

Inventing the Electronic Century: The Epic Story of the Consumer Electronics and Computer Industries. *By Alfred D. Chandler Jr.* New York: Free Press, 2001. xiv + 322 pp. Tables, notes, index. Cloth, \$35. ISBN 0-743-21567-2.

Reviewed by Martin Campbell-Kelly

Alfred D. Chandler Jr. explains the genesis of *Inventing the Electronic Century* in his preface to the volume. His original plan was to recount a history, to be called “Paths of Learning: The Evolution of the High Technology Industries,” that would cover in two parts the consumer electronics and computer industries and the chemical and pharmaceutical industries. In the event, because “the evolution of the electronics industries was historically unique” and “almost unrecorded,” he decided to produce two separate books on these topics. This one, on electronics and computers, is the first. It is scarcely true to say that the consumer electronics and computer industries are “almost unrecorded.” I have on my bookshelf some twenty histories of IBM, two or three of which are first rate. Many other firms in the electronics and computer industries have substantial histories. But the existing business history of consumer electronics and computers is fragmented, and Chandler has produced a fine integration of this disparate literature into a coherent narrative. To take one example at random, RCA’s failure to compete with IBM in mainframe computers in the 1960s features in every business history of the computer, and the failure is usually attributed to corporate drift combined with shortfalls in research-and-development and marketing resources. A complementary seam of the business history literature (notably Margaret Graham’s *RCA and Videodisk*, 1986) focuses on RCA’s biggest failure of the 1970s, the video disk, which has become a classic in how to do innovation badly. What Chandler has achieved is to relate such apparently unconnected facts. According to Chandler, RCA’s decline had two causes: “the lure of the computer” and “the curse of the conglomerate.” The lure of the computer led RCA to squander its research and development resources on a technology in which it had little expertise compared with consumer electronics, while the desire to be a conglomerate led it to diversify in areas remote from its historic competencies. While RCA’s eye was off the ball, the video cassette recorder replaced color television as the next big thing in consumer electronics, and RCA lost its market to JVC. Incidentally, identifying the VCR as a critical node on the path of consumer electronics—in a different league from innovations such as the Walkman or the videogame—is an important insight.

Three themes set this book apart from the other business history literature of information technology: the conflation of consumer electronics and the computer; the concept of “learned organizational capabilities”; and the international dimension.

The conflation of consumer electronics and computing is a novel perspective, the merits of which one can debate. Almost all histories of information technology exhibit a degree of teleology, as the writer seeks the historical causes for the contemporary computing environment. In the 1970s, the computer was a scientific story—the evolution of mathematical instruments from the abacus to the mainframe. In the 1980s, the computer was seen as a business machine, and histories described an evolutionary path from the typewriter to the word processor. The recent crop of computer histories now have to explain the Internet, and they usually do so by starting with the telegraph. Chandler’s perspective is that the computer is more of an information appliance: an evolutionary path leading from radio to the home computer by way of television and the video cassette recorder. In the long term, the correctness of Chandler’s vision hinges on whether the personal computer turns out to be the domestic entertainment center of the future.

The book has an explanatory framework in the concept of “learned organizational capabilities.” Chandler’s basic theme is that all the successful firms—such as RCA, IBM, and Microsoft—developed an “integrated learning base” that enabled them to become “path definers” in their industry, whether it was radio, mainframe computers, or software. Any historian familiar with Richard Nelson and Sidney Winter’s *Evolutionary Theory of Economic Change* (1982) will feel comfortable with this notion. However, this single cause is perhaps overused and emphasized too much in a pedagogical fashion. By contrast, other explanations of firm evolution—such as disruptive technologies, firm clusters, network externalities and standards creation, and increasing returns economics—get very little discussion. This is a significant point, because—to take the currently fashionable example, Microsoft—while Chandler might argue that its success was the result of an accumulation of learned organizational capabilities, other authors would argue that Microsoft understood and exploited the economics of increasing returns. Perhaps both were important.

The book’s most significant contribution is its international outlook. To date, almost all the business history of information technology has consisted of monographic studies of individual firms—usually American corporations, but also a few European and Japanese companies. In these histories, the nonnational players tend to be a shadowy factor in the business environment rather than strategic players in their own right. In part, this shortcoming of the literature is a consequence of its early development—there are simply not enough good sources to do much else. Chandler is the first writer to describe the industry as a set of mutually interacting

international strategic players. A roll call of some of the firms discussed hints at the impressive scope: RCA, GE, IBM, DEC, Sony, NEC, Matsushita, Philips, Siemens, Thomson, Olivetti, and many more. Chandler is certainly helped by the fact that in a 320-page book not too much needs to be said about each, but it takes a master historian to produce a well-balanced international history based on available secondary sources.

Chandler describes the consumer electronics and computer industry as being unique for two reasons. First, it consists of relatively few firms that became the path definers—RCA, IBM, and Sony are some of the names that stand out. Because there are so few firms, it is difficult to discern general from specific causes for their rise and fall. Rather than attempt this, Chandler likens their history to an epic Greek narrative, in which characters such as “antitrust,” “microprocessor,” or “conglomeration” randomly come on stage—hence the “Epic Story” of his subtitle. The second reason Chandler regards the industry as unique is that whereas the twentieth century (which Chandler terms the “industrial century”) was shaped by myriad innovations—electricity, chemicals, the internal combustion engine among them—the twenty-first century (the “electronic century”) sprang from “four small, closely related electronic devices—the vacuum tube, the transistor, the integrated circuit, and the microprocessor” (p. 12). It was this tiny number of extremely capital-intensive innovations, Chandler believes, that led to the present dominance by relatively few firms. It has become a commonplace to talk of the twentieth century as having laid down the electronic infrastructure for the century to come. This book is one of the first to raise the level of argument above that of a debating point and to explore the processes by which it happened.

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