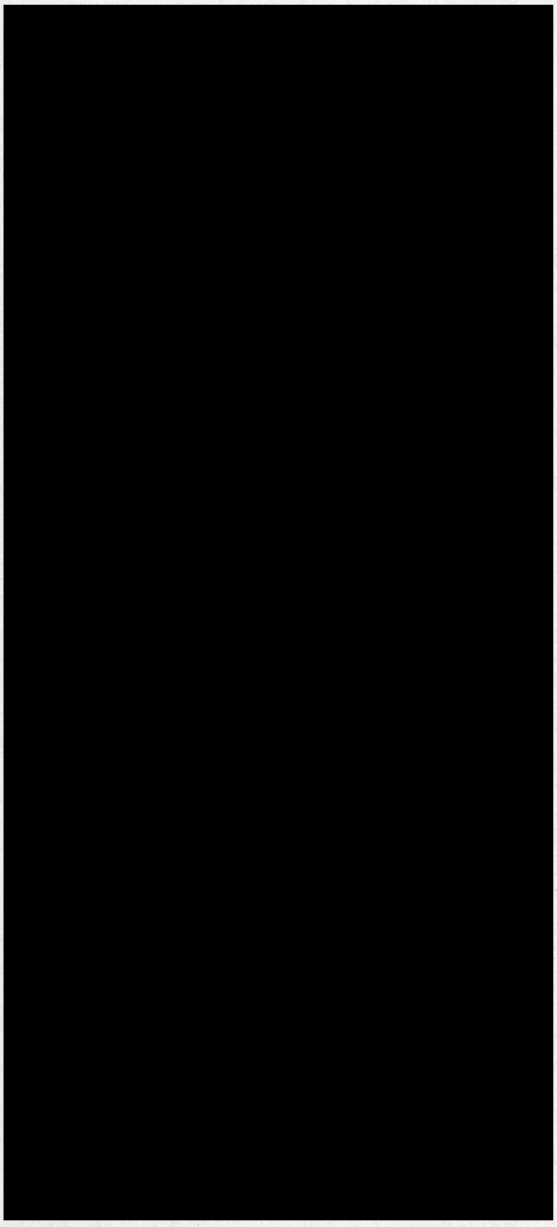

バーバラ モロニー

『技術と投資』

——戦前期日本の化学工業——

Barbara Molony, *Technology and Investment : The Prewar Japanese Chemical Industry*, Harvard University Press, Cambridge, Massachusetts and London : 1990, xv+396 pp.

The book under review deals with the historical development of electrochemical and related products in Japan up to World War II. The author uses a combination of biography and company history approach to bring out the salient features of this process. Molony concentrates primarily on the dynamic personality of Noguchi Jun as a pioneer of electrochemicals in Japan and traces the development of his firm, Nippon Chisso Hiryo (Nitchitsu), founded in 1908 by merging the electricity generation and carbide production operations, to produce calcium cyanamide, a nitrogenous fertilizer. Firms other than Nitchitsu do get a mention but only as supplementary material, evident from the fact that of the *"three waves"* of development of chemical industry, as discussed by the author, the second and third wave firms are clustered together in a 40-page Chapter towards the end of the book. To be fair, however, one can find repeated references to at least some of these firms in the discussion of Nitchitsu.

Molony begins by enumerating four basic "requirements" for investment strategy : (1) access to capital ; (2) access to resources and labour ; (3) environmental conditions such as markets and political climate ; and, (4) existence of skilled professional managers. It is the interaction of these factors that, according to Molony, determines the investment decisions of a firm. Having provided information on these ingredients, she goes on to describe the state of chemical industry before the introduction of electrochemicals and also spends some time on scientific education and research in Japan which, according to her, put in place the basic infrastructure to promote the development and diffusion of the chemical industry in Japan.

Molony divides her narrative into what she calls "*three waves*" of development. The first wave was clearly distinct from the latter two phases in that it was led by entrepreneurs who themselves were scientifically trained and very much at home with the technology they intended

to use. The problem for them was to find resources and capital. Their knowledge and experience in generating hydro-electricity provided them with one of the most important resources and, according to the author, political links that stood them in good stead at later stages. For the second and the third wave of chemical producers, on the other hand, technology and scientifically trained managers seem to have been a bottleneck more than capital resources. It is, however, difficult to see how the second and the third waves were different from one another except that the latter was dominated by the established *zaibatsu* that developed, primarily, through their mining operations. The basic fact, however, remains that in both cases, it was availability of technology at economically meaningful prices that was the main bottleneck.

In describing the first wave, the author concentrates on the development and growth of Nitchitsu under the dynamic and ingenious leadership of scientist-entrepreneur Noguchi Jun. Chapters 2 through 5 provide a fascinating study of building of an empire. Starting with hydro-electricity and carbide production, Noguchi, with his active pursuit of new technology, his willingness to take calculated risks, ability to organise and persuasiveness with bankers, government and military authorities, was able to build a company that by the end of World War II was producing a vast number of diverse chemical products.

The narrative, somehow, gives the impression that the most important factor, from the point of view of development of Japanese chemical industry was the existence of scientist-managers like Noguchi and Fujiyama, who were quick to seize on any new development in the West as soon as it became available. Their decision, first, to invest in the production of calcium cyanamide in 1908 and, later, Noguchi's decision to adopt the Casale process for ammonia synthesis in early 1920s clearly demonstrates the need to perceive the opportunities and act upon them immediately. It was perhaps the absence of this feature in the management cadre of the old *zaibatsu* than any thing else that prevented the powerful conglomerates from entering the industry earlier than they did. Even though most of the *zaibatsu* were interested in the chemical industry for a long time and it was not until late 1920s and early 1930s that they could finally enter the field.

The author concludes from her study of Nitchitsu and the second and third wave firms that "during each of these waves, firms commenced chemical manufacture when certain conditions had been met."(p. 316). By this she implies that firms in respective "waves" invested or came on line when they met the requirements of "access to resources, capital and technology", a conducive "political climate", a "market for their products" and "managers who were committed to research, development and commercial production". Barring the fact that Noguchi showed the qualities of an astute scientist and a successful entrepreneur rolled into one, it is difficult to see how the *basic conditions* or "requirements" for investment differed in any radical manner for the other firms, especially the *zaibatsu* firms, as compared to those facing Nitchitsu. If electricity, as a resource, capital, access to skilled workforce and political connections were a bottleneck, the narrative does not convincingly show that the *zaibatsu* had any less access to these factors. The scientist-entrepreneur qualities of Noguchi, extraordinary and important as they may have been, should not be overemphasised. These qualities may affect the development of particular firms but all the firms in an industry cannot be expected to show these qualities. If existence of markets, capital resources, business environment, technologically trained workers and managers did not prove to be an insurmountable bottleneck for one firm, why did these prove to be deterrent in case of the others. There is no doubt that a potential market for fertilizers existed and the *zaibatsu*, if anything, had relatively easier access to capital. Skilled work force was probably as scarce for the *zaibatsu* as for Nitchitsu and professional managers with technological skills probaly could be hired. Why, then, did the old *zaibatsu* not enter the industry at an earlier date?

There are other questions that the author fails to ask and answer. For example, given the fact that the world nitrogenous fertilizer production capacity continued to rise throughout the 1920s and the prices were declining precipitously, why was it that new firms entered the industry in such an adverse environment? Given the fact that the Eastern Nitrogen Association decided not to implement the Haber-Bosch process of ammonia synthesis, apart from the high costs, was the fact that it would lead to excess supply(p. 270)*. It is true that emergence of alternative techniques of production made technology relatively accessible at lower costs but the author does not provide any evidence that the conditions had changed

sufficiently to warrant increased capacity at the time when the second and third waves in fact made the investments. If anything, the environment seems to have deteriorated. It is a failure to ask such analytical questions that gives the book a semblance of a "*glorified company history*" rather than an inquisitive and investigative analysis of the investment decisions in terms of economic and business fundamentals.

This, however, does not denigrate the usefulness of the book and the author must be commended for the effort she has put into investigating the Japanese sources of the prewar era and presenting it to the Westem readers in an intelligible form. The most important contribution of the book, in my opinion, lies in the fact that through a meticulous study of Noguchi and his firm, Nitchitsu, the author brings out clearly that the Japanese success in developing modern and technologically advanced industries was dependent neither on any "peculiarities" of the Japanese cultural traditions nor on the concentration of economic power in the hands of the *zaibatsu*. It was the result of calculated risk-taking by entrepreneurs that were well versed in, and kept abreast of, the technological developments of their times. By being alert to the changing technology and impinging on the "environmental" determinants in their industry, these entrepreneurs were able to progress the interests of their firms and, in the process, the progress of the Japanese economy. This was, and is, true not only for Japan but probably for any country developed or developing.

* This was in fact true. In my own research, I found that addition of 100,000 ton capacity in the ammonium sulphate industry in 1923, assuming that the existing firms did not change their own production levels, would have caused the prices to fall by 53 yen which would have resulted in substantial reduction in profits and even losses, See, Khosla, Anil (1984). *Industry Structure and International Trade ——Japanese Ammonium Sulphate Industry in Inter-War Period* (Unpublished M. A. Dissertation, Department of Economics, Hitotsubashi University, Tokyo).

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