



**Charles Gadea and Roland Lardinois (dir.), *Les Mondes de l'ingénieur en Inde (XIX<sup>e</sup>-XXI<sup>e</sup> siècle)*, Paris, Classiques Garnier, 2022, 447 pages.**

The studies gathered in this volume, *Engineering Worlds in India (19<sup>th</sup>-21<sup>st</sup> centuries)* fill a gap in the history and sociology of Indian engineers, disciplines in which researchers' interest is quite recent. The book opens with an introduction that outlines the historical conditions of emergence of this profession, in the wake of the colonial conquest. Indeed, the first engineers were soldiers under the private status of the East India Company, before the British Empire took direct control of the government of India and entrusted public works to members of the Royal Corps of Engineers. Paradoxically, Indian engineers were much earlier

oriented towards the model of a profession trained in special schools than their English counterparts, who for a long time remained faithful to the tradition of pupilage, which was closer to an apprenticeship model. By the mid-19<sup>th</sup> century, four training schools were opened to meet the growing needs of civil engineering administered within the Public Works Departments, and these colleges remain among the most highly renowned in the country today.

After this general perspective, a series of contributions are presented, most of which are the result of a research project carried out within the framework of a contract financed by the French National Agency for Research, which brought together Indian and French scholars, notably sociologists and historians.

Thus, Vanessa Caru's article presents exploratory remarks on the question of inter- and trans-generational social mobility through access to the profession of civil engineer in India during the British colonial rule, with reference to the case of the Bombay Presidency. A knowledge of the social contours of this group makes it possible to measure the evolution in terms of the social recruitment of engineers in the past and in the present. After locating the career of a public works engineer in the field of possibilities, the article analyses the social origins of the members of this group, seeking to establish the fractions of the population that were able to benefit from the development of this new profession, before seeing whether access to this profession was able to give rise to intergenerational processes of upward social mobility.

Charles Gadea and Roland Lardinois then examine the specificities of the Indian engineer. They analyze the failure of attempts to federate the various professional engineering associations into a single body, the Engineering Council of India, in order to establish a state-guaranteed engineering title, noting that the engineers behind this project encountered two types of resistance. On the one hand, that of the first generalist association, the Institution of Engineers (India), established in 1920 and recognized by a royal charter guaranteeing its members the title of Chartered Engineer, and, on the other hand, that of the National Association of Software and Service Companies (NASSCOM), a powerful union of entrepreneurs in the ICT sector, which had no interest in seeing a profession reshaped according to the needs of the market regulated by these new technological industries they represented. These observations revive the

sociological argument about the notion of professional group closure, which is much debated among scholars.

The third chapter, by Aparajith Ramnath, traces the history of the iconic second Howrah Bridge, inaugurated in 1943, which connects the city of Calcutta to Howrah (Calcutta's industrial district and a crucial railway terminal), spanning the Hoogly River, one of the branches of the Ganga in its delta. The design of the bridge was hotly debated for nearly three decades between engineers, politicians, colonial officials, and big business. The main options considered were a floating bridge and a more expensive cantilever bridge, each with its own advocates. It is shown that, unlike the public works departments and private industries, which were then in the process of being Indianized, Indian engineers, on the whole, did not play a prominent role in the debate on the construction of this bridge. However, two types of experts played a central role: the metropolitan representatives of a supposedly universal science of bridge building (in the form of British and American consulting engineers), and those who claimed a particular knowledge of "local conditions" (Calcutta-based engineering firms, British engineers who had served long in India). Moreover, the expertise of engineers, though frequently invoked, was ultimately subordinated to major economic and political considerations.

The history of engineers, in India as elsewhere, is written in the masculine. Women often disappear from research, partly because they are in the minority, but also because of the scarcity of sources available to the historian. In the fourth chapter, Roland Lardinois draws on a few autobiographies that have to be unearthed from libraries, on memoirs published on blogs and on testimonies published in English-language newspapers and magazines, all of which are supplemented by a few interviews. He traces the careers of a handful of women engineers, mainly from the states of South India, who had to overcome social resistance, more *de facto* than *de jure*, in order to acquire this type of professional qualification from the 1940s onwards, often with the support of their parents, especially their fathers.

Ross Bassett, a professor at the State University of New York, extends the analyses presented in his book *The Technological Indian* in the fifth chapter. He focuses on Indians who studied engineering in the United States at the Massachusetts Institute of Technology and the University of Michigan between 1945 and 1971. By tracing their journey, both to and from American universities, he shows American technological imperialism in action, an empire maintained by a variety of actors driven by different objectives. Indian graduates from MIT and Michigan were involved in the most high-profile national technological developments in the years following India's Independence, from the atomic program to the birth of the software industry, or to the Bhopal industrial accident. Graduates of these two institutions constitute different fractions of India's technological elites.

The social heterogeneity of Indian engineers is all the greater because the profession is riddled with issues and tensions related to caste origins and the reserved quota systems designed to compensate for these inequalities. Odile Henry and Mathieu Ferry's contribution aims to investigate the effects of this through an in-depth study carried out in an Indian Institute of Technology located in North India, one of the oldest and most reputed. They focus on the educational pathways and difficulties encountered by students recruited under quotas, as well as on the logic of professional placement in the private sector of students at the end of their studies. The authors examine the disparities in professional integration, in terms of salaries and social properties of

companies, of students according to their field of study, diploma, academic results and status (whether or not they belong to the reserved categories). Secondly, they attempt, on the basis of in-depth biographical interviews with former students of this IIT and with teachers, to specify the logic of placement on the labor market and to provide the historical elements allowing their contextualization.

This concern in engineers who do not come from the dominant castes and classes is also reflected in the chapter on Muslim engineering schools in Bangalore by Aminah Mohammad-Arif. The Indian Constitution of 1950 grants religious minorities the right to establish their own educational institutions. The example of the Muslim minority and the colleges they have established is particularly noteworthy given their political and social history in India. From the perspective of engineering education, the south Indian city of Bangalore is an eminently interesting case study as it is considered the Silicon Valley of India, with a rich educational market for the engineering “factory”. This paper examines the three engineering colleges established by Muslims in and around Bangalore that fall under the status of “minority institutions”, and enjoy the rights that such status provides. These are the Islamiah Institute of Technology, Ghousia College of engineering and HKBK. The author sets out to demonstrate how the educational policy of these schools is subject to two constraints: on the one hand, the aspiration to improve the social status of the Muslim “community” and, on the other hand, the need to deal with the economic imperatives to survive in the highly competitive environment of Bangalore’s engineering schools.

The tensions within the professional group are not only generated by the origins of its members, but also by the controversies that arise from their own activity. Bérénice Girard provides an eloquent example by studying the trajectory and mobilization of G. D. Agrawal, a former professor of environmental engineering at one of India’s leading engineering institutes and a former senior official of the Central Environment Agency. Since 2008, the retired professor has dedicated himself to the fight against the exploitation of the Ganges springs for hydroelectricity, supported in his struggle by many of his former students and colleagues. This mobilization is part of two long histories, that of the internal debates in the engineering profession on the construction of dams and hydroelectric power stations, and that of the controversies on the planning of these same hydraulic structures on the Ganges. The chapter examines the mobilization of G. D. Agrawal from a socio-historical perspective, in order to highlight both the elements of continuity with these earlier controversies and its specificities. This analysis allows several hypotheses to emerge on the evolution of the policy of hydraulic exploitation in India and on the relationship of the engineering profession, historically structured by the public authorities, to this exploitation, which is one of its favorite fields. The chapter thus contributes, more generally, to an analysis of the evolution of the relationship between the profession and the state in contemporary India in a context of liberalization and the rise of environmental issues. In addition to the “hydrocrats” in charge of the large state bodies managing water, another high point of the power of Indian public engineers is that of rail transport. Bérénice Bon shows that Indian railway engineers are an old and influential state body (*corps d’État*) in the construction of major infrastructures, but also in urban policies. Since the mid-2000s, some engineers have been posted for a short period of their career in a railway agency in charge of developing hundreds of hectares located in the heart of Indian cities. This chapter analyses the professional logics of these engineers and shows how they fit into the wider world of the railway company. The author thus

shows the evolution of the Indian administration in the context of liberal reforms. Within this organization, engineers devote a large part of their time to contracts with private consultancy firms to whom land development is delegated. The ethos of public service dominates the discourse of the oldest engineers, who began their careers in the 1960s and 1970s, and who are opposed to the diversification of professional profiles in a reflexive defense of the culture of large public companies. More recently recruited engineers are seizing on the land issue to accelerate the pace of their careers and are seeking to influence working practices and the use of consultants.

However, the field that has popularized the figure of Indian engineers worldwide and has been the driving force behind the expansion of the profession in the 2000s remains information technology. Balaji Parthasarathy, Amit Prakash and Supriya Dey study the evolution of the professional category of “software engineer” using an analytical framework from the sociology of work. Although few engineers specifically graduate in information technology (IT), the term “IT engineer” is socially accepted. Based on interviews in IT companies and engineering schools, the authors explain the shaping of the profession between 1985 and 2015 and its professional coherence. The results indicate how the evolution of technologies, the wide gap between the formal education system and the heterogeneous material practices of the industry, as well as the transient roles of IT engineers, have led to low professional coherence. As a result, IT engineers are best thought of as “imagined technologists”.

This development of the IT sector and the unprecedented growth, in two decades (1990-2010), of the engineering schools that train the skilled workforce employed in this sector, has led to the emergence of a new literary genre that Roland Lardinois calls “engineering novel”, which is the subject of the last chapter of the book. His approach focuses on three of the first novels of this genre published in the second half of the 2000s. Two of these novels are written by men, Chetan Bhagat and Amitabha Bagchi, the third by a woman, Parul A. Mittal, all three graduates of the same IIT Delhi. Roland Lardinois first studies the development of this new literary market in the field of English-language Indian literature. He then analyses the place of the software engineer profession in the imagination of the urban English-speaking classes from which the authors come. Finally, the author examines the symbolic family order that unfolds in this fictional imaginary of contemporary India.

The book ends with a new perspective, proposed in the postface by André Grelon. This time, Indian engineers are confronted with French engineers and the literature devoted to them. In a vast and rich synthesis that revisits each of the themes dealt with in the previous chapters, André Grelon highlights the outstanding features of French engineers as outlined by the research carried out on their subject in history and sociology, and from this face-to-face encounter, a series of original considerations and new lines of research with a comparative aim emerge.

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