in Theni district in Tamil Nadu with a proposed investment of Rs 1350 crore.

The Department of Earth Sciences has launched a Monsoon Mission to improve the predictability of the Indian monsoons.

This year the Nobel Committee recognized the contributions of three extraordinary women who were inspirational agents of change in the struggle for peace, democracy and human dignity in their respective countries.

In India too women are making a mark in traditionally male bastions and decisively breaking the glass ceiling. The Project Director of the Agni Missile programme is a distinguished woman scientist Dr. Tessy Thomas. Last year, for the first time, three women scientists received the prestigious Shanti Swarup Bhatnagar award, as compared to a total of only 11 women awardees for all the years since 1958 up to then.

I congratulate these creative women scientists. I hope that their examples will motivate other women to take up careers in science, where women are under-represented.

I commend the Department of Science and Technology for introducing the "Women Scientists Scheme" which has helped more than 2000 women scientists resume careers after breaks arising from family commitments.

The Department of Science and Technology is also formulating another scheme called 'DISHA' which will help women scientists to relocate to other cities. The Department will create 1000 contractual positions tenable in publicly funded institutions for this purpose. A fellowship matching the total emoluments of an in-service Science and Technology professional will be provided when she moves from one station to another.

But, we should also take note of the results of a study published last year that showed that 60% of nearly 2000 Indian women Ph.Ds in science who were surveyed were unemployed. The main reason cited was lack of job opportunities. Only a very small number cited family reasons. This underlines the need for transparency in selection procedures at institutions and also the great importance of gender audits.

This year we celebrate the 125th birth anniversary of the great mathematician, Srinivasa Ramanujan. We have declared 2012 to be the National Mathematical Year to emphasize the importance of maintaining our traditional strength in mathematics.

It is a matter of great pride that the name of another great Indian scientist Satyendranath Bose is associated with an elementary particle that may revolutionise our understanding of sub-atomic physics.

In the final analysis, the pursuit of science is a process of unlocking the human mind. It is an exploration of the mystery, beauty and method in the universe by stretching the frontiers of our imagination. We need to invoke the power of science in every sphere of our economy and way of life.

I end by quoting Isaac Asimov who said "There is a single light of science and to brighten it anywhere is to brighten it everywhere"

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