Technological Change and Corporate Fortunes

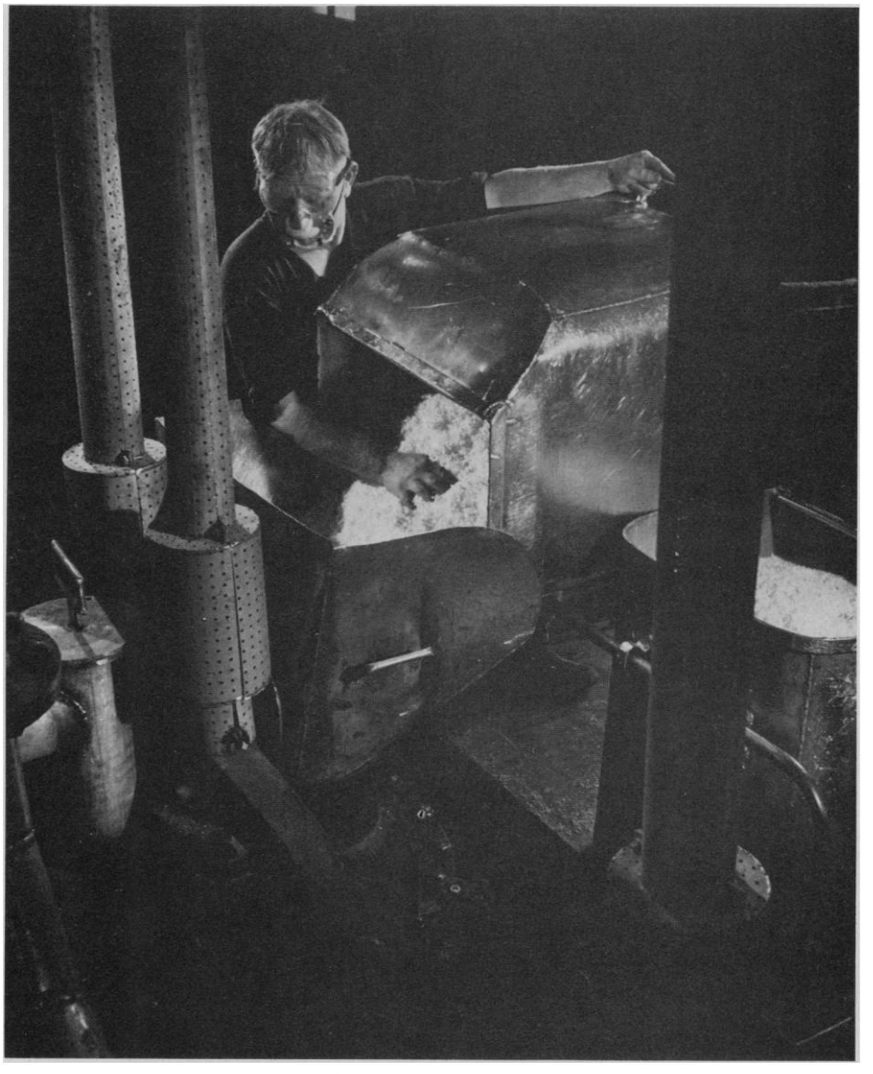
Imperial Chemical Industries. A History. Vol. 2, The First Quarter-Century, 1926–1952. W. J. READER. Oxford University Press, New York, 1975. xviii, 570 pp. + plates. $49.95.

Technology and large-scale multinational corporations are today acknowledged as major interacting forces that have shaped and continue to shape industrial societies. Yet, the documentary resources that could provide understanding of some of the most fundamental administrative and technical forces are diminishing as a result of the replacement of letters by telephone conversations and the destruction of corporate records by record "retention" systems, often created in response to American antitrust law enforcement. Fortunately, W. J. Reader, one of Britain's leading business historians, has been able to provide a rare scholarly glimpse inside one of the world's major technically oriented business enterprises. Drawing upon vast and nearly unique historical and financial resources, he conducts a remarkably comprehensive historical tour of the inner life of the Imperial Chemical Industries, Britain's largest research-oriented company and one of the dozen largest non-American firms in the world. Retained by ICI to write its history, Reader obtained access to a vast quantity of historical materials, the support of a four-member research team, and the freedom to write with candor and without censorship. With these resources he produced six years ago a highly acclaimed history of the forerunner firms of ICI, 1870 to 1926. In this second and final volume, he examines the first quarter-century of ICI, 1926 to 1952. Sensitively interweaving the forces of tradition, personality, business diplomacy, economics, politics, resources, and technological change, he has produced a detailed, perceptive, and well-documented account that complements the other major studies of the modern chemical industry written by L. F. Haber, John Beer, Alfred D. Chandler, and Stephen Salsbury.

The key dynamics in Reader's interpretation are interfirm relations and technological change. Beginning with the formation of ICI by the merging of four major British chemical firms (Brunner, Mond and Company; Nobel Industries; United Alkali Company; and British Dyestuffs Corporation), he portrays the merger as a British response to the challenge of the formation in the mid-1920's of I.G. Farbenindustrie, the large German chemical combine. Initially, Brunner, Mond and Nobel Industries, with their respective interests in alkali and nitrated explosives, served as the central members of the new British combine. Accordingly, the key leaders in the two firms, Sir Alfred M. Mond (1926–30) and Sir Harry D. MacGowan (1930–50), served as the chairmen and dominant leaders of ICI in its first quarter-century.

During its first decade ICI pursued its established product line, maintaining profits through a complex system of cartel agreements which were undergirded by key understandings with Du Pont and I.G. Farbenindustrie. Its first major investment decision committed the reserve financial resources of the Nobel division to the development in the Brunner, Mond division of the high-pressure technology for ammonia synthesis as a basis for fertilizer production. The worldwide depression of the 1930's curtailed demand, brought substantial production overcapacity, and prompted a precipitous price plunge in the fertilizer industry. As a consequence ICI sought in the 1930's to salvage a part of its heavy investment in high-pressure technology through hydrogenation of coal for gasoline production. This project, too, was commercially unsuccessful.

At the same time, changing chemical technology gradually steered the company's production emphasis from the traditional heavy chemicals into organic chemicals. At the time of the formation of ICI, the organic division, British Dyestuffs, played only a peripheral role in the combine because I.G. Farbenindustrie held world dominance in this sec-



A workman loads cotton into one of the nitrators for nitrocellulose production at Dumfries, Scotland. Drawing upon ICI's broad-ranged production capabilities, the British government during World War II invested £58 million in ICI-operated war materials factories such as that at Dumfries. [From *Imperial Chemical Industries: A History*, vol. 2]

tor; however, as new organic chemical technology shifted from aromatic to aliphatic compounds, organic chemical production gradually shifted from fine organic chemicals—dyes, pharmaceuticals, and photographic chemicals—to heavy organic chemicals—plastics, synthetic fibers, and petrochemicals. This major change in chemical technology in the late 1930's and the 1940's provided ICI with the opportunity to enter this sector successfully. Accordingly the old dyestuffs division came to play a more central role in ICI's research, investment, and sales. ICI's ability to shift gradually from traditional lines into new sectors of the industry derived in large part from the conditions fostered by the cartel system of the 1930's. First, ICI acquired under the terms of the cartel agreements new technical capacities and products from other firms such as Du Pont. Second, the cartel agreements that set prices and sales quotas provided little opportunity for sales and profit growth except through the development of novel products. Hence in the 1920's and 1930's these agreements fostered research competition among the participants, which eventually led to entirely new lines of products.

World War II strained ICI's research program and the cartel system. In the wake of the war the cartel system collapsed and the special relationship between ICI and Du Pont ceased as a consequence of the enforcement of the United States antitrust laws. As the technical revolution became manifest, research and production shifted markedly into the organic sector. Nevertheless, the company found it difficult to change as rapidly as it might have. Consequently, the heavy chemicals end of the organic chemicals spectrum predominated in ICI's production, not because of technical incompetence in fine chemicals, but because of the vicissitudes of the war and the lack of adaptability in ICI's organizational structure, a structure that continued to reflect the company's traditional technologies and interests rather than contemporary opportunities. This problem continued to plague ICI well after the termination date of this history.

Reader and his assistants have successfully faced the Herculean task of making the complex and wide-ranging activities of this large enterprise during a period of technical revolution both comprehensible and interesting. Although the chronological overlapping of the major divisions of the book produces disjointedness and redundancy, Reader has gained, in comparison with his first volume, a better treatment of organizational structure, managerial personnel, labor relations, and research and development activities. As in the earlier volume, he has effectively employed a large number of photographs, tables, charts, and maps and has produced a very complete index and technical glossary. While his treatment of the role of technology and science in the evolution and direction of a large industrial enterprise is important, the two-volume study may be of even more enduring significance as an example of the successful union of enlightened business attitudes toward corporate history and of good historical scholarship applied to a technically oriented company and industry. In that respect it is an example to be emulated.

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Capitalizing on Invention

Images and Enterprise. Technology and the American Photographic Industry, 1839–1925. REESE V. JENKINS. Johns Hopkins University Press, Baltimore, 1975. xviii, 372 pp., illus. $20. Johns Hopkins Studies in the History of Technology.

Photography was born in 1839, when art and science combined in the collaboration of Joseph Niepce and Louis Daguerre to capture permanently in silver grains what the eye sees fleetingly. It was at once hailed as a great cultural contribution too precious to vulgarize commercially and hence was given to all mankind through open publication by the French government, which recompensed the inventors with handsome pensions. For a decade or less the new discovery inspired intense photochemical research, but, as no major new finds ensued, scientific interest waned. Such was not the case among practitioners of the new photographic art or the public, however. In the United States great enthusiasm developed for daguerreotypes, for they provided portraits truer to life than painting at a price ordinary folks could afford. Itinerant daguerreotypists and photo galleries multiplied across the land. They were supplied by an infant photographic industry.

The subsequent development of that industry, as recounted by Reese Jenkins, was determined primarily by a succession of technical innovations. Not that Jenkins slights other more general factors (economic, organizational, legal, and so on), for he treats these and their interaction with technology with subtlety and authority, but he shows convincingly that for the photographic industry their role was secondary. And within the technical sphere Jenkins identifies the carrier base for the photosensitive material (the plate and later the film) as the most important determinant in shaping the destiny of the industry. Photochemicals, developing and printing techniques, and cameras with their complex optical and shutter components, though every bit as important in advancing the art of photography, were less significant in determining the course of the industry, at least in the United States.

Having thus isolated the most critical factor, Jenkins proceeds to organize his book neatly into five sections corresponding to five historic stages, each dominated by a different carrier base: the daguerreotype, 1839–1855; collodion emulsion on glass plates, 1855–1880; gelatin plates, 1880–1895; roll films for amateurs, 1895–1909; cinematography, 1909–1925.

Both the daguerreotype and the collodion plate required sensitizing just before exposure and had to be developed immediately; hence the photographer needed to be a skilled technician operating ponderous equipment. He drew his supplies from local dealers, who in turn obtained their goods from regional jobbers such as the Scovill Company and Edward Anthony in New York. Unlike the daguerreotype, the collodion process produced a negative plate from which any number of prints could be made on paper. Until 1880 most innovations came from Europe. For instance, in the 1870's the gelatin dry plate was invented by Maddox in England. It could be prepared efficiently in a factory months before use and after exposure could wait for development. This simplified photography to the point where knowledgeable amateurs could practice the art.

George Eastman (1854–1932) was such an amateur. In 1881 he decided to quit clerking in a bank to manufacture dry plates. Possessing a remarkably balanced combination of technical and business talent, Eastman did for photography what Henry Ford did for the automobile; he democratized picture-taking. His machine for making gelatin dry plate was the first step to mass production and worldwide sales. It was followed in the 1890's by his development of celluloid roll film mounted on removable spools inside his now famed Kodak box camera. Through a bewildering succession of pat-