tions establishing their own individual, specifically tailored programmes. In this regard, it is being effectively utilised at the Victoria University of Wellington, New Zealand in the development of a Master in Management (Technology) programme. It is apparent that it will be used by interested parties to network amongst themselves. At US $25 this is a resource well worth buying.

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The creation of technological capability in developing countries: a study prepared for the International Labour Office within the framework of the World Employment Programme *by J.L. Enos* (Pinter Publishers, London and New York, 1991), pp.224, ISBN 0-86187-127-8.

It is now almost three years since the publication of Enos' book, but the broad issues it addresses are still the subject of much debate amongst those concerned with the technological aspects of development. At the outset, it should be said that this review will concentrate on the assumptions and implications within Enos' work from a broadly cultural perspective, rather than examining in detail the nuts and bolts of Enos' economic modelling and theory, as it is beyond the disciplinary knowledge of this reviewer to treat those adequately and thus fairly. But as Enos himself concedes, there is much in this work that goes beyond pure economic analysis, and the review focusses on these aspects.

Enos seeks to develop a systematic model for analysis of endogenous technological capability applicable across medium-sized developing countries with the end of developing optimum policies for such countries. As a starting point, Enos acknowledges the failure, or at least the non-success, of the appropriate technology movement to capture the imaginations of the elites of developing countries concerned with industrial development. For Enos, this means that instead of looking at the consequences of technological change, attention should instead be given to the development of technological capability (written as TC from this point), to better allow countries to adopt and make the best of existing techniques, as well as to modify and adapt those that are not yet wholly appropriate for the needs of the particular country.

First, Enos deals with definitions of TC, which he defines as having three components: first, the technical skills of individuals; secondly, the need for individuals to meld and work within groups; and finally common purpose within and across groups. Enos argues that this synergy is a necessary component of TC. After outlining various other definitions of TC Enos decides that although there are various differences in emphasis, the content is quite similar. Following this, Enos decides that the most appropriate tool to explore this definition of TC is the analytical model, rather than performance indicators or mapping techniques, and expresses a preference for mathematical models over those that are verbal or schematic. Enos' three-part definition of TC is a good working notion of the subject, and although no mention is made of more controversial notions of technology and society this is not necessarily expected in such a pragmatically directed document. As Enos concedes, the last part, that of "common purpose" is the most problematic and also the least amenable to mathematical study, being an "immeasurable". Enos also states that common purpose within an institution may or may not be in concordance with "national interest".

Part Two look various economic models in terms of TC. Chapter 3 examines detailed

sectoral models looking at different industries in several countries. Enos concludes that although these models are useful in their wide applicability, input-output data appropriate to TC is not usually available in developing countries. Chapter 4 then looks at broader and more theoretical models of economic growth. After reviewing and comparing these models, Enos draws the possibly unpalatable conclusion that countries must "build up [their] stock of the scarce resource as quickly as possible, whatever that scarce resource might be" (in this case TC), and as quickly as possible, rather than in attempting to maximise production whilst still lacking in TC. The final chapter in Part Two then attempts to derive an optimal growth model that incorporates the advance of TC. Enos notes that the solution to this problem "will not be entirely satisfactory", but argues strongly that the need for such a model requires that the attempt be made. The prime conclusion drawn for policy-makers from the model and simulations is the need for a country to put all the scarce resources it has into promoting TC. This would, according to the simulations, achieve the goal of full employment in the shortest time.

In Part Three Enos addresses the development of TC in the three industry sectors, using evidence from various developing countries. His groupings differ slightly from the standard ones, being technology defined rather than industry defined; for example, he includes within the primary sector the development of all technologies relating to agriculture, thus encompassing research, development and extension practices. Some problems that Enos identifies include the disparate and uncoordinated nature of government agencies, and lack of enough data to help coordinate the different groups involved in further TC. There is a need for private sector organisations to recognize the value of TC; currently the governments in some developing countries employ the lion's share of technical trained people. From a methodological point of view, Enos is forced to reallocate statistical information from available data to suit his revised definitions and concepts, and finds that for some sectors the current information is inadequate.

The last part of the book deals with policy. Enos attempts to produce policies that will optimise the technological capabilities of a developing country. Here Enos works from the ground up, exploring the "nurturing of skills" from literacy and numeracy right up to highly technical and specialized post-graduate training, even making projections as to the appropriate forms of training and the numbers to be trained for specific circumstances (including growth rates). An interesting recommendation is that people should be trained in their native language rather than English, to help prevent "brain drain" to other countries, although he notes the necessity for at least some scientists to have an international language, and the initial start-up costs associated with translating and publishing text-books in the native tongue.

Finally, Enos addresses the challenging task of creating suitable organisations and instilling them (and the broader society) with "common purpose"; that is, creating cultures that recognize and value TC, a task that Enos feels is only possible if undertaken wholeheartedly by the leaders of developing countries. Indonesia in fact would meet several of Enos' conditions for this goal, with a powerful and high profiled S&T minister, and a society that values scientists and engineers (Indonesian engineers have the honorific "Ir." before their names, just as western medical practitioners use "Dr."), but current Indonesian policy aims at leaping towards high technology rather than improving technologies in labour intensive industries, thus straying from Enos' optimum path. Many other cultural and managerial issues impinge on the practices of technology, as those who study these questions intensively will attest. Organisational culture is now almost a discipline unto itself, so it is not surprising that Enos cannot give this subject a more fulsome treatment given the constraints of his work.

Enos is methodical and values clarity of purpose and writing in his work. Each section clearly outlines its assumptions, goals and limitations, and assesses honestly with what success its techniques meet, and points towards areas where the model falls down or where further data must be collected before firm conclusions can be drawn. Enos' model and method

is a good starting point for the analysis of economies which are concerned with the question of TC and its impact upon development with the goal of informing policy, even though his analysis of the human and organisational dimensions of technological capability needs expansion.

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SHORTER NOTICES

A Bright & Savage Land *by Ann Moyal* (Penguin Books, Australia, 1993) pp.240, $16.95, ISBN 0 14 017806 6.

In this book, originally published in 1986 as a highly illustrated work titled **A Bright & Savage Land: Scientists in Colonial Australia**, Ann Moyal traces Australia's contribution to the great scientific advances of the 19th century. With the aid of their letters, diaries and journals, she brings to life the work and characters of the scientists who pioneered in a new continent where all things were 'queer and opposite'.

DML