2. See for example: C. Freeman, *Technology Policy and Economy Performance: Lessons from Japan*, Pinter Publishers, London and New York, 1987; D. Friedman, *The Misunderstood Miracle: Industrial Development and Political Change in Japan*, Cornell University Press, Ithaca and London, 1988; D.I. Okimoto, *Between MITI and the Market: Japanese Industrial Policy for High Technology*, Stanford University Press, Stanford, 1989; and S.M. Tatsuno, *Created in Japan: From Imitators to World-Class Innovators*, Ballinger, Grand Rapids, San Francisco, and London, 1990.

3. Tessa Morris-Suzuki, *Beyond Computopia: Information, Automation, and Democracy in Japan*, Kegan Paul International, London and New York, 1988.

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Building Competences in the Firm: Lessons from Japanese and European Optoelectronics *by Kumiko Miyazaki* (St. Martin's Press, New York, 1995), pp. xvi+321, £ 40, ISBN 0 312 12314 0.

While it is tempting to view Japan's industrialization in the Meiji period (1868-1912) as simply a process of going shopping for the best technologies available, we often forget the importance of industrial development which occurred during the preceding Tokugawa period (c.1600-1868). It is useful to view Japan's success, both last century and this century, in terms of core capabilities and core competences which accumulate over time. How have such competences been built up? This sort of question has been raised by recent work coming out of the Science Policy Research Unit (SPRU) at the University of Sussex, most notably in the work of Keith Pavitt. The book under review builds on such work. It is very much a product of SPRU.

The author chooses to focus on the field of optoelectronics, which constitutes a core technology within information and communication technology. It is a prime example of what Michael Gibbons and others [1] have described as the 'New Production of Knowledge', where new industries can emerge through the fusion of previously distinct fields of science. Given this, it is imperative for firms to recognize and preserve existing competences which make them distinctive, while developing new products and moving into new markets.

While purportedly a study of both Japanese and European optoelectronics, the book's strength is its coverage of Japanese firms, who are leaders in the field. Rather than examine manufacturing competence, it looks specifically at technological competence building in large, multi-product, multi-technology firms. Japanese corporate strategies tend to be coherent and long-term in nature, and carefully take into account the changing business environment. The technical background of managers helps them to focus on long-term competence building.

This is an important book which signals a new level of maturity in the study of Japanese science and technology. Instead of making the commonplace assumption that Japanese firms are similar to each other but different from those in the 'West', it begins with the premise that Japanese firms are no different from European firms. It pays special attention

to differences among firms, whether they be Japanese or European, rather than looking at national systems of innovation as the units of analysis.

The book first explains the concept of competence building and provides an overview of the optoelectronics industry. It then proceeds to explore how optoelectronic competence is built up in firms, and attempts to measure such competence using data obtained from bibliometric studies, US patents and interviews. A key finding of the study is that while competence building is strongly related to path dependent factors such as core businesses and management strategy, once it reaches a certain level it enables firms to go into new areas.

This study is of special interest to those interested in technology management but it will also be welcomed by historians of science and technology. The book recognizes the contribution the latter can make in identifying the strengths of certain firms and accounting for how they achieved their position in the market. Chronological histories of companies, attached as appendices, document how firms have become competitive. The author reminds us that technological competence building is a cumulative process. What firms do in the future and the way new technological opportunities are viewed is to some extent dependent on what they have done in the past: management strategies, primary markets, and technological bases can all be important. While there are many factors which have contributed to Japanese economic success, firm-specific competences and inter-firm difference go some way in helping us to understand the new production of knowledge.

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Emerging Patterns of Innovation: Sources of Japan's Technology Edge *by Fumio Kodama* (Harvard Business School Press, Boston, 1995), pp. xxvii + 297, ISBN 0-87584-437-5.

Most existing theories on the development and diffusion of new technologies have been derived from the experience of western industrialised countries such as Britain and the United States. In this book, Fumio Kodama sets out not merely to apply existing theory to the Japanese experience, but to use Japan's recent technological successes as a basis for refining technological theory itself.

His analysis suggests the need for a range of new approaches to deal with the rapidly changing nature of research and development in high technology industries. In the first place, expanding on ideas set out in his earlier study *Analysing Japanese High Technologies*, he argues that high tech corporations in Japan can no longer be seen simply as producers of goods and services, but must be seen as organisations geared to knowledge creation. As evidence, he points out that in the late 1980s many leading firms were spending more on research and development than they were on capital investment. What is new, however, is not simply the scale of research and development, but also the nature of research strategies.