

Curiosity-Driven Science and Indian Academia

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In recent years, institutions and Universities are ranked both nationally and internationally based on multiple criteria, academics, research outputs, infrastructure, student enrolments etc. Unfortunately, none of the Indian Universities are ranked globally in the first 200-250 Universities. There is only one institution of worth mentioning, the Bengaluru-based Indian Institute Science (IISc). It figures in the brackets of 250 to 350. The other institutes which make the list in the bracket up to 500 are some of the Indian Institutes of Technology (IITs) and one or two other national Universities. India has nearly 900 plus Universities, roughly 400 state Universities, 50 central Universities, remaining deemed to be and private Universities. Besides, there are Institutions of national importance, private medical and engineering Universities. Indian Universities are also not ranked very high amongst Asian Universities. They are always far behind Chinese, Japanese, Singapore or Taiwanese Universities.

What does this ranking mean? It means many things; our yard sticks for quality

education are compromised, our research is not of global competitiveness, our curricula are not relevant to changing times and challenges, we do not have best practices in hiring the talent in the University systems, state supported Universities are bogged down by high bureaucracy and reservation criteria, and lastly, we have not come out of colonial mindset of suspicion and control regimen even after 70 years of independence.

In spite of higher education what it is today, our economy is better placed and the country is making progress in many sectors. Some of the Indian industries are doing extremely well, particularly the Pharmaceutical and the Information Technology (IT) industries, respectively. As for Pharma sector, it is often described as 'Pharmacy of the world' being the largest provider of generic medicines worldwide, 20% global share in volumes and 50% of global supply of vaccines. The industry is ranked 3rd worldwide in terms of volume and 13th in value. Presently (2018) the industry is valued at USD 38 bn and expected to reach USD 55 bn by 2020. It is proudly said that every 3rd pill consumed in the world is 'Made in India'.

The success story of Indian Pharmaceutical industry is their ability to do reverse engineering and process chemistry. Their business model is pure economics. India has 16% of the global population and 20% of the disease burden, and some of the diseases are exclusive to India specific. For many diseases we do not have effective medicines. We always look to the West to find remedies to our own maladies. One may wonder why the global supplier of medicines, ie; Indian Pharmaceutical industry or the Indian Universities cannot discover medicines (molecules) for diseases specific to our country. We have the world's largest pool of

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scientists and technologists and yet the country is waiting for 'Made in India' drug molecule. The answer to these observations is very complex. Indian Universities perhaps lack enabling innovation eco-system which calls for thinking out of the box mindset, commitment, accountability, and entrepreneurial ability, and national priorities. Besides, the drug discovery process is cost intensive and time consuming. In the government sector the nation has exclusive national laboratories like Central Drug Research Institute (CDRI), NIPERs, and others in existence for several decades (some more than 50 years old) and heavily funded, yet the first drug(s) for India's need is awaited. The nation is waiting for a drug molecule to treat TDRTB (totally drug resistant tuberculosis) a deadly form of TB. We have no clue about its discovery.

In its second term the Modi government is planning to address the issue of 'Made in India' drug molecule. The government has (PMO) expressed concern that despite being 3rd largest supplier of medicines to the world with more than 3000 pharma companies and over 11000 manufacturing facilities, India has remained out of the club of nations that have demonstrated the capability of developing a new drug molecule,. The government envisages a first-of-its-kind move to hunt for a 'Made in India' drug molecule by creating a separate department of 'Research and Development' which will focus on discovering commercially viable new drug molecules. The government will appoint someone to head the R & D in pharma.

Will this be another government regulated (officer-controlled) institute or department like NIPERs which have not blossomed in to world class institutions? It is often asked why conversion of research in to products is so difficult in our country. Academia-industry tie-ups are on the paper and as a matter of fact seminar topics for decades. Nothing substantial happens in terms of accountable alliance to produce a 'Made in India' molecule. Industry has no trust in academia and as a result industry does not invest in academia. It is interesting to note that the captains of Indian industry were one time students in the very University or institute. In a recent conversation between the alumni and the faculty, an alumnus said his new company substantially

outsources its development work to Universities. An upset faculty questioned the alumni why he did not think of his alma mater. The answer was obvious, he was looking for deliverables.

Indian Science Congress (ISC) is the premier meeting places for scientists annually. It is held traditionally from 3rd January to 8th January and inaugurated by the Prime Minister. Generally the Prime Minister sets out the agenda of his government or the science policy matters. ISC is attended by some of the leading Nobel Laureates in physics, chemistry and medicine etc. In a recently concluded ISC (2020) two Nobel Laureates expressed that governments across the globe need to learn and understand science. Further, they pointed out creative or discovery science does not happen as per time table, they occur when they do, after a lot of work. Governments are made by politicians with short-term existence, but science is a long-term business. Science has to be free and more emphasis should be on basic sciences.

Drug discovery once considered as a hot pursuit by the big pharmaceutical companies in India in the early 2000, suddenly all of them have given up and opted for profit-based business model(s). Because of the inherently uncertain return on investment, curiosity-driven research is commercially unpopular and tends to lose investment. The governments also lose political will to support such adventures once they realize that there will be no immediate returns before their (elected governments) expiry which is certain!

Curiosity-driven science does not yield or bring immediate success and applications for human use. It needs to be nurtured and continuously supported. For drug discovery to happen in our Universities solid strength of basic sciences and presence of innovation ecosystem are essential. High end science is cost intensive and may not happen in all the campuses. Identifying of young entrepreneurial faculty, building inter-disciplinary and inter-institutional collaboration, networking with industry is the key element to promote development of new molecules, products, processes and technologies. This cannot happen overnight but sustainable and conducive environment(s) has to be created sooner than later for India to have 'Made in India' drug molecule.

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