

game ... as just one more bureaucracy to outsmart'. In line with his iconoclastic image, he considers himself as a member of the MIT administration, but not 'of' the administration. He brings us into the reality of what someone in his position has to deal with, which involves seemingly endless bouts of conflict resolution. Whether placating protestors, or fending off lawsuits from former students, Keyser repeatedly finds himself in situations which he has never formally been trained for. Not surprisingly, in his usual frank and self-deprecating voice, Keyser admits that he often 'hadn't a clue' what to do in these situations, feeling like a 'marriage counselor trying to reconcile a union between a Jehovah's Witness and a vampire'. It is in these personal accounts of such impossible situations that Keyser really shines, giving the reader backstage passes into what really goes on in the top offices at MIT.

Along with his storytelling, Keyser also shares interesting insights that he had gained during his time as a senior administrator. These include how power is exercised at the administrative level (usually by the 'one who controls the money tap'), or how faculty are often 'under the useful illusion that [they] runs things', while the real power lies with the administration. He further describes the most difficult task of any administrator – ending programmes or 'removing people from the community'. He compares them to divorces, where the resulting bitter sentiments often last until the grave. Keyser also makes repeated references about how the wealth of talent at MIT has a transformative power, turning scientists (including himself) from simply good to great. While these accounts are interesting, how truly unique they are to MIT (as opposed to any other top academic institution) is questionable. What makes MIT unique and distinguishes it from its peer institutions is unfortunately never fully explored.

Keyser continues the book by describing his experiences as Housemaster (faculty manager) of one MIT's most notorious undergraduate dorms, Senior House. This will most likely be the most appealing part of the book to many readers, disclosing a world of sex, drugs, and rock and roll that most would hardly imagine exists at a place like MIT (including annual kegs of nitrous oxide). Soon Keyser finds himself becoming the 'Houseadversary' (as opposed to House-

master) resulting from his numerous confrontations with the residents over issues ranging from drug use to vandalism to even something as mundane as water-efficient showerheads. What stands out in these stories are not the specific details (which are quite interesting), but Keyser's confrontational tone and seemingly one-sided depictions. It is hard not to believe that Keyser still holds a grudge against Senior House, and this is his opportunity to vent. And vent he does. His choice of words to describe the perceived troublemakers (especially given his linguistic training) is particularly interesting: 'hard-asses', 'bad guys' and 'self-unaware'. The irony, of course, is that by calling the residents self-unaware, Keyser also holds a mirror to himself, highlighting the fact that while he is generous in assigning blame, he neglects to take any for himself; especially for contributing to a situation in which 20% of the residents actively advocate against his removal. The irony is put on even thicker when Keyser describes later in the book (in regards to sexual-harassment at MIT), 'when thirteen women from the same school have the same complaint, you pay attention'. Why not when 40 residents from the same dorm?

In the last half of the book, Keyser increasingly interweaves his personal views with his experiences. One of Keyser's favourite devices is to apply a psychological lens in order to explain the behaviours of those around him. He uses this quite liberally, whether when trying to explain the relationship between faculty and students at MIT, or the motives behind student-turned-protestors. This, however, often results in overtly simplified or even paradoxical representations. For instance, while Keyser labels the students of MIT as 'America's best young scientific minds', he is quick to ascribe their acts of protest as the result of deep psychological issues – whether as rebellion towards MIT's parental role (which he labels as '*in loco parentis*'), or as a way of dealing with the love/hate relationship they have with MIT (which he labels as 'disobedient dependency'), or as trying to fulfil their pre-existing view of the world (which he labels as 'role compliance'). While these might apply to certain individuals or situations, using such psychoanalytical reductionism to explain the intricate motives of whole groups of people is at best dismissive, and at worst misleading. It is also simply

uninteresting. Keyser's overabundance of psychoanalysis is somewhat surprising, given his own perceived lack of formal psychological training. It rather appears to stem from his own experience of having received psychotherapy while at MIT. Such deterministic accounts, unsurprisingly, hurt Keyser's credibility and thus steal from the last few chapters of the book.

All in all, *Mens et Mania* presents an interesting albeit fragmented picture of a side of MIT that rarely sees the light of day. The book unfortunately never fully delivers on its promise to take us into the 'MIT that nobody knows'. Instead, Keyser sprinkles the book with interesting personal anecdotes from his time in (and out) of MIT. As a result, instead of a systematic account, we obtain a cursory and often one-dimensional portrayal of MIT, with little reference to what makes it such a singular place. It is a shame since this is exactly what makes MIT interesting – how it is *different* from other academic institutes. By veering away from his forte, and attempting to cover too much, Keyser misses this important point. Consequently, the book will read more like a personal memoir of Keyser's own life, rather than a book truly about MIT.

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Our Frugal Future: Lessons from India's Innovation System. Kirsten Bound and Ian Thornton. Nesta, 1 Plough Place, London EC4A 1DE, UK. 2012. 93 pp. Available at http://www.nesta.org.uk/news_and_features/assets/features/our_frugal_future_lessons_from_indias_innovation_system.

What role does diplomacy play in promoting international collaboration in science? Substantial, as a reading of this report will suggest. The report was prepared by Nesta, an independent innovation foundation based in London, with the assistance of the UK Foreign and Commonwealth Office through the Sci-

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ence and Innovation Network in India and two other government bodies involved in higher education and research, viz. Research Councils UK–India and the UK–India Education and Research Initiative. The Foreword is by James Bevan, the British High Commissioner to India.

Why would all these organs of the British state evince so much interest in the innovation system of India? ‘To help the UK policymakers, businesses and universities better understand the opportunities and challenges of engaging with Indian research and innovation and how to strengthen their efforts to collaborate’, say the authors. And why would they want the British to engage with Indian research and innovation? Because the authors believe that the UK cannot only ‘benefit from India’s strong and deepening links into global networks for research and innovation’, but also because Britain can derive inspiration from India’s unusual skills for low-cost innovation.

The West’s engagement with the East is no longer confined to the culture, religions, languages, literature, art and archaeology. Nor is it content with the mere market potential offered by countries with large populations for goods and arms manufactured in the West. Since the turn of the millennium, there has been a steady increase in the West’s interest in research carried out in countries like China and India. Five years ago, the lead author of this report, Kirsten Bound, wrote the precursor to this report, *India: The Uneven Innovator* (Demos, 2007), and her colleagues at Demos, James Wilsdon and James Keeley wrote *China: The Next Science Superpower* (Demos, 2007).

In six short sections – Frugal innovation, research, place, business, people and collaboration – the report achieves its purpose of mapping and analysing recent shifts across India’s research and innovation enterprise with an enviable economy of words and ample data from a variety of sources, both Indian and international. The presentation of data – both in tables and in figures drawn with the help of a specialist in visualization – is particularly impressive. There are more than 320 end notes. If one is in a hurry, one can read the executive summary, introduction and conclusions and recommendations, and one will not miss much.

The report explores the policies, institutions and industries that are driving research and innovation in India. The

reader is left with a vivid picture of the culture of creative improvisation, expertise in business model innovation and new sources of social finance that characterize India’s frugal innovation. The authors have also not left out areas that need remedying.

It is precisely because of the Indian penchant for frugal innovation, which in the authors’ opinion would be ideal for Britain and other advanced countries which are going through a phase of lack-luster growth and public austerity and are facing severe competition from emerging markets, the report calls for frugal innovation to become a strategic focus for collaboration between India and the UK. After all, frugal approaches are as relevant in Birmingham and Manchester as in Bangalore and Mumbai, says Kirsten Bound. Right now for India the UK is not the partner of choice for collaboration either in research or in higher education. The report suggests measures that both countries, especially the UK, can adopt to increase their engagement in joint R&D.

The report attempts to map the geography of research excellence across the country with a bibliometric report by Evidence Ltd, a unit of Thomson Reuters, publishers of *Web of Science*. India’s annual R&D spend is around five times smaller than that of China, but India produces more scientific publications per dollar (PPP) of spending than USA. India takes very few patents (0.1 per million people). India produces over twice as many scientific publications a year compared to a decade ago, but it is not yet a science superpower. This amounts to only 3.5% of world research (compared to 6% for the UK and 12.3% for China), and most of that is below-average quality. But the authors caution that while traditional metrics such as publication, citation and patent counts may reveal a few things, they may also fail to capture India’s distinctive strengths and potential, viz. emerging specialism in frugal innovation.

Incidentally, the Evidence report on science and innovation in India is freely available on the net [http://www.nesta.org.uk/library/documents/Evidence_India_Bibliometrics.pdf] for anyone to download. A similar report on science in India, prepared by Thomson Reuters for the Department of Science and Technology is now available at http://dst.gov.in/whats_new/whats_new12/report.pdf.

With many examples of frugal innovation – creating low-cost but high-quality products and services with limited resources – in sectors ranging from sophisticated healthcare delivery and manufacture of automobiles to production of low-cost generic drugs through indigenous research and crowd sourcing – and interviews with policymakers, entrepreneurs and scientists across six Indian cities, the authors uncover rising stars and expanding clusters of innovation.

There are many nuggets, at least some of which may surprise even seasoned watchers of Indian science. It is the National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram in Kerala, which produces the largest percentage of world-class papers (defined as in the top decile for citations) and not Tata Institute of Fundamental Research, Mumbai or Indian Institute of Science, Bangalore. It is not new biology that is the best performing area of research (in terms of citations per paper relative to the world average), but engineering, followed by physics and materials science. Pune has overtaken Chennai, Kolkata and Hyderabad in competitiveness and has emerged as an important hub for research and innovation. Only Delhi, Mumbai and Bangalore are ahead of Pune. Karnataka accounts for 42% of all foreign domestic investment in R&D. Investment in R&D by multinational corporations has risen sharply since 2000, and both the quantity and quality of the R&D are increasing. The pharmaceutical sector accounts for 45% of business R&D and India produces 60% of the world’s vaccines. India is the largest exporter of generic drugs. There are 150 business incubators and science and technology parks across India, but only a few are geared to support innovation. Academia–industry interaction remains low. The higher education sector needs to be strengthened. To achieve the Government’s ambitious goal, India needs to set up 8 universities and 417 colleges every month for the next eight years. Right now, more than 90% of IT, engineering and management colleges in India are private. Unfortunately, the quality of this provision is extremely variable. Many private institutions offer little in the way of laboratory or practical training. Curricula are outdated and there are crippling shortages of teaching staff.

The report is well conceived, well researched and well written. It is a must read for all policymakers, students of science and technology policy, heads of research councils in India and the members of the Parliamentary Standing Committee on Science and Technology. Its main recommendation, viz. establishing a research programme on 'science of science and innovation policy' is worth implementing.

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Is American Science in Decline? Yu Xie and Alexandra A. Killewald. Harvard University Press, Cambridge, MA, USA. 2012. x + 230 pp. Price: US\$ 45.00/£33.95.

Is American science in decline? The direct answer to this question is not found in the book under review. Indeed,

from his own personal research, some of which have been reported in these pages (*Curr. Sci.*, 2008, **94**, 1113; 2010, **98**, 1160–1161; 2012, **103**, 351–352), it is clear to this reviewer that from 1995 to 2009, the United States' share of the world's science and engineering (S&E) articles has diminished from 34.24% to 26.46% (data based on the 2012 report of Science and Engineering Indicators).

What the book does answer is the question, 'Is America the pre-eminent S&E research power in the world?' Indeed it is, and will remain so for quite a long while, if one does not compare it with the European Union taken as a single monolithic entity. With only 5% of the world's population, the US accounts for 35%, 49% and 63% respectively, of the world's scientific output, citations received and highly cited publications. But this position of dominance is slowly being eroded. It is holding on only because it devotes huge resources to research and development (about 40% of the total global research and development spending) has the finest higher education infrastructure in the world (85% of the world's top 20 universities and 54% of the world's top 100 universities) and last but not the least, encourages the steady increase in the number of immigrant scientists. Immigrant scientists from India accounted for 16% of all US scientists and engineers and China another 11%. Taken together, this diaspora from the notional sub-continent called 'Chindia' (a portmanteau word attributed to the politician Jairam Ramesh), is keeping the S&E machinery of the US ticking healthily. Interestingly, a simple back-of-the-envelope calculation shows that there are more S&E professionals of Indian origin working in the US (approximately 240,000) than those who remain at home (maybe 150,000). There is anecdotal evi-

dence that Chindians in the US work much harder than those at home and presumably much harder than their own American-born counterparts. This leads to the speculative but plausible projection that Chindians account for nearly half or maybe more of the S&E research output of the US.

Some of the important issues that Xie and Killewald address apply equally well to emerging scientific and economic powers like China and India. Scientists' earnings are stagnating. Academic science is threatened because of poorer growth prospects and the higher risks involved in finding and retaining tenure-track positions. Science, like sports, is a highly competitive social activity, driven by personal ambition and national pride and imperatives. With increasing competition in a globalized world, one has to work harder to keep one's share of the S&E pie. The US is just about able to hold on to its position as the global S&E super-power.

The book ends on the following note:

'Loss of dominance does not mean decline. All current signs indicate that American science can still remain a leader of world science for many years to come.'

One cannot find fault with the latter statement. However, one can quibble over the preceding sentence – what is decline, if not the loss of dominance?

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