Book Review

Technical Knowledge in Early Modern Japan

Edited by Erich Pauer and Ruselle Meade

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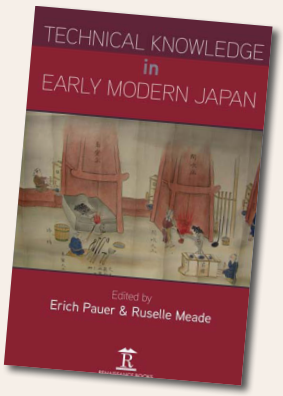
224 pages.



Reviewed by Hyeok Hweon KANG

In Japan between the sixteenth and nineteenth centuries, new knowledge on material production became increasingly codified and circulated in texts and images. Occurring alongside existing practices of transmitting craft knowledge—mainly oral, tacit, and apprenticed—this process signaled a modernizing society, one in which technical knowledge accumulated in sectors such as agriculture and metalworking; dissemination was increasingly effective and in "more publicized … and printed form(s)" (p. xx); and a transformation of knowledge structures facilitated the influx of foreign (Chinese and Western) technologies.

This story of an early modern transformation in technical knowledge is familiar to most historians of science and technology. It was first told in the context of Western Europe, where historians demonstrated that craftspeople and practitioners began transforming their embodied knowledge into writing after 1400.[1] The story has been recently complicated by historians of China and Korea, who point to intriguing differences in how craft knowledge was also increasingly codified and circulated in these societies.[2] *Technical Knowledge in Early Modern Japan* offers seven contributions of meticulous scholarship that address a similar phenomenon in Japan. Unfortunately, while the contributors carefully situate their work in the historiography of Japanese studies on technology, they do not directly engage with this broader, global-historical discourse—the volume's main shortcoming. Nevertheless, the chapters describe in rich detail the culture of knowledge in early modern Japan, and the volume also provides an introductory historiographical essay, appendix, and individual bibliographies, all of which aid further research.

A strength of the volume is its consistent emphasis on the processes of knowledge formation and circulation. Annick Horiuchi's chapter examines the rise of *meisan* ("famous products") books in eighteenth-century Japan. Containing illustrated descriptions of craft techniques and products, these books, she argues, were written by scholars who directly observed rural craft industries and sought to document knowledge deemed useful for domainal authorities. While these scholarly books were, as Bray has it, "social documents"

1 For a recent overview, see Klein 2021.
2 Schäfer 2011; Chen 2014; and Kang 2020.

that captured (but did not necessarily teach) craft knowledge, Erich Pauer focuses on another genre, technical drawings, which served as efficient carriers of craft know-how.[3] Pauer argues that across various fields, such as agriculture, carpentry, and clock-making, Japanese illustrations grew increasingly sophisticated and useful as templates for action—that is, for hands-on material production.

It was not just texts and illustrations that moved knowledge. Regine Mathias' chapter surveys the introduction of various smelting techniques into Japan from Chinese, Korean, and European sources. Mathias shows that the prompt and successful adoption of techniques was not just due to the emergence of a "relatively rich literature and pictorial material on mining [unlike in China]," but also the mobility of skilled experts, who fostered knowledge exchanges within and between mines (p. 92). Itō Mamiko's contribution examines yet another vehicle for knowledge transmission by narrating how the nascent Meiji government fostered the development of Edo-era *yakuhin-e* (medical and pharmaceutical shows) into modern *hakurankai* (exhibitions). These championed the epistemic role of observation and experience, and proved to be an "especially practical medium" for transmitting new knowledge about the industrial arts (p. 66).

The remaining chapters retain the emphasis on the transmission of knowledge, but focus on Western technologies. On the basis of both scholarship and material disassembly, Hashimoto Takehiko's contribution details the craftsmanship of Tanaka Hisashige and his masterful combination of Western and Japanese clock-making, concluding that Tanaka's "sub-millimeter precision" contributed to Japan's early success in modernization (p. 126). Nishiyama Takahiro emphasizes the strong tradition of Japanese metalwork by tracing the introduction of Western technologies, and detailing how Japanese gunsmiths, in particular, became mechanics able to support the emergence of modern ironworks and shipyards. Finally, Suzuki Jun's chapter examines the uneven uptake of boilers in the Meiji period. Suzuki argues that differences between Western and Japanese craft traditions created obstacles to the spread of boilers in Japan, and that it was local adaptations—rather than transplantation from abroad—that determined the speed and extent of technological diffusion.

In uncovering a wide spectrum of Japanese knowledge in action, the volume is a welcome addition to the growing Anglophone scholarship on the history of East Asian science and technology. Yet it is unable to fully meet the contributors' hopes of stimulating "historians of technology and representatives of other disciplines to broaden their view and include Japan … as a matter of course in their reflections on technological development," due to the following limitations. First, opportunities are missed to reflect on the nature of technical knowledge. Is craft knowledge necessarily tacit and informal? How does it move? Where does it fail or succeed when conveyed in writing or drawing? More than half of the contributors—Horiuchi, Pauer, Mathias, and Suzuki—had clear opportunities to address these questions, and could have done so by engaging with a rich literature on this topic by historians of China.[4] Second, this volume emphasizes cases where novel knowledge and technology were seamlessly transmitted into and within Japan. Recent work in the history of science has, by contrast, emphasized the need to study "sticky things" that prevent or inhibit the movement of such knowledge. Likewise, historians of technology have long

3 Bray 1997, p. 95.
4 See for instance Bray 2008; Golas 2014; Eyferth 2010.

emphasized the importance of technologies-in-use and the maintenance of old technologies. What would happen if we examined Japanese technical knowledge from the perspective of "sticky things" and the maintenance of the old?

Despite these shortcomings, the volume is valuable in making new scholarship on Japanese technical knowledge available in English. Other merits include the colorful illustrations, while the introduction and appendix provide an effective overview of Japanese historiography on technology. Taken together, the contributors demonstrate a robust culture of technical knowledge in Japan, which proved remarkably successful in adopting and adapting complex technologies. Future research will further illuminate how exceptional the case of Japan was; what underpinned its successes and failures; and how the Japanese historical experience may offer theoretical contributions to the field of the history of science and technology at large.

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