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SCIENCE AND
TECHNOLOGY IN
HISTORY

AN APPROACH TO
INDUSTRIAL
DEVELOPMENT

Ian Inkster

M
MACMILLAN

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This book is dedicated to the memory of my father
John James Inkster

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General Editor's Preface

SINCE the Second World War there has been a massive expansion in the study of economic and social history generating, and fuelled by, new journals, new academic series and societies. The expansion of research has given rise to new debates and ferocious controversies. This series proposes to take up some of the current issues in historical debate and explore them in a comparative framework.

Historians, of course, are principally concerned with unique events, and they can be inclined to wrap themselves in the isolating greatcoats of their 'country' and their 'period'. It is at least arguable, however, that a comparison of events, or a comparison of the way in which different societies coped with a similar problem – war, industrialisation, population growth and so forth – can reveal new perspectives and new questions. The authors of the volumes in this series have each taken an issue to explore in such a comparative framework. The books are not designed to be path-breaking monographs, though most will contain a degree of new research. The intention is, by exploring problems across national boundaries, to encourage students in tertiary education, in sixth-forms, and hopefully also the more general reader, to think critically about aspects of past developments. No author can maintain strict objectivity; nor can he or she provide definitive answers to all the questions which they explore. If the authors generate discussion and increase perception, then their task is well done.

CLIVE EMSLEY

Preface

THIS book is about the changing relationships between science, technology and economic development from the eighteenth century to the present time. Such an embracing subject demands that the text swings between social history and economic history, between cultures and markets, between Europe and Asia and between information (embodying ideas) and artefacts (including machines). In performing this exercise a very large and complex body of secondary literature is drawn upon, ranging from material on popular science in Hanoverian England to modernisation strategies in post-Maoist China. I very much hope that the undergraduate and postgraduate students for whom the book is intended will bear with me and eventually find some enlightenment and even a touch of entertainment. Quite simply, the task of this book is to uncover the dynamics of industrial change.

An understanding of this book does not require any advanced training in modern science or engineering, nor a profound knowledge of the mysteries and models of modern neo-classical economics. But it does require some real concentration. I think that students should use this text as a book which can be broken into at various points. Important historical themes, such as those of industrial revolution, technology transfer or the institutional setting of knowledge diffusion are broached in chapters whose major topics may vary between eighteenth-century Europe or late nineteenth-century Japan. A coherent story is told, a chronology is followed, and in many ways the text is quite conventional. But no student should feel that he or she must read ‘through’ this book. I am not a Tom Sharpe

on one hand or an Eric Hobsbawm on the other. This is a book to be used several times rather than loved once.

The general approach of this book is stridently comparative and interactive. Here are to be found no 'single causes' of any large event or process nor any mathematical models. But there are many (my reviewers will say, too many) attempts at explanation and several disclosures of at times quite complicated causal sequences. Although we cover an awful lot of ideas and much general history in the first two chapters of this book, the major historical problems of the text are not formally or finally defined at the outset and subsequently discovered in a series of titillating historical episodes. Historians (and I am still hopeful enough to add, and social scientists) do not apply theory to history. Rather, if they are somewhat patient and reasonably insightful, they may use history to develop theory. In particular, the task of economic history – one of the central dimensions of the book – is not merely to fructify economic theory, to test models against what is purported to be a past reality. For all too often the finger exercises of such fructification pose a threat to the integrity of the data as we know it. Even worse, too much attention to existing theory may inhibit the essential task, the redefinition of and continual search for more data, more evidence. If model or schema building of any sort is to be valid, it must allow in its essence for the possibility of variance, of intractability, of that material which is by nature fractious, and for the feasibility of explaining such variations within boundaries discovered through serious empirical examination. A belief in the veracity of historical detail, rooted in time and place, has governed the sometimes eclectic nature of this book. I have attempted to present fairly the material and the viewpoints of a great many representative historians and social scientists by the selection from a range of possible themes of those which to my mind best illustrate the essential dynamics in modern history.

As a flick through the pages will show, there are several diagrams and quite a number of tables. At points the discussion is summarised or evaluated in terms of a number of enumerated, accumulative factors or elements. Nearly two decades of teaching modern history to undergraduate and postgraduate students convinces me that such breaks in the formal text, although primarily designed to harness data or argument in a useful manner, also help to sharpen the attention of the reader. I hope that these features of the book will

make it useful not only as a reading or text for essays and examinations, but as a source of tutorial discussion and general debate.

All textbooks, however high they aim or eccentric they become, owe debts to several people, and the present book is no exception. Intellectually, the commanding works of Joseph Schumpeter, Alexander Gerschenkron, Albert Hirschman, Nathan Rosenberg and R. R. Nelson have been decisive in influencing the manner in which I come to this whole subject area. Sidney Pollard, now of Bielefeld, but in the early 1970s my research supervisor at Sheffield University, has exerted a quiet, now distant but transforming presence. To him more than any other scholar I owe my sense of time pressing. My debt to other academics is apparent in the footnotes, and I trust that none will feel seriously or harmfully misrepresented.

My thanks also go to the staff of several institutions, including the librarians and archivists of the Diet Library and the Institute of Developing Economies, both in Tokyo, the Indian International Centre, New Delhi, the Bodleian Library, Oxford, and the Mitchell and State Public Libraries of Sydney. No photocopier or fiche can replace their personal interest. My publishers have provided stalwart service and my secretary Charleen Borlase has worked much beyond the call of duty. At the end, conventionally, I must thank my wife and three children, who continue to put up with a lot. In this case, the convention which places the most at the end is well observed. The volume is dedicated to the memory of my father.

IAN INKSTER