

Productivity and performance in the paper industry

*Labour, capital, and technology in Britain
and America, 1860–1914*

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Introduction

Nothing attracts the attention of historians, economists, and even the more astute of policy-makers, like the economic decline of once great and powerful societies. This is amply borne out by the plethora of theories accounting for the demise of *inter alia* Ancient Rome, Venice, Holland, Imperial China, and, in more recent times, America and the West in general. It is, moreover, an observation that seems to hold *a fortiori* when the declining society had once been the world's most dynamic. It is in this light that post-1870 Britain has come to be regarded by many.

That this should be so is hardly surprising. In the hundred years prior to the 1870s Britain had managed to break from the pack of rival European nations to command, what must have appeared to contemporaries, a seemingly unassailable lead in industrial production. The events of the nineteenth century, however, soon revealed that Britain's historic role was to be that of *primus inter pares*, not workshop of the world. By the turn of the century Britain was thus only one of several industrialised countries, albeit an important one. Increasingly British firms found themselves driven by foreign competitors from markets that they had once pioneered and dominated.

In many ways this was the experience of the British paper industry in the nineteenth century. From a situation at the beginning of the century where British papermakers were amongst the most advanced producers of paper in the world – a lead primarily won by their early introduction of the Fourdrinier paper-machine – the industry in the latter half of the century seemed to enter something of a relative decline, characterised by growing foreign import penetration and shrinking market shares. By the 1860s and 1870s Britain's chief competitors had likewise mechanised the production of paper in their countries and made great strides in the search for, and development of, new raw materials.

Yet, in a number of interesting respects the paper industry differed from the old, often moribund, industries that had already begun to fade in Britain in the late Victorian and Edwardian era. Although historically

an old industry, by the late nineteenth century the paper industry in Britain had taken on a remarkably modern guise. Indeed, dominated by a capital-intensive flow production technology and a process of innovation characterised by gradual technological accumulation rather than major leaps, the paper industry rather than being a mere relic of the past was in many ways more a foretaste of the future. Moreover, with its long, standardised production runs and high proportion of relatively unskilled labourers working on daily wages, the industry stands as a useful balance to the widely held conception that all British industry in the nineteenth century was geared to the batch production of goods by highly skilled craft labour on piece-rates. That such a 'modern' industry should in any case decline just as emphatically from the second half of the nineteenth century as the old staple industries did, should in itself arouse interest in the industry, raising as it does questions central to the cause and nature of Britain's relative economic decline in general since the nineteenth century.

The British paper industry, however, has hitherto been strangely neglected by economic historians. Although Spicer undoubtedly claims too much in saying that the advent of cheap paper had a far greater impact on British society than the steam engine, it is nonetheless surprising just how little attention the industry has actually attracted.¹ Conceivably, the smallness of the industry's contribution to the overall British manufacturing sector has had something to do with the relatively poor coverage it has received, yet with just under 5 per cent of the labour force in manufacturing finding employment within its ranks in 1891, the paper industry was in this respect actually larger than both the chemical and the food, drink, and tobacco industries. Of course, the practice of equating an industry's importance with its size is a dangerous and unreliable one to adopt.² This is especially so in this instance, as the role paper has played, and still plays, in sustaining modern society certainly far outweighs the industry's perceived deficiencies in scale. As a consequence of this role paper has become a ubiquitous part of modern society; a product without which life would be far more complicated and inconvenient.

The aim of this book is to assess and explain the performance of the British paper industry in the late Victorian and Edwardian period. Along

¹ A. D. Spicer, *The Paper Trade* (London, 1907), p. 2.

² It should be remembered that in 1900 cotton employed only just over 3 per cent of the British labour force. Smaller than the paper industry were the chemical and the food, drinks, and tobacco industries, whose workforces in 1891 made up just 1.7 and 4.1 per cent of all labourers employed in manufacturing. The corresponding figure for the paper industry in that year was 4.9 per cent. P. Deane and W. A. Cole, *British Economic Growth* (Cambridge, 1967), p. 146.

the way it necessarily explores concepts and processes such as technological change, productivity growth, free trade, and entrepreneurship, that lie at the very heart of industrial competitiveness. Despite their proximity to the heart of the matter, however, many of these issues and phenomena remain to a large extent empty boxes; plainly important, but largely taken for granted. Entrepreneurship is a case in hand. Economic historians, who engage in the debate on entrepreneurial failure in late Victorian and Edwardian Britain, usually delve no deeper into the dynamics of entrepreneurial activity and decision-making than the neoclassical or Schumpeterian traditions allow. With the neoclassical approach, that amounts to the equating of entrepreneurship with management, and hence, in effect, the assuming away of the entrepreneur. In this case entrepreneurship becomes indistinguishable from profit-maximisation. By contrast, in the Schumpeterian schema the distinctive activities of the entrepreneur are lauded and elevated to a central position. Nevertheless, although vital to the dynamics of the whole system, this tradition still regards entrepreneurship as being exogenously determined.

At least as practised in the economic history literature then, there would appear to be no adequate theory for what it is the entrepreneur does, and how he or she goes about doing it. Since it is the entrepreneur who is often asked to accept the blame for the failings of the British economy from the last quarter of the nineteenth century, this seems a rather strange omission. It is surely valid to ask how one can be certain that entrepreneurship is indeed at fault when no attempt is made even to define it, let alone to provide guidelines by which its quality can be assessed. To do that, of course, would require one to know something about how entrepreneurs make decisions; or in other words, to understand at a micro level how he or she works.

This book posits such a model of entrepreneurial decision-making. The model is based on the notion that as most decision-making is of an on-going nature, information – the bedrock of all decision-making – and consequentially decision-rules must be in a state of constant flux. When assessing decisions it is therefore necessary to consider the quantity and quality of information available at the time the decision is made. In the early stages, when information is patchy and incomplete, intuition and hunch are central to the decision-making process. However, as the entrepreneur's data base expands – often in the direction laid down by his or her own previous decisions and choices – more rationally based decisions become feasible. In time, when the various options have been more fully worked out and understood, the type of optimisation behaviour described by neoclassical economics becomes a possibility. As

very little entrepreneurial decision-making actually takes place in such a setting, however, the best that one can ever reasonably expect from one's entrepreneurs is for them to act with competence and vigour.

In chapter 4 this framework is outlined and applied to the paper-maker's search for new raw materials in the second half of the century: one of the most dramatic and testing events in the industry's history. It was a quest which in the end turned out to be long and arduous and which not only questioned the very strength and quality of British entrepreneurship, but also saw Britain for some thirty years pursue an entirely different path from its main competitor in the trade, America. Since British entrepreneurs have frequently been criticised for their failure to adopt American best-practice, and as there is also little doubt that the decision directly impinged on the industry's ability to perform, the search provides an ideal test case for the entrepreneurial failure thesis in the late Victorian paper industry.

Intimately tied to entrepreneurship and just as little understood in the entrepreneurial failure literature is technological change. Frequently depicted as manna from heaven and as homogeneous in character, its occurrence in that literature is more often assumed than explained. In reality, the process is much more diverse and varied. After all, there is no real reason for us to believe that all technological change should be similar in either pattern, direction, or timing. While there are general trends, whose influences will be fairly universally felt, the process in each industry is more likely to be affected by conditions that are unique to that industry and its technology. As a consequence, the variety of types and patterns of technological change possible is wide.

In nineteenth-century papermaking, technological progress was principally derived from extensions and improvements to the existing technology made possible by the learning and accumulation of knowledge attained through the act of production. By nature, this was an incremental, cumulative, and often firm-specific process. The effects of this type of learning on technological change, however, are not well understood in the theoretical literature. In particular, little attention in economics and economic history has been devoted to the determinants of such economies of practice. As a start, chapter 2 of this book explores some of the factors that could influence the degree of innovation achieved via learning; an analysis clearly of use to all industries where such forms of technological change are important. It concludes that if one is to understand the rate of technological accumulation in an industry, one must look at factors that affect that industry's opportunity, ability, and willingness to learn from production. Such analysis would involve consideration of a wide range of factors, ranging *inter alia* from

institutional and organisational setting to the development of human capital and labour relations. In chapter 8 this approach is applied to the Anglo-American technological divide that appeared in the 1890s.

A number of issues and phenomena common to late Victorian Britain and beyond also surface in the paper industry at this time. One such facet of the industry's experience, like that of the manufacturing sector as a whole, was the American industry's higher level of labour productivity from 1860 when Britain was still the technological leader in the trade. This curious feature raises interesting questions about the British industry's performance in the second half of the nineteenth century which, if answered, may not only aid our understanding of the relative decline of British papermaking, but also contribute to our knowledge of the determinants of technological and productivity leadership in general: factors crucial to the economic rise and fall of nations. In particular, this book considers in chapters 5 through to 8 to what extent this productivity gap between Britain and America reflected each country's own distinct resource environment and pattern of demand, and to what extent the gap stemmed from other factors such as rates of technological change and the actions and attitudes of each country's workforce and entrepreneurs.

Also of general interest is the impact national commercial policies had on the industry's progress. In October 1861 Britain removed the last of its import duties on paper and board, for the first time exposing its manufacturers to the full force of competition from foreign producers who themselves continued to be protected by imposing tariff walls. The paper industry thus affords an opportunity to examine how this combination of British free trade and foreign protectionism impacted on an industry like the paper industry where long production runs and economies of scale were vital to survival. In such circumstances it is argued that the effect was far from negligible. In chapter 9 British and German trade in paper in particular is examined from this perspective.

Readers will find the methodology adopted in this book somewhat eclectic, as an amalgam of quantitative, qualitative, and theoretical evidence is employed. The absence of any single comprehensive source on the industry makes such an approach essential. To this end, a wide variety of primary sources, including patent data, government publications, trade journals, contemporary manuscripts, private notes, union records, and business archives are used in conjunction with secondary literature in an attempt to make some sort sense out of the many intertwining trends and forces operating in the latter half of the nineteenth century. Direct and detailed comparisons with the British industry's leading competitors – America and Germany – are also

consciously made in this book in the belief that such comparisons are not only helpful in putting the British industry's performance into its proper international context, but also serve to elucidate many of the crucial aspects of the industry's development in the late Victorian and Edwardian era.