The Developing Economies, XXXIX-1 (March 2001)

BOOK REVIEW

Yuzo Akatsuka and Tsuneaki Yoshida, eds., *Systems for Infrastructure Development—Japan's Experience*, Tokyo, Japan International Cooperation Publishing Co.,* 1999, xxi + 382 pp.

This title is a systematic overview of Japan's experience in building its infrastructure. The original Japanese version of the book was published in 1995 with the cooperation of some forty contributors, mainly civil engineers. Its publication in English is welcomed due the close relationship of infrastructure to the field of development economics. Readers interested in this topic are urged to refer to another title, *World Development Report, 1994: Infrastructure for Development* published by the World Bank in 1994.

The aim of *Systems for Infrastructure Development* (hereafter *Systems*) is threefold. The first is to evaluate the relationship between infrastructure and economic growth quantitatively from the standpoint of macroeconomics. This issue is the focus of Chapter 1. The second aim is to review in a comprehensive manner various problems related to Japan's infrastructure from the standpoint of civil engineering, for example, use efficiency. The third aim is to put some order to the Japanese experience and organize it into a textbook of sorts for the developing countries.

There is no doubt that *Systems* has succeeded in achieving its second aim. Chapter 2 surveys the process of planning for infrastructure development. Chapter 3 looks back over infrastructure development by periodizing it historically, while Chapter 4 reviews Japan's human resource development as a part of social infrastructure, departing somewhat from the conventional research that tends to emphasize the physical aspects of infrastructure. Chapter 5 looks at the institutional framework of administrative mechanisms that formed the background to infrastructure development, while Chapter 6 views the fiscal framework. Then in Chapters 7 through 14, we are treated to the specifics of roads, railways, airports, ports, electricity, telecommunications, the role of consultants, and the construction industry, in that order. Chapter 15 then turns to the timely topic of infrastructure and disaster prevention in the aftermath of the Great Hanshin Earthquake that struck western Japan in 1995. Each and every chapter has been compiled by experts in the field and thus contains extremely detailed information on the subject matter. In this respect, the present volume now serves not only as a reference work for infrastructure experts, government and otherwise, working in the field, but is also used as a textbook on the university level.

Chapter 1, which deals with the quantitative evaluation of relationships between infrastructure and economic growth, first divides economic development into the phases out-

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lined by Simon Kuznets[1] in order to proceed with the analysis.[2] The development phase is divided into social indices related to gross domestic fixed capital formation (GDFCF), the share of GDFCF in GDP, etc. GDP elasticities are calculated for the transportation, primary energy, and telecommunications sectors. This kind of analysis is very instructive in giving us a large framework for considering the development of the specific sectors to be discussed in later chapters.

The latter half of Chapter 1 compares the correspondence between infrastructure development and the stage of overall economic development in Japan and the Republic of Korea. This analysis reveals a pattern common to both countries, in which GDP elasticity reached a peak at 20 per cent share of manufacturing sector GDP, then gradually declined. However, the elasticities of Korea are generally large, indicating a "compressed" development pattern (p. 36). As the result of examining the conditions making such compressed development possible, the authors argue the necessity for international comparison focussing on infrastructure based on the following four points: (1) investment priority, (2) technology transfer and development in the construction industry, (3) the importance of concessional foreign assistance to infrastructure development, and (4) specific government policies that support infrastructure development and the organizational or institutional arrangements for the construction, maintenance, and management of infrastructure facilities (pp. 37–38). This relatively simple elasticity comparison analysis of correspondence between the timing of economic growth and infrastructure development makes the book's argument easy to understand for readers with no expert knowledge of the field.

The third aim of putting into some order the Japanese experience as an example for developing countries has unfortunately not been sufficiently accomplished. What is particularly important here is what the Japanese experience teaches us about the desirable roles to be played by the market and government in the building and management of infrastructure. As to the reasons why government should be responsible for building infrastructure at the initial stages of economic growth, the authors cite (1) a lack of capital, technological, and managerial capability in the private sector, (2) long gestation and high risk in infrastructure investment, (3) the necessity to build infrastructure based on social goals due to its impact on income distribution, and (4) the connection of the services offered by infrastructure to the basic needs of everyday life (pp. 25–26). The latter two points correspond to the definition in political economy of the role of the government to "achieve and maintain social equality." In the case of point (2), government funding is exemplified as effective in cases where

[1] Simon Kuzunets, *Economic Growth of Nations: Total Output and Production Structure* (Cambridge, Mass.: Belknap Press of Harvard University Press, 1971).

[2] Similar analysis has been done by Ohkawa and Kohama, focusing on Japan's social and physical infrastructure from the standpoint of economic development. See Kazushi Ohkawa and Hirohisa Kohama, *Lectures on Developing Economies: Japan's Experience and Its Relevance* (Tokyo: University of Tokyo Press, 1989), pp. 190–203; idem, *Keizai hattenron: Nihon no keiken to hatten tojōkoku* [Economic development: Japan's experience and its relevance to developing economies] (Tokyo: Toyo Keizai Shimposha, 1993). Here infrastructure is understood as "facilitating industries" (FI), and its mutual relationship with sectors directly involved in production is emphasized. Ohkawa and Kohama point out the possibility of a gap forming between FI and productive capacities of direct producing activities, because most FI are developed by government funds, and there are swings in private investment in direct producing activities.

choices taken by the private sector become near- or short-sighted or when private sector capital markets are still undeveloped. However, as one may expect, if the authors would have explicitly touched upon the production of public goods and externality, the economic discussion could have been better sorted out and improved. For example, non-rivalness and nonexcludability are important characteristics of services provided by public goods. These characteristics form the foremost rationale for government intervention from the viewpoint of efficiency. Also, we would have liked to hear from the Japanese experience concerning the case of developing countries where the administrative and management capabilities of central and local governments are as underdeveloped as those of the private sector. Furthermore, if, as the book's comparative analysis claims, the development pattern of today's developing Asian countries is indeed "compressed," there is the possibility that problems related to infrastructure building will occur simultaneously in more diversified areas, in which case capabilities demanded of the governments in such countries may just be higher than what the Japanese government could muster. Therefore, it is necessary for us to take such a possibility into account and investigate ways of improving government's ability to supply, maintain, and manage its country's infrastructure.

An especially serious problem to be faced by Asian countries in the near future is maintenance and management; that is, what to do about deteriorating infrastructure. The necessity for building infrastructure has rapidly increased in Asian countries, including the NIEs and China, meaning that now there is the distinct possibility that what they have built will just as rapidly deteriorate. In preparing for such a scenario, it is most desirable that a maintenance and management system be sufficiently set up to deal with the problem. The related sections in the present volume—on airport development maintenance standards (p. 198), operation and maintenance of power facilities (pp. 263–65), and maintenance technology in the construction industry (p. 345)—are all of use; however, when considering the importance of infrastructure maintenance and management in Asian countries now and in the future, a little deeper analysis of what Japan has done in this area would have made the volume that much more valuable.

With respect to the funding of infrastructure development, Section 5 of Chapter 6 reviews the characteristic features of the fiscal institutions available to Japan, and offers several implications for infrastructure building in the developing countries. The authors of this section take up the following five points: (1) the importance of a public character when dividing up the burden for infrastructure between government and the private sector; (2) when difficulties arise in local government's ability to fulfill its role, even when funding has been determined between local and national bodies according to the character of any given infrastructure project, Japan's system of local grant taxes would be a good place to start in order to surpass such difficulties; (3) Japan's mechanism for adjusting fiscal differentials among regions, however, is far too complicated for any developing country, necessitating a more simplified approach to such inequality; (4) it is necessary to establish clear standards in the case of bond floatation and also desirable to decide on such standards in the light of state subsidies; and (5) it is also desirable that build, operate, and transfer (BOT) formula have long-term master plans and measures for maintaining coordination (pp. 126–27). While there are many rich implications in such policy-oriented suggestions, such issues as long-term master plans and dividing burdens between government and the private sector by ap-

propriately evaluating the public character of infrastructure would definitely present problems depending on initial conditions and stage of development in some developing countries. As described in Chapter 3, while in pre–World War II Japan, such items as rivers, water ports, and roads were in fact turned into infrastructure, no master plan was carried out to coordinate those areas, although the necessity of such a plan was recognized (pp. 76–77). Such a set of circumstances leads this reviewer to conclude that even in countries where economic development has already started from a relatively early point in time, like prewar Japan, it will take more time to adjust and coordinate policy.

The World Bank's *World Development Report, 1994* (hereafter *Report*) also features a special section on infrastructure preparation in the developing countries and is thus useful for a deeper understanding of the subject when read in comparison with *Systems*. Incidentally, the World Bank's treatment examines the effects of infrastructure building on economic development, dividing its presentation into the three aspects of links to economic growth, links to poverty, and links to the natural environment. The *Report* goes on to examine concrete options for improvement, beginning with public ownership and management of infrastructure, and including the other options of public ownership with private management, private ownership and management, and finally preparation of infrastructure by local communities and users themselves. While the *Report* (pp. 109–22) highly approves of the market mechanism in building infrastructure as the best option, it also goes into detail about the potential of its four options, given such conditions as stage of development (income levels), and institutional and socio-cultural factors. *Systems* also discusses the necessity of participation, responsibility, and mutual cooperation on the part of the central government, local governments, and the private sector (see especially pp. 102–12); however, we are missing any in-depth treatment of the implications offered by the experience of Japan for developing countries with specific regional and historical conditions. Therefore, for readers particularly interested in the question of who should participate and how, we urge them to read the World Bank's *Report* along with *Systems*.

As mentioned above, *Systems* is in need of improvement, but it is still a valuable work of research that systematically summarizes Japan's experience in the area of infrastructure over the past fifty years. We hope that the results will be duly heeded, criticized, and revised in the future. Also, because *Systems* is useful as a comprehensive handbook on infrastructure development, any research attempting to compare its results with those of the developing countries would be an extremely important contribution both on the applied and academic fronts. In this sense, we hope that *Systems for Infrastructure Development* will be read by a broad spectrum of engineers, scholars, and general readers alike, who are interested in the problems surrounding economic development. (Hiroki Nogami)