

and D. Gruen (eds.), *Productivity and Growth: Proceedings of a Conference*, Reserve Bank of Australia, 1995.

3. P.J. Sheehan, Nick Pappas and Enjiang Cheng, *The Rebirth of Australian Industry*, Centre for Strategic Economic Studies, Victoria University of Technology, Melbourne, 1994.
4. Some recent studies seem to indicate that Australia has not been particularly successful in taking advantage of the latter. See, e.g. D. Coe and E. Helpman, 'International R&D Spillovers', *European Economic Review*, Vol. 39, 1995, pp. 859–887.

Hans-Jürgen Engelbrecht
Massey University, New Zealand

Challenge to Change: Australia in 2020 edited by Richard Eckersley and Kevin Jeans (CSIRO Information Services, East Melbourne, Australia, 1994), pp. 280, A\$34.95, ISBN 0-643-05675.

The UK equivalent of Australia's Commonwealth and Scientific and Industrial Research Organization (CSIRO), the Department of Scientific and Industrial Research (DSIR), was abolished long ago and so a book such as this could not have been published in the UK. The chapters are authored by CSIRO's 'top people' (preface) and are relentlessly optimistic in tone and the authors are clearly assured of the value of the work they do. The impression given is that the CSIRO scientific bureaucracy is identical with Australian science, that CSIRO is active in an enormous range of fields under all kinds of collaborative arrangements with industry and all for the public good. All the chapters are based on presentations made to the 1994 Congress of the Australian and New Zealand Association for the Advancement of Science and I assume that as a result they are directed towards some conception of a general public. The book is free of the spirit of critical assessment. This book is a public relations exercise.

That might be expected given that the CSIRO has recently experienced another critical review of its functions - and why should not CSIRO attempt to justify itself and its work to the Australian public? The problem is whether such a work can convince anyone of anything.

You would not read the book for what it calls its 'stories' or futurist 'scenarios' of different science and technology fields. Some of these appear hastily written, most are without critical content, unsubstantiated and unreferenced. For the state of the different fields you would be much better advised to read selected articles from *New Scientist* or *Scientific American*. But this is hardly a criticism, for the preface itself disclaims any pretence that the chapters predict or critically assess the future. It goes so far as to call chapters 'stories' for which the authors 'need not feel their professional reputations are on the line' (p. v). Yet at the same time these scenarios are 'grounded' in the authors 'thorough knowledge of what is happening at the cutting edge of their fields' (p. v). One might ask whether the authors truly can have their cake and eat it too: in some way their conceptions of the future are legitimated by their expertise, yet their scenarios are described as 'stories' in a clear attempt to leave the authors unaccountable for the scenarios 'validity', not responsible for explaining how and why the scenarios might come about. Indeed, the barrenness of thought on how and why the different science scenarios might occur is a striking feature of the text. It is not possible, then, to take this book seriously and at face value.

There are reasons why one might read the book. This book makes partly explicit the CSIRO scientists' assumptions about the relationship between science, technology and society. Anyone who fancies practice at the deconstruction of science texts to exhibit the underlying assumptions about society should buy this book.

What the book shows is the extent to which social science and social issues can be thoroughly divorced from futurist scenarios when the authors are scientists and technologists without any apparent background in the social sciences. One wonders, too, whether the scientific bureaucratic environment of CSIRO demands or encourages the adoption of this particular version of 'scientific determinism' because of its need to justify its existence to the public, or because the organisation insulates its members from alternate views.

The introduction entitled 'The Role of Science and Technology in Achieving a Preferred Future for Australia' has the most dense set of assumptions about science, technology and society and deserves the greatest scrutiny. Some criticisms are discussed below.

On science and society: 'Science's relevance to [a knowledge society] is usually seen as a source of technology. But science's contribution goes beyond this. It also shapes our beliefs and values' (p.13). No awareness here that the 'linear' model of innovation is supposed to be dead, that study of technology often generates science, that a reciprocal social-shaping of science and technology occurs, or of a mechanism by which our beliefs and values are shaped by science, rather than science being shaped by beliefs and values.

On planning: 'With respect to industry development, we must focus on exports and other key sectors. This may mean picking winners, and we should not be afraid of that' (p. 12). No-one has picked winners for decades in the UK and it is refreshing to see a straight claim that we should do so. Unfortunately there is no articulation of how or what should be picked. There is no understanding of why so many buzzards were picked in the past (in the UK), no understanding that past colossal failures such as Concorde and the AGR programme are the reason for a current deep-rooted antipathy on the part of government for allowing the science and technology establishment to 'pick losers' ever again. It is just such naive assertion, backed only by a scientific/technological authority that led to disaster before and would do so again.

On the economy: '...new growth theory emphasises what scientists have long argued; that innovation, is the prime factor behind economic growth and hence wealth creation; and that it is good policy for government to intervene in the market and to encourage the discovery, diffusion and application of knowledge' (p. 8). An interesting appeal to late-in-the-day insights on the part of orthodox economics, but what about the work of people like Freeman, Rothwell, Soete *et al.*, who have worked on the precise role of science and technology in the economy for decades?

On R&D and the economy: There is worry that Australian investment in R & D, expressed as a percentage of GDP is 'well below the OECD average' (p. 8) and it is implied that this should be raised. There is no understanding of the industrial structural reasons for this low spend. First, Australian manufacturing industry represents a below average proportion of total economic activity because of the dominance of primary good production in the economy. In the low and medium technology industries Australian R&D spend as a percentage of turnover is not much less than the same industries in other OECD countries, but the high technology industry is dominated by foreign multinational corporations (MNCs) that do their R&D elsewhere¹. These features negate the simple policy of 'increasing R&D'; it would be more relevant to attend to the formation of new indigenous industries and companies in the manufacturing sector rather than to subsidise R&D, for the companies that do exist either do it elsewhere or have no intrinsic need for it.

Despite their engagement in R&D the CSIRO scientists are remarkably ill-informed about

its role in the Australian economy. It is simply a 'good thing', with no awareness that the historical pattern of expenditure shows that past high rates of spend (UK) do not ensure continued relative economic success or that low past rates of spend (Japan) may correlate with very high rates of catch-up.

On savings and institutional reform: 'Australia needs to lift its savings so that higher investment can be paid out of savings not higher overseas borrowing' (p. 11). Fair enough, but how should this be done? From CSIRO one can expect no comment on the typical Anglo-Saxon structure of Australian financial institutions, in that they appear designed to maximise consumption and consumer debt rather than to encourage saving. A large mortgage industry, free and easy corporate merger and takeover activity, an apparently large 'personal loan' activity - why should anyone save? No awareness, then, of the social and institutional engineering that might create the requisite incentives to save, no awareness of countries like Japan that have successfully carried out such programmes of reform and of course no understanding of the nature of the internal opposition which would inevitably mobilise to obstruct such a programme of reform.

These are major criticisms, but since the text marches unembarrassed into socio-economic territory it leaves itself open to such comment. Nor can the way it cuts out whole chunks of literature and debate be excused by its target audience of the general public, for as the points above show, its 'simplifications' tend to mislead rather than inform. These criticisms are of what the book includes, but as significant are the relevant issues that are left out, such as a discussion of the relative balance between government and industry-funded R&D or the relative merits of centralised R&D agencies with project selection autonomy versus market-based mechanisms. Nor is the idea raised that the distribution of R&D expenditure might be changed to Australia's advantage; for example, in the last 30 years as rural economic activity as a share of total GDP has fallen from 15 per cent to 4 per cent there has not been a concomitant redistribution of government-funded rural R&D. This might have interesting implications for the CSIRO, which is responsible for 70 per cent of rural R&D expenditure².

In short, as an unashamed piece of propaganda, this text should be kept off the library shelves.

Reference

1. R.G. Gregory, 'The Australian Innovation System' in R.R. Nelson (ed.) *National Innovation Systems*, Oxford University Press, Oxford, 1993.
2. *ibid.*

John Howells

Brunel University, UK

The Technological Transformation of Japan: From the Seventeenth to the Twenty-first Century by Tessa Morris-Suzuki (Cambridge University Press, Cambridge, 1994), pp. x + 304, A\$29.95, ISBN 0-521-42492-5.

Two elements of the history of Japanese industrial organization have received regular comment and rigorous analysis. The first is the active role the Japanese government has played