

India: In pursuit of scientific excellence in the present scenario!

S. Salim*

21925 Manor Crest Ln, Boyds, Maryland MD 20841 USA

ABSTRACT

India's economic growth continues to astound and its economy ranks third in the world in terms of purchasing power, behind China and the United States. Despite this impressive economic growth, scientific research continues to lag behind. The debilitating pace of our scientific pulse is noticed at the declining number of youth opting for scientific careers, the passion for research and the quality of research publications, that clearly brings India a step down in terms of performance with respect to other counterparts, such as China and Brazil. Clearly our country has decades to span before it earns the status of a scientific superpower. There are several critical issues that need to be immediately addressed for universities to become centers of excellence. The researchers in India and abroad assert that the country has a relatively weak foundation in science and engineering. The daunting challenges facing today that wistfully still leads the world in the maximum number of maternal and child deaths, tuberculosis, dengue and malaria cases. A quarter of the population that still lives in dark without having the basic amenities like electricity and clean water, our nation surely requires a robust scientific backbone to hold the crumbling torso of our country's infrastructure. The infrastructure that could well cater to the expanding needs for health care, education, jobs and the basic necessities of life. The basis of any educational setup requires to have a strong work force, the teachers who chisel and sculpt our foundations from its core to the pinnacle. It is strongly required to address their issues regarding salaries and project funding to ease and allow our scientific minds to break free and perform to the best of their competence without the hassle of stiff budget. The minds of young scientists should be nurtured and be given accolades and scholarships at an early phase to inculcate an innate love for science and research. Scientific research in India with all its inherent deficiencies and commendable achievements is in dire need of visionary leaders and path finders to embark on a new journey.

KEY WORDS: SCIENTIFIC, EXCELLENCE, REASONS, PRESENT, SCENARIO

ARTICLE INFORMATION:

**Corresponding Author:*

Received 12th Nov, 2016

Accepted after revision 19th Dec, 2016

BBRC Print ISSN: 0974-6455

Online ISSN: 2321-4007



*Thomson Reuters ISI ESC and Crossref Indexed Journal
NAAS Journal Score 2015: 3.48 Cosmos IF : 4.006*

© A Society of Science and Nature Publication, 2016. All rights reserved.

Online Contents Available at: <http://www.bbrc.in/>

The growth of any nation depends upon its advancements in scientific and technical manpower. In United States 50% of the economic growth post World War II can be attributed to its investments in science and technology (Bush, 1980). With this avalanche of scientific breakthroughs on a global front, India is marching forward. With nearly 1.3 billion people and a steady growth rate, it is expected to become the world's most populous nation within a generation. India's economic growth continues to astound and its economy ranks third in the world in terms of purchasing power, behind China and the United States. Despite this impressive economic growth, scientific research continues to lag behind.

Assuredly, this slackened pace of research turnover is accounted to the low level of overall research investment – the present 0.9% in GDP is notably less than China's 1.5% and 2.6% of the US (*Nature*, editorial, 2009). This number must increase if we are serious about waning the gaps with leading nations. The debilitating pace of our scientific pulse is noticed at the declining number of youth opting for scientific careers, the passion for research and the quality of research publications, that clearly brings India a step down in terms of performance with respect to other counterparts, such as China and Brazil. Clearly our country has decades to span before it earns the status of a scientific superpower.

What is the hindrance our nation is facing towards reaching the league of top nations? Perhaps there are many reasons. The basis of the whole feebleness of our system roots from our education foundation. India's university system as it exists today started in 1857 with three essentially British creations – the Universities of Madras, Calcutta and Bombay. But now in 2016, India abodes roughly 800 universities, that includes the Central, state, deemed and private universities (*source: wikipedia*). These universities that build the grounds up for nearly 29 million students lack basic facilities. "Most are 'chalk and talk' classrooms with poor-quality teaching laboratories, let alone research laboratories," according to Dr. Ila, Professor of chemistry at the Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru in a Comment piece (Prasad, 2015).

Also, the quality of education is varying, from the elite institutions funded by the central government to more than 300 state universities and about 200 private ones. "The landscape of science education is uneven," says Sri Krishna Joshi, former director-general of India's Council of Scientific and Industrial Research (CSIR) and former chair of the advisory committee of the University Grants Commission, which funds and oversees university education in India. The lack of lucrative projects, funding, improper planning as well as poorly paid professors all affect the ill-repertoire of the present scenario. Furthermore, the never-ending loop of the unavailability of

resources to the time it takes for the project execution adds up to the steps of the whole process of research.

There are several critical issues that need to be immediately addressed for universities to become centers of excellence. The first necessary change requires a complete "overhauling" of the University Grants Commission (UGC), which draws its power from the University Grants Commission Act, 1956 (2011). "Archaic ordinances and rules set by the University Grants Commission have stifled the spirit of academic excellence and hampered institutions' flexibility," writes Prof. Vinod Singh, Director of IISER, Bhopal (Prasad, 2015).

India produces 9,000 PhD graduates a year in science and technology, in comparison to the US that produces four times more number of PhDs despite having one-fourth of India's population. This comparison is alarming not just in terms of number, but in terms of quality of research and publications. Ironically, Indian students are flocking to U.S. schools at a faster rate than ever recorded, and their number rose to 29.4% in the academic year starting fall 2014 (Powell, 2014). The reason for this continued trend is due to better access to funding from banks, a lack of high quality higher education institutions in India and stiff competition for those that stay here. With this current situation, it is expected that this trend will continue to last in perpetuity unless our present education system and planning brings serious reforms.

The researchers in India and abroad assert that the country has a relatively weak foundation in science and engineering. The daunting challenges facing today that wistfully still leads the world in the maximum number of maternal and child deaths, tuberculosis, dengue and malaria cases. A quarter of the population that still lives in dark without having the basic amenities like electricity and clean water, our nation surely requires a robust scientific backbone to hold the crumbling torso of our country's infrastructure. The infrastructure that could well cater to the expanding needs for health care, education, jobs and the basic necessities of life.

The impeding pace of scientific research is attributed to burgeoning bureaucracy, poor-quality of education at most universities and insufficient funding. The gross domestic product to support research has sadly remained static at 0.9% since 2015, against what had been promised by the government bodies time and time again. Only by tackling its systemic problems can India compete with other emerging powerhouses (Padma, 2015).

Despite its huge pool of students, India has a relatively miniscule number of researchers, and many of its budding scientists head for other countries, with a dream to fulfil at foreign lands. When questioned about this lack of passion and the sense of non-allegiance among the native researchers, it seems apparent that

they are doubtful about their future and the sustainability of what this field has to offer in their home country. Scholarships and stipends are very attractive in western countries strongly suggesting that those at the helm of affairs do some introspection on why we have failed to build world class institutes. Many students at state universities are receiving a substandard education (Padma, 2015). “Here, there are no good science teachers, no good Indian textbooks, and most of the science laboratories are poorly equipped. The lack of interest and passion of research is losing its charm and is surely reflected. “We are caught in a vicious circle of mediocrity,” says geneticist Deepak Pental, former vice-chancellor of the University of Delhi (Padma, 2015).

There is over-bureaucratization and lobbying within the universities and their controlling bodies” (Pusaria, 2015). The process of fresh recruitment is bizarrely lengthy, and it takes two years to recruit an academic after announcing an open post, which means that the best applicants can slip away. “Lack of even bare, minimal and sustainable funds for teaching, let alone research, has seriously plagued the quality and standards of science education,” says Krishna Ganesh, a chemist and director of the Indian Institute of Science Education and Research in Pune, one of five top universities set up in India since 2006. And to add the regulations governing the formation, financing and functioning of these organizations are murkier than what is believed.

Council of Scientific and Industrial Research (CSIR), an autonomous body and the largest research and development (R&D) organization in India. It runs 37 laboratories and 39 field stations or extension centers spread across the nation, with a collective staff of over 17000 (source; Wikipedia). The governmental stance has begun to affect some elite national research institutes, too. Of the 38 national laboratories that are part of the CSIR, only 25 have full-time directors. The rest are making do with acting directors, or temporary arrangements.

Even the CSIR headquarters in New Delhi has been without a full-time leader since January 2014. Interim director-general Madhukar Garg says that “the current situation is indeed challenging (Sharma, 2015). CSIR is the backbone of scientific and technological research in the country. In case the prevailing scenario continues, it will affect the national innovation system as a whole.” (Sharma, 2015). The current budgets of almost all scientific departments have either been slashed or are just stagnating. Furthermore, the practice of temporary or adhoc recruitment in governance of scientific institutions is adding up to build distort. (Sharma, 2015).

The major chunk of research is still being conducted in academic institutes that are being run by the government funded projects. This dependence on government money has been one of the leading causes to diminish the

overall ambience of the scientific community in India. Sadly, the scientists and academicians have a pessimistic sentiment about their inventions as the patents received through government supported schemes and fellowships are sold to private companies for huge sums and the other major industrial players don't support any R&D activity other than for their in-house projects. In western countries, it is vice versa. Private companies provide the huge share of funding for research.

With this prevailing sentiment amongst the scientific youth it is likely that the trend of brain drain will continue to rise unless a major change happens to halt this efflux. On a flip side, there are some signs that India might be slowing its crippling brain drain, however the chances are bleak. Although the vast majority of Indians who obtain science doctorates in the United States remain there for at least 5 years after graduation, the proportion has declined: from 89% in 2001 to 82% in 2011, the most recent year for which data are available (Mervis, 2014). There are many who return back to their home lands. Kaustuv Datta, a geneticist at Delhi University South Campus, is one of those who returned. “My parents are here, in India. And academics have a strong, positive influence on the next generation of students,” says Datta. “I wanted to make that contribution in India” (Padma, 2015).

The phrase ‘Knowledge is Power’ might have originated with in the 16th century and it's as old as time. Today as we stay, we need to have a concerted progress and clarity of goals. India's educational system fails to instill into young Indians a dynamic awareness and understanding of their country's achievements. In present scenario, our crumbling educational and research framework requires serious uphauling, from successive increase in plan allocations for scientific departments, to setting up of new institutions for science education and research, creation of centers of excellence and facilities in emerging and frontline areas in academic and national institutes, induction of new and attractive fellowships and strengthening R&D infrastructure in universities. Turning brain drain into brain gain requires creation of appropriate opportunities at certain critical stages in the progression of a scientific career.

On the contrary the picture in the west, especially US is not rosy either. The pattern reaching back over the years demonstrate how the US scientific produce has reached a stand point- a state of saturation with fewer jobs, more unemployment, and more post-doc work - especially in the sciences. A post doc essentially translates into toiling as a low-paid lab hand. In short, job prospects for young science Ph.Ds haven't been looking so hot these last few years, not only in the life sciences, which have been weak for some time, but also in fields like engineering (Powell, 2012). So, its high time,

when the authorities in India need to gear up for a much needed rebuild, revamp and reexamine, to bring back our talent and to retain our youth to stay and connect to our roots, rather than bearing the fruit in foreign land.

The basis of any educational setup requires to have a strong work force, the teachers who chisel and sculpt our foundations from its core to the pinnacle. It is strongly required to address their issues regarding salaries and project funding to ease and allow our scientific minds to break free and perform to the best of their competence without the hassle of stiff budget. The minds of young scientists should be nurtured and be given accolades and scholarships at an early phase to inculcate an innate love for science and research. Scientific research in India with all its inherent deficiencies and commendable achievements is in dire need of visionary leaders and path finders to embark on a new journey. As truly put by Dr. Sharique Ali, "as teachers we have great responsibilities, we have to advocate our students to accomplish and show them the path to test their mettle in hard times to excel. If the zeal and enthusiasm are correctly infused by a teacher into his student, I am sure science will never take a back seat. We, as teachers have to fuel our science students with a never say die attitude (Ali, 2016) ! "Will India be able to fully capitalize on this unique heritage? The question still remains....

REFERENCES

- Ali SA (2016) Editorial Communication, Fueling Science Biosc. Biotech Res.Comm Vol 9 (3)
- Bush V (1980). The Endless Frontier. National Science Foundation, Washington, DC, Science 18.
- Council of scientific and industrial research. https://en.wikipedia.org/wiki/Council_of_Scientific_and_Industrial_Research E-paper; Deccan chronicle: India's tragedy: Science lacks funding and funding lacks science. Nation Current Affairs. <http://www.sciencemag.org/careers/features/2012/08/postdoc-experience-high-expectations-grounded-reality>
- Mervis J (2014). Data check: Why do Chinese and Indian students come to U.S. Universities? Science AAAS. Education data check.
- Nature Editorial, (2009) Challenges for science in India, Nature Materials 8, 3611. doi:10.1038/nmat2437.
- Padma TV (2015) India: The fight to become a science superpower, despite great strides in some areas of research and development, the nation still has a long way to go.
- Powell K (2012). The Postdoc Experience: High Expectations, Grounded in Reality. Science Mag, AAAS.
- Prasad R. (2015). What ails science in India. The Hindu. Science. <http://www.thehindu.com/scitech/science/what-ails-science-in-india/article7202170>.
- Pusaria R. (2015). The systemic problems of science in India. <https://www.myind.net/systemic-problems-science-india>.
- Sharma D (2015). How Science is under Modi is equals headless labs and budget cuts. <http://www.dailyo.in/technology/narendra-modi-nature-journal-science-csir-madhukar-garg-icmr-greenpeace-biotech-SCITECH-QUANTUM-LEAP>.
- UGC (2011) Universities in India are recognized by the University Grants Commission (UGC), which draws its power from the University Grants Commission Act, 1956.