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EDITORIAL

IIT, MIT and the Evolution of Institutions

Technical education in India was transformed in the post-Independence era by the creation of the Indian Institute of Technology (IIT). The need for a thrust in engineering education was recognized as early as 1945, when a committee, headed by Nalini Ranjan Sarkar was set up to examine the requirements of post-Independence India. Planners need models and the Sarkar Committee chose MIT (The Massachusetts Institute of Technology) as an example to follow, developing an engineering curriculum that had a strong science base, with courses in humanities and an evaluation system that differed dramatically from the annual examination approach favoured by most existing institutions. IIT Kanpur, which I entered in the late 1960s, embodied in many ways an entirely new experiment in science and engineering education. Half a century later the IITs have an image that reflects the success of these experiments, in undergraduate engineering education. In his book, *An Eye for Excellence* (HarperCollins, 2008), E. C. Subba Rao notes that the Kanpur Indo-American Program (KIAP) provides an example of 'how the dynamics of a four-cornered configuration – IITK, consortium universities, governments of India and the US – were adroitly managed ... an instructive story for all inter-institutional and inter-governmental collaborations'. He goes on to quote the US Ambassador to India in the early 1960s, John Kenneth Galbraith: 'Not often, and perhaps not ever, has an economic and technical effort so rewarded both the donor country and the major recipient.' In an incisive analysis entitled 'Exporting MIT: Science, Technology and Nation Building in India and Iran', S. W. Leslie and R. Kargon examine the events that led to the establishment of IIT Kanpur and provide an assessment decades later: 'Pioneering programs in aeronautical engineering, computer science and materials science, so effective at MIT, turned out students over-qualified at home and best prepared for graduate training and eventual employment abroad.' They go on to quote a 'common witticism in India', clearly one which must have emerged from the IIT itself: 'When a student enrolls at an IIT, his spirit is said to ascend to America. After graduation his body follows' (*Osiris*, 2006, 21, 110). Leslie and Kargon observe that 'The Massachusetts Institute of Technology (MIT) redefined engineering education in the 1950s, then became a model and mentor for the rest of the world in the 1960s and 1970s.' The 'MIT model', envisioned and implemented in the 1950s pro-

vided 'a solid foundation in advanced mathematics and fundamental science' for prospective engineers. Gordon Brown, a key figure in the transformation of the curriculum, hoped that 'students would acquire the purposefulness, the creativity and the sound judgement found in the brilliant engineering of science – and become men who get things done' (*Technology Review*, 1959, 60, 19). The vision of 'a university polarized around science' is described by Leslie and Kargon as 'a place where the basic sciences encompassed and contributed to interdisciplinary centres, constituent departments and education at all levels'. They go on to note that MIT was the best positioned amongst America's universities to address the challenge posed by President Truman in his 1949 inaugural address: '... to embark on a bold new program for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas'. The late 1940s and early 1950s were fundamentally transformative in science and in world affairs. The electronics revolution and the antibiotic era were about to begin; physics, chemistry, biology and a host of other disciplines were set to explode and many new nations were born, India and China amongst them, creating a new world order. In engaging with a changing world, Leslie and Kargon note, with a touch of surprise: 'Oddly enough, given the relative numbers and reputation of their faculties, the work of MIT's social scientists has overshadowed the arguably more enduring foreign policy legacy of its engineers, who believed that the institute itself could be a powerful model for economic development and nation building.'

The very first IIT at Kharagpur 'got no direct advice from MIT'. Kanpur was the chosen location, where a direct engagement by MIT was sought. In the words of Leslie and Kargon, 'the Indian government did its best to make MIT an offer it could not refuse'. The first delegation to assess 'the prospects for IIT Kanpur' was led by Norman Dahl, a mechanical engineer. Their conclusions were positive, especially after a meeting with P. K. Kelkar. The desire to push ahead with 'strong graduate and faculty research programs' seemed a departure from existing models in India. Dahl believed that India in the 1960s needed "problem recognizing" and "problem solving" graduates who will have the confidence, inclination, and training to do something about India's problems'. His colleagues were skeptical. Leslie and Kargon

quote from Robert Halfman, who would later oversee the KIAP: 'I have come to realize that Indian culture ... is in many ways only superficially responsive to the objective techniques of science and engineering. The capable, modern, imaginative engineer with initiative is a misfit, a man a little ahead of his time who must have courage, perseverance and patience in the face of endless frustration'. American prejudice, apparent in this cautionary assessment would undoubtedly have been reinforced by a glimpse of Kanpur, which presented a stark contrast to MIT's surroundings in Cambridge, Massachusetts. Retrospective views of the Kanpur experiment have sometimes worried that the MIT model may not have been as influential, as originally envisaged in the Indian context. P. V. Indiresan and N. C. Nigam provide a view that is cited by Leslie and Kargon: '[It is] critically important for the faculty and staff to develop a pride in the Institute as an *Indian* Institute of Technology, not as an imitation of some foreign technological institute. This entails an orientation towards problems confronting India and a realization that the development of an Indian technology for dealing with Indian problems can be both interesting and exciting.' They note that IIT Kanpur's 'constituency is India and the Indian people' (*The Indian Institutes of Technology: Excellence in Peril in Higher Education Reform in India*, Chitnis, S. and Albach, P. G. (eds), New Delhi, 1993, pp. 334–363). This sentiment is true for all our institutions and especially relevant in today's context, where energy, water and health research appear to be central to future national development. The IITs, specifically the first five institutions, are undoubtedly the pride of India's higher education system today. My attention was drawn to the Leslie–Kargon article on IIT Kanpur's origins by a book about MIT, that appeared on my table.

Becoming MIT: Moments of Decision (Kaiser, D. (ed.), MIT Press, Cambridge, Massachusetts, 2010) is a celebration of MIT's 150 year history. The book is a fascinating collection of articles which present a broad view of MIT's evolution. An introductory essay notes that at the centennial, half a century ago, the MIT President Julius Stratton hoped that sometime in the future we might have 'a coherent account of the flow of ideas that have influenced academic aims and the methods of teaching at the Institute throughout the century'. He was clear that academic evolution 'can be understood only when placed in the context of the great industrial and intellectual movements of the times'. David Kaiser's introduction notes that the individual chapters 'interrogate those moments of decision that have helped to define the Institute [MIT] we know today. Some of these turning points have been dramatic, their import obvious to participants at the time. Others have been more subtle, their full impact only recognizable with hindsight. Moments of intense strife and uncertainty take their place ... alongside some of MIT's great successes'. How does one choose 'moments of decision' in tracing the evolutionary history of an

institution? Kaiser notes that 'though invoking the past, anniversary celebrations like all history, are conducted in the present with an eye to the future'. He adds that 'we always strive to craft a usable past – one whose highlights and contours are shaped by our current concerns and anticipations'. Having reflected, albeit with minimal pretensions to historical scholarship, on the century long progress of the Indian Institute of Science, I was drawn to Kaiser's view of institutional evolution: 'Episodes and individuals that once loomed large in the collective memory inevitably fade from view, our sense of meaning shading, at times imperceptibly upon each reconsideration.'

MIT's 'foundational years' span the years 1861–1894 and the story as told by Merrit Smith is a story of an individual, William Rogers, pursuing a dream of a 'polytechnic school' even while the American Civil War was raging. MIT's first laboratory (1867) was set up in chemistry by Francis Storer. Physics appeared shortly thereafter, focusing on laboratory experience for students. Even in this early period MIT seems to have experimented with curricula and teaching methods, directly confronting the competing demands of laboratory work and classroom teaching. The chemist Charles Eliot went on to note in his inaugural address as Harvard's president, in 1869, that the problem was 'not what to teach, but how to teach'. Nearly 150 years later, I suspect that this problem has become even more acute, as scientific advances have far outstripped the pace of reform in curricula and teaching methodology. MIT began with 'fifteen students in 1865' and 'grew to three hundred in 1881'. Merrit Smith points out that the Latin words on MIT's seal, *Mens et Manus*, translates as Mind and Hand. This phrase in his assessment 'aptly expressed the defining academic values of MIT and the aim to produce both cutting-edge scientists and engineers'. A brief essay entitled 'Mergers and Acquisitions' recounts the attempts to merge MIT with its older, richer and more established neighbour, Harvard. MIT operated largely as an 'undergraduate engineering school' in its early years. The transformation to a research university happened in the years between 1910 and the late 1930s. These years were marked by MIT's increasing involvement with industrial research, but the truly transformative period lay just ahead. The war years impacted MIT in a manner that few institutions have experienced. The 'military–industrial–university complex' was a phenomenon without precedent, driving scientific and technological advance at a rapid pace, but leading to a loss of innocence, which would trigger, at times violent, confrontation in the Vietnam years of the late 1960s and early 1970s.

Evolutionary history can be instructive, even for institutions. We can only hope that recognition of the turning points in the growth of our institutions will one day provide a framework for charting a future course.

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