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Unshackling Science in India

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India has the talent for research, but to realise the potential we need greater outlays, a transformation of the environment, loosening of government control and a recognition, especially in medical science, of the contribution of CSOs and the private sector.

Amongst the myriad global rankings that are published every year, one that often captures the imagination of the media is that of the "leading universities of the world". Not surprisingly for our hyper-nationalist times, these are often viewed through the prism of a country's strength in the global knowledge economy.

This year, as with every year gone by, the disappointing results for Indian institutions stand out. I will refer to one of the most widely cited ranking systems to illustrate how poorly our institutions perform. The Quacquarelli Symonds (QS) World University Rankings has been produced annually since 2004, publishing global, subject and world region rankings. In its 2022 edition, not a single Indian university ranked in the top 100. The highest ranked Indian institution is IIT-Mumbai coming in at 177 with two other institutions (IIT-Delhi and IISc) making up the remaining Indian institutions to scrape into the top 200. Even in the regional rankings restricted to Asia, only two Indian institutions make it to the top 50 with IIT-Mumbai coming highest at 42. Our medical schools, which I follow most closely given my personal scientific interests, perform particularly poorly: the highest ranked (AIIMS, New Delhi) features outside the top 150 medical schools in the world.

Other rankings that employ different methodologies come up with even more dismal results: the Times Higher Education (THE) rankings, for example, do not feature a single Indian university in the top 300 in the world.

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While some have critiqued these global rankings for being biased against "non-Western" countries (it is not my intention to critique the ranking system itself in this essay but I think that the rankings, no matter how imperfect they might be, are the best system currently available to benchmark the performance of universities), these criticisms fall short of explaining why 10 Chinese universities find a place in the top 100 universities in THE rankings or why four Asian universities (two from China and two from Singapore) feature in the top 20 in the QS rankings. Still, the government's response to this dismal performance has been to reject global rankings on the grounds that the criteria are biased against India. A former education minister had attributed the poor performance to being "primarily because of the criteria used by these agencies for ranking, which depend a lot on the perception of a select group of persons." The fact is that the 'perception' criterion accounts for only 10% of the weightage given to a university ranking.

Instead of examining why Indian universities are struggling to make a global impact even while universities in China are storming ahead, the government has gone on to invent our own home-grown ranking system that employs parameters (for example, teaching, research and perception) similar to the global rankings, but where Indian universities are no longer compared with or compete with their global counterparts. Unlike other rankings that are run by independent private entities, the National Institutional Ranking Framework (NIRF) is a product of the central government, which is itself the country's most prominent actor in the landscape of institutions of research and higher education. While China had also launched its own Shanghai Rankings nearly two decades ago, those rankings were intended to be global from the outset (three Indian institutions made it to the top 500 in the first edition) and were run independently of the government. China has now largely abandoned its own ranking system as her universities climb the global QS and THE rankings, demonstrating the acceptability and applicability of these rankings to "non-Western" countries.

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Is the solution to the abysmal performance of India's universities in global rankings to replace them with a home-grown system where the competition is entirely local? Such a strategy is akin to declaring our National Games as equivalent to the Olympics (another global

competition where we routinely perform poorly). To me, it smacks of a parochial, isolationist and defensive posture that is refusing to confront and address the structural challenges facing our universities, many of which can be easily remedied.

I am an Indian physician-scientist who has worked in the country for the past 25 years while holding tenured professional appointments at high-ranked institutions in the UK and the US. During this period, I have co-founded and nurtured one of the leading public health research NGOs in India (Sangath), served as a professor in the leading public health institution of the country (PHFI) and the institute body of the leading mental health research institution (NIMHANS) in the country, mentored junior researchers and collaborated with senior researchers from an array of India's institutions, and served on two of the country's leading science funding selection committees.

My privileged opportunities to work in these diverse roles and contexts offers me a unique vantage point to reflect on two key questions: why are India's universities ranked so low? What actions are needed to transform their impact? But I should clarify two important caveats: I focus here on research in science and medicine, as these are the major contributors to the rankings of universities and because I am most familiar with these fields. I do not address knowledge generation from the social sciences (though many of my observations would apply just as much to the social sciences and, as I argue later, their separation from the natural sciences and medicine has been a major reason for the low rankings of Indian universities), or the contribution to teaching, a key function of universities.

> Compounding the paucity of domestic funds for research and science are the stringent regulations that constrain Indian institutions from accessing international research grants.

Why do our universities rank so poorly? At its most basic level, research needs the people, the financial resources, and the environment or culture that fosters career development, collaboration, original and creative thinking, and transparency in decision-making. The lack of human resources is certainly not a problem in India, for there are legions of young people who aspire for careers in science (and medicine, in particular), and there is no evidence to suggest that they are inferior to their international counterparts in any respect. Indeed, the leading faculties of science and medicine of the world are home to a disproportionate number of scholars who had their foundational training in India. This fact is a testimony to the massive brain-drain that has stripped the country of some of its brightest talent, while enriching the universities of wealthy countries. This brain drain is, in turn, the result of problems in the other two domains: the lack of money and the pervasiveness of an environment that stifles individual and institutional excellence.

Research needs money and India plainly spends far too little compared with other major countries. The government spends less than 1% of the gross domestic product (GDP) on science in comparison to over 2% by China and over 3% by the United Sates (US), the country with the largest number of universities in the top ranks. In absolute amounts, India spends a paltry $43 (in per capita purchasing power parity dollars) on science, compared with over $350 by China and a staggering $2000 by the US. Even this limited government spending is spent largely on its own institutions, rather than fostering competition between institutions in diverse sectors. In sharp contrast, over 80% of funding from the US National Institutes of Health (the biggest funder of science in the world) is allocated to external institutions through a transparent competitive process, with the largest amounts being awarded to private universities and research institutions. The incestuous relationship between government funding agencies and its own institutions (often intra-mural components of the funding agency) in India is hardly the right environment for fostering risk-taking, originality, competitiveness and, ultimately, excellence. The net result is that, while Indian universities and research institutions rank highly on the number of scientific publications they produce per faculty, their impact is very low, often being published in marginal journals with low citations by peers, a critically important metric in the global knowledge economy.

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Compounding the paucity of domestic funds for research and science are the stringent regulations that constrain Indian institutions from accessing international research grants. The foremost of these regulations is the Foreign Contribution (Regulation) Act (FCRA) that prohibits Indian institutions from receiving funds from international funders and from sub-awarding to partner institutions in India or abroad; the latter restriction has led to the situation that an Indian institution cannot use international funds to collaborate with other Indian institutions or to lead an international collaboration. Even institutions that are certified under FCRA regulations can lose them suddenly, blocking access to international research grants. This has happened on a number of occasions in recent years, most dramatically on the first day of the new year when over 5000 institutions, including a number of universities, lost their FCRA licence.

To add to this hurdle, all international biomedical research grants must secure approval from the Health Ministry Screening Committee, a process that involves a fresh peer review of proposals which have already successfully navigated a competitive peer review process by the funding agency. This additional review can take up to a year and may ultimately end in a rejection (even though the proposal has secured funding!).

The culture and environment of our research institutions was designed in the early years of our independence and has hardly changed since then. In many institutions, "Professors" have reached this exalted position simply on account of their years of service, rather than scientific achievement. This is especially true of medical schools where the unique opportunity presented by the requirement that every MD degree must include an independent research study is squandered because the 'guides' (the senior faculty of the medical school) themselves have little expertise in research. To be fair, faculty in most universities are burdened with heavy teaching loads and, especially in medical schools, clinical service responsibilities, which crowd out the time available for research. In short, most faculty in India's universities are neither trained in research nor do they have ring-fenced time to pursue research.

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An equally formidable challenge is the control that governments exert over universities, essentially subjugating the autonomy of the academy. The starkest example of such control is that the appointment of the top positions in universities, such as the vice-chancellors or directors, are made by politicians. The governor of a state is the chancellor of all state-owned universities. This is a constant reminder to university faculty that their career progression to the highest positions in the academy ultimately lies in the hands of politicians. Such a culture fosters an atmosphere of mistrust and cynicism, where promotions are clouded by suspicions of, or may be the result of surreptitious, political patronage. The intensely hierarchical culture that prevails across our institutions, amplified by historic caste and communal biases, is fuelled by this top-down, opaque, sycophantic and arbitrary system of promotion. Such a toxic environment demotivates younger researchers who struggle with the lack of agency, transparency and opportunity and, ultimately, either succumb to the stifling conditions by focusing on service or teaching, or simply pack their bags and migrate to another country. Indeed, this is one of the principal reasons why only a fraction of the world's leading scientists of Indian origin are actually working in Indian universities.

It is no surprise that almost all the universities occupying the top rungs of the national rankings belong to a small, elite group of holy cow institutions, exemplified by the IITs, whose founding principles afford them the most autonomy from government interference, while simultaneously benefiting from its largesse in terms of core funding and research grants. These institutions enjoy a range of freedoms, for example to appoint visiting faculty, to collaborate with NGOs and international universities, to receive alumni donations, to permit faculty to consult for industry, and to foster an environment conducive to the productivity and advancement of the careers of younger researchers on par with world-leading universities. (This is perhaps not surprising given the high proportion of faculty who have completed their doctoral education in such universities.) But these are islands of excellence (reinforced by the award of titles of 'institutes of excellence') in an ocean of mediocrity.

> The government needs to significantly increase its investment in science, but it should also simultaneously review the regulations that constrain the abilities of Indian institutions to compete for international research funds.

What can be done to unleash the incredible opportunities for India's universities to make a greater impact in the global knowledge economy? It goes without saying that the government needs to significantly increase its investment in science, but it should also simultaneously review the regulations that constrain the abilities of Indian institutions to compete for international research funds. At the very least, the state must forthwith scrap the requirement for FCRA certification for all registered research institutions (a process that is already done by the Department of Scientific and Industrial Research) and limit the HMSC scrutiny of international biomedical grants to ethical considerations, such as the equitable recognition of the contributions of the Indian scientists and protection of human participants and data privacy. The higher impact of the holy cow institutions points to an obvious remedy to transform the culture and environment of all universities: liberate them from the shackles of state interference to operate with complete autonomy on all academic matters such as the appointment of leadership positions, securing grants and appointing faculty, and collaborating with domestic and international institutions.

> [M]ulti-disciplinary universities that dominate the global rankings which reflect the sum of the contributions of all their disciplines, are fundamentally weakened in India.

The rapid design, evaluation and production of diagnostic tests and vaccines, and their subsequent widespread deployment across the country, in response to the pandemic is an example of what can be achieved when government institutions, civil society institutions and industry collaborate with generous funding to address the entire spectrum of science from discovery to its translation to impact the population. This multi-disciplinary and inter-sectoral approach to research should become the norm. One of the historic challenges for India's universities has been the hiving off of the most research-intensive disciplines, such as biomedicine and technology, to subject specific institutions (such as the IITs and AIIMS), creating a patchwork of institutions that focus on specific disciplines. As a result, multi-disciplinary universities that dominate the global rankings which reflect the sum of the contributions of all their disciplines, are fundamentally weakened in India. This structural flaw in the architecture of India's research eco-system can be addressed through enabling and incentivising research 'clusters' connecting universities, research institutes, NGOs and the private sector; the science that will emerge will not only be of higher societal impact but also enhance the rankings of each of the participating institutions.

Such an architectural reform requires the explicit recognition of the contributions of civil society and private sector institutions to India's research eco-system. In my field of clinical and public health science, some of the leading institutions are NGOs (both large institutions like the Christian Medical College, Vellore, and smaller, specific theme focused organizations like Sangath) that compete internationally to win grants from the world's most prestigious science funding agencies such as the National Institutes of Health (US), the Wellcome Trust (the worlds' premier private foundation funding biomedical science) and the Medical Research Council (UK). Such institutions must be considered full partners of the country's mission to generate knowledge, offering them core funding to strengthen their capacity (as has been done for some institutions such as the PHFI) and ensuring transparent opportunities to compete for government grants. The decade-old India Alliance, launched by the Department of Biotechnology in partnership with the Wellcome Trust, is an exemplar of what can be achieved through such transparent competition.

In closing, the strategies for enhancing the ranking and impact of India's universities and research institutions are plainly evident from how other countries have organized their knowledge sectors and from the experiences of select institutions and initiatives within India herself. All these strategies are eminently feasible and relatively simple to operationalize, but they do need the political will to implement in the spirit of catalysing the enormous, unfulfilled, potential for India's universities and research institutions to take their rightful place in the world.