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# BOOK REVIEWS

*Indonesia's Technological Challenge* edited by Hal Hill and Thee Kian Wie, published jointly by Singapore, Institute of Southeast Asian Studies and Canberra, Research School of Pacific and Asian Studies, Australian National University, 1998, xxv + 414pp.

Technological innovation and diffusion is a prime mover of economic development. Discussing the policies for technological development in the context of economic development is not simply a matter of examining research and development (R&D) expenditures and educational development. Two prominent economists on Indonesia, Hal Hill and Thee Kian Wie, edited this book with a wider view on technology. The book reviews the three decades of Indonesia's technological challenge during the Suharto regime and tries to draw lessons for the future. A sizable number of pages are given over to assessing, among other topics, President Habibie's approach to the development of the country's technology. This matter delves into the issue of what technologies are relevant to Indonesia in addition to the impact of rapid technological progress on the country's socioeconomy during the last three decades.

The volume is the proceedings of the 1997 Indonesia Update Conference held at the Australian National University on September 19–20, 1997. The 1997 conference was the fifteenth consecutive Update Conference and the book is the ninth volume of the *Indonesia Assessment* series although this time it is not clearly written on the cover. This series is usually comprised of two parts: an assessment of the recent economic, political, and social developments in Indonesia and a section of selected papers on a special issue relevant to the present. The assessment part of the present volume could cover only the beginning of the currency, later economic, crisis because of the timing of the conference. Considering that it is hardly fair to review this part at this time, the present review will focus only on the technology issue.

Following the excellent and lengthy "Introduction" by Hill, the book is structured into five parts. Part 1 assesses "Recent Developments." This is followed by the technology issues which are classified into four categories: overview of the issues (part 2), the policy framework (part 3), case studies (part 4), and international dimensions (part 5). A feature of this series is the at least modest efforts made to balance opinions through the inclusion of writers from government agencies and the business world.

Part 2 contains three papers. Samaun Samadikun begins with a brief sketch of R&D expenditures and the government organizations, and then gives a rather formal but compact explanation of "Indonesia's Science and Technology Policies" (chap. 5). Thee Kian Wie picks out five "Determinants of Indonesia's Industrial Technology Development" (chap. 6) and examines their performance and problems. These five are the incentive system, human skills, technological information and support services, finance, and science and technology

(S&T) policies. His analysis reveals the poor incentive system for S&T development, the mismatch of the educational system with the demand for skilled labor and professionals, the poor linkage between government research institutions and private companies, and the nonexistence of a broad and consistent S&T policy concept.

Sanjaya Lall also addresses the "Technology Policies in Indonesia" (chap. 7). In addition to examining educational and technological development systems, similarly dealt with in the previous two chapters, he compares the level of Indonesia's technological development with other Asian countries using the technology content of manufactured exports. Being ranked at the lowest stage technological development, Lall points out Indonesia's urgent need to develop the capacity to absorb imported technologies. He proposes practical and deliberately considered polices such as avoiding detailed government intervention because of the limited capacity of bureaucrats, transparency and openness in the scheduling of trade liberalization, and using financial support for upgrading production facilities and training rather than for new investment.

Part 3 is comprised of three papers. After a brief explanation of the organizational chart (fig. 8.1) of the government system for S&T development, Rony M. Bishry and Murman Hidayat, officers of the Agency for the Assessment and Application of Technology (BPPT), explain "The Role of BPPT in Indonesia's Technological Development" (chap. 8). They point out the need for BPPT's structural reform so that it can better serve private sector technological development. They also imply that poor salaries are a cause for the low work ethic of the bureaucrats in the public S&T institutions.

Robert C. Rice explains and evaluates "The Habibie Approach to Science, Technology, and National Development" (chap. 9). This chapter should not be overlooked since Habibie, then minister of state for research and technology since 1978, is the person who has long designed the government's S&T policy. Habibie puts the development target not on GDP growth but on "national performance productivity (PPN)" growth which can be indicated by the value added ratio to inputs for production. Rice examines Habibie's four stages of technological development and his picking the winner (industry) policy. While Rice agrees with Habibie on the emphasis of human capital, he points out the danger of too hasty technological development to a higher stage, the lack of cost-benefit comparison with alternative projects, and the difficulty of ensuring fairness and transparency in infant industry selection under the given political environment.

Chris Manning gives a quite interesting and probably correct view in "Technology and Human Resources: Are Supply-Side Constraints Holding Indonesia Back?" (chap. 10). He challenges the popularly accepted notion that government intervention is desirable since the inadequate supply of skilled labor, partly caused by the private sector's underinvestment in skill formation, is the bottleneck of industrial development. With empirical, albeit limited, evidences, he denies the significance of this underinvestment and also questions the effectiveness of Indonesia's present vocational training as a solution. This point is important because the government is shifting the focus of educational development to vocational training and because such training is becoming the popular target for ODA from abroad.

Part 4 provides a collection of case studies. Saadillah Mursjid, then minister/cabinet secretary and also the president director of PT Dua Satu Tiga Puluh (DSTP), explains in Chap-

ter 11 his company's role in financing the N-2130 passenger jet developed by the IPTN (public enterprise). Ross H. McLeod, in a short Chapter 12, evaluates DSTP and the N-2130 project, seeing it as a step forward since the financing of the project is now through a private company which should enhance the transparency of this financing although McLeod has some reservations about the transparency in reality. Colin Barlow summarizes in Chapter 13 the past performance of innovation and diffusion in rice, rubber, goat, and water closet, and points out the inadequacy of government intervention in the sectors other than rice. William Cole describes the development of "Bali's Garment Export Industry" (chap. 14) as a unique case of a strategic alliance between Bali's producer groups and foreign buyers with good market information. Rick van der Kamp, Adam Szirmai, and Marcel Timmer explain the mechanization of the spinning and weaving industries and measure the technology index and total factor productivity (TFP) in Chapter 15.

The book's last section, Part 5, presents four papers. Hadi Soesastro looks at the "Emerging Patterns of Technology Flows in the Asia-Pacific Region: The Relevance to Indonesia" (chap. 16). He comprehensively analyzes both the embodied and disembodied technology flows based on the data of patents, know-how or services with technology content, foreign direct investment (FDI), technology-based international strategic alliances such as original equipment manufacturing (OEM), trade in high-tech products, and flow of people. He also evaluates the advantages and disadvantages of the technological development patterns of the Republic of Korea, Taiwan, and Singapore. With implication to Indonesia, he suggests that an appropriate policy will be different depending on a country's situation, and he proposes an orthodox policy based on comparative advantage and gradualism.

Yuri Sato's paper on "The Transfer of Japanese Management Technology to Indonesia" (chap. 17) presents a successful case of Japanese management technology transfer. Her chapter challenges the arguments of the often-alleged Japanese company's reluctance to transfer technology and Indonesia's lack of capacity to absorb technology. Her case study of the Astra group depicts the evolutionary process by which the Indonesians themselves took up the concept of quality control (QC) introduced from Japan, applying it to QC activities, then to total quality control (TQC) activities, and finally even to TQC for the whole Astra group.

In Chapter 18 Shannon Luke Smith reviews Indonesia's high-tech strategy for Batam Island under Habibie's development policy. The author points out that the industrial development of the island came ironically after 1989 when Habibie's approach gave way to the orthodox comparative advantage approach. The final chapter jointly written by Don Scott-Kemmis, Leslie O'Brien, and Remy Rohadian of Australia's Department of Industry is a progress report on S&T collaboration between Australia and Indonesia.

The above array of papers reflects Hill's deliberate and well-balanced analytical framework. His "Introduction" includes a short theoretical and empirical literature survey on the general relations between technological development and economic growth. He then gives his assessment of the Indonesia's technological challenge and policy framework, incorporating the important results from the individual papers.

The following section of this review will first comment on some of the assessments and policy proposals presented in Hill's "Introduction" and in other parts of this book, and then will briefly refer to the technological issues untouched in this book.

The first topic relates to the core idea of appropriate technological policies for economic development in Indonesia. Hill regards the country's past high economic growth as evidence of successful indirect S&T policies such as the general macroeconomic policy and basic education policy. However, he regards the direct S&T policies as unsuccessful because they failed to develop targeted manufacturing sectors up to international standards. This problem can be discussed under the following three aspects: the criteria for selecting strategic industries, the grand design of the future industrial structure, and the intervention policy for this purpose. The first aspect rests directly upon the ever old and new "infant industry arguments." Paper contributors correctly criticize Habibie's approach as lacking cost-benefit and comparative advantage considerations, but the book does not go as far as giving a clear and practical discussion of "picking the winner." For example, Rice refers to *competitive* advantage and others talk about *comparative* advantage. The resultant criteria of industry selection will be different between the two approaches. Any practical discussion on this point needs as a prerequisite some concrete idea about the second aspect (grand design). Hill and Soesastro compare the technological development policies and their consequences for Korea, Taiwan, Singapore, and Malaysia. Such comparison of countries in this book overlooks the distinctive difference of development pattern between the Asian newly industrializing economies (NIEs) and the ASEAN countries. In Korea liberalization proceeded by and large in a sequence from trade to FDI to finance. The dependence on FDI in economic and technological development was relatively limited. In contrast in ASEAN countries, liberalization in the three fields went relatively simultaneously. The consequences were a quick response of growth impetus and the resulting vulnerability revealed by the currency crisis. Drawing a grand design should start from the recognition of an economy's ongoing openness to the global economy and its increasing reliance on market forces for adjustments. In other words, the environment will not allow for the sort of pure industrial policies adopted in Japan and Korea. The practical choice left to Indonesia will not be to develop cutting-edge high-tech or heavy industry, but is the selection of an infant industry among the existing import substitution industries or the attraction of FDI in the targeted manufacturing industry. This relates to the third aspect (intervention policy). In this respect, valid are Lall's proposal for transparency in the scheduling of trade liberalization (mentioned above) and Soesastro's points. Soesastro lists, as the common factors for success, gradualism in technology accumulation, enough learning periods, export orientation of technology, assimilation of imported technology, and the choice of standardized technology. Also in Indonesia's case, an arrangement for enhancing domestic competition will be of importance. This is not so easy in an industry where there are only one or two producers. In such case, attracting a limited number of FDI industries should be considered. Securing domestic competition to a certain degree is important even if the industry is protected as an infant industry.

The second topic concerns the system of desirable labor supply for technological development. As mentioned in Manning's paper, the shortage of skilled labor and S&T professionals are often regarded as an obstacle for the technological development of industries. The shortage of such workers is explained both by the negative externality that accompanies in-house training and by the mismatch of the educational system that is biased toward liberal arts. Hill correctly agrees with Manning in proposing to leave vocational training to

the market. However, a deeper analysis of the labor market and wage structure is required to improve the situation. As Manning's data show, the additional wage for a skill is marginal. Moreover, the Indonesian wage structure shows a relatively high reward to indirect white-collar workers in comparison with direct blue-collar workers. Therefore, the present labor supply situation is the reflection of quite rational behavior by workers or students coming into the labor market. This implies that it is time for Indonesian manufacturing industry to review its wage structure so that wage reflects marginal productivity. Rent-seeking activity by white-collar workers will no longer be as profitable as before. This is not to deny the importance of vocational training. Vocational training by government facilities should be addressed to modernizing the technology of small and medium manufactures that lack the ability to provide in-house training of modern technology. Revitalization of traditional small and medium industries will help the development of supporting industries.

The third topic is about improving the effectiveness of policy incentives for R&D. Lall and Hill criticize the poor incentives and find the reason in the vagueness of policy objectives and poor financing. They also point out the lack of consistency among the policies. So far the country has had only two extreme guidelines: abstract objectives and ad hoc selection of industries led by Habibie. To avoid such a situation through the accomplishment of consistency among policies, a guideline at the intermediate level is needed. This relates to the first topic above.

The fourth topic is about the utilization of FDI for technological development. Thee Kian Wie and Lall touch upon the possibility of selective policy or regulation of FDI for such development. However, Indonesia has already lifted most of its restrictions on FDI and is facing a drastic slowdown of FDI because of the economic crisis. In such an environment selective policy or increased restrictions will not be practical policy.

The fifth topic which is suggestive but not fully discussed in this book is the distinction of production technology and management technology in the study of technological development. Sato's study indicates that there is not much problem of absorption capacity in the case of management technology. The clear recognition of the importance will expand the policy area for technological development and will contribute to the improvement of X-efficiency.

A last and small comment is on the Habibie approach. Rice explained the PPN concept, but did not examine the concept technically. The concept suffers from a simple technical problem as a measure of technological development. The value added ratio is not free from the aggregation bias. Since the value added ratio is defined against either total material inputs or total output, it will have the problem of double accounting of outputs after the aggregation of industrial figures. Also, for economic development measured by GDP, the important thing is the product figure of the value added ratio and output. An industry with a high value added ratio with small output would not contribute to the welfare of the country. Although this is a digression and maybe a bit of an exaggeration, Habibie's approach is nothing else but an old type of import substitution policy that puts emphasis on key heavy industries. The only difference with Habibie's approach is that this key industry includes high-tech industry.

The important aspects of technological development not dealt with in this book are as follows. First is the semi-macro empirical study of the manufacturing sectors. The study of

the time-series data from the annual industrial survey can supply a lot of information and implications. Such analysis is a prerequisite for the process of picking the winners. Second, the technological and industrial linkages should be a factor for consideration. Especially the backward linkage analysis by an input-output table and technological linkage analysis will help in selecting industries with larger indirect effects. Also, the recognition of international linkage is important nowadays. The high growth of the East Asian economy has built up the transnational production network in the region. AICO (ASEAN Industrial Cooperation) in AFTA (ASEAN Free Trade Area) is also an important and promising area. Third, the selection of industry should accompany a long-term view of the sequence of leading sectors. For this, the double-track growth strategy (coexistence of leading export industries and potential leading industries still at the import substitution stage) of Korea and Taiwan is suggestive. Lastly, although alluded in Sato's paper, analysis of entrepreneurship is required if we depart from public industry–led technological development.

All in all, the core of the problem goes back to the first topic, how to translate the theoretical discussion about the market and government intervention in technological development into the practical and concrete plan. Since this book was written, the Indonesian economy has fallen into a deep socioeconomic crisis. The country is going through harsh structural adjustment as it accepts the trend of market orientation and globalization. In such an environment, the short-term policy issue for technological development will be to ensure the present level of school enrollment, especially in basic education, and to protect in particular the supporting industries from bankruptcy due to weakened demand and financial contraction.

This book is the first comprehensive book written in English about Indonesian technological development and without question it is informative. But the value of this book lies in the effort to generalize the problem as exemplified in Hill's "Introduction" and in some of the other pieces presented. (Hiroshi Osada)

*The Analysis of Household Surveys: A Microeconometric Approach to Development Policy* by Angus Deaton, Baltimore, Johns Hopkins University Press, 1997, viii + 479pp.

This book is about the analysis of household survey data from developing countries and how such data can be used to cast light on policy issues. Household surveys are a rich source of data on economic behavior. They provide information on consumption, income, ages, household size, education, housing, and other variables to measure living standards at the level of the individual household. In many cases, survey data have been designed and used to produce aggregate data such as the national accounts, or to provide weights for consumer price indexes. Recently, such survey data have become more and more attractive to applied econometric researchers. In many applied econometric studies using macro data, it is common to assume away the underlying heterogeneity of individuals, and analyze the