

WHERE DID WE GO WRONG?

INDUSTRY EDUCATION
& ECONOMY OF
VICTORIAN BRITAIN



*Edited by Gordon Roderick
& Michael Stephens*

 The Falmer Press

*Where
Did
We Go
Wrong?
Industrial Performance, Education and
the Economy in Victorian Britain*

*Edited and Introduced by
Gordon Roderick
and
Michael Stephens*



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I

Background

Introduction: Britain 1851–1914

Gordon Roderick and Michael Stephens

In 1851, the year of the Great Exhibition, Britain was almost exactly at mid-point of the period at which, it is claimed, she was 'the workshop of the world'.¹ The period, which began in the 1820s and ended with the depression of the 1870s, was the high noon of economic advance. Britain's natural resources (especially of coal and iron), her skilled, adaptable manpower and the industrial developments of the eighteenth century enabled her by 1851 to rise to a position of global influence and power² and to lead the world in the supply of machinery, manufactured and textile goods. At this time, Britain was experiencing a level of industrial production and foreign trade which set her far ahead of all other countries.³

Although natural resources and inventiveness were central to Britain's rise to economic power, other factors also played a part: her naval strength guarded her overseas trade routes and had removed all danger of destructive wars; the growth of population gave manufacturing industries an increasing home market as well as a supply of workers; free trade encouraged overseas commerce; and the railways accelerated industrial and commercial development. The Great Exhibition, whilst confirming Britain's position as the leading industrial nation, also marked the beginning of an age of rapidly accelerating industrial production of coal, iron and steel and many other commodities. The mood of euphoria and complacency lasted for the next twenty years, at the end of which period the foreign trade of the United Kingdom was still more than that of France, Germany and Italy together, and four times that of the United States.

By the end of the century, however, a dramatic transformation had come about as a decline set in in the rate of increase of industrial production relative to her competitors. There appeared to be a failure of British industry to maintain the momentum it displayed in the first half of the nineteenth century. During the final quarter of the century prices fell, factories closed down, unemployment went up and there was widespread distress. The age of British economic supremacy was over.

In steel, American production passed Britain's in 1890, followed six years later by that of Germany; by 1900 the United States and Germany between them were producing three times as much steel as Britain. Steel was only one element in the challenge, although the most significant one. The British chemical industry in 1913

accounted for only 11 per cent of world output as against 34 per cent by the United States and 24 per cent by Germany, while the latter exported twice as much as Britain.⁴ The initiative had passed to Germany, particularly in the production of synthetic dyes from coal tar (which replaced the traditional dyes from natural sources) and in the production of a whole new range of products – fertilisers, explosives, cyanides and pharmaceuticals. The British had pioneered electrotechnics yet by 1913 the output of the British electrical industry was only a third of Germany's and its exports barely half. By 1913 Britain ranked a poor second to the United States in car production whilst in the machine tool industry, which had been British in origin, 'nowhere did foreign countries and yet again chiefly the United States leap ahead more decisively'.⁵ By the outbreak of World War I in 1914, Britain was short of khaki dye, acetone for explosives and magnetos for transport because Germany had become the chief source of supply.

Yet it would be wrong to assume from the foregoing that Britain stagnated industrially. Rather, industrial activities developed on a great scale: basic industries increased their output – between 1893 and 1913 coal, shipping and steel increased 75 per cent, 100 per cent and 136 per cent respectively; others such as boots and shoes, brewing, soap and tobacco also grew fast and new technical inventions led to electrical engineering, motor cars, bicycles, aluminium, ferro-concrete and artificial silk. What cannot be denied, however, is that the bare facts of industrial production reveal lower increases in Britain than was the case for her competitors, Germany and the United States.

With regard to exports, the position was even worse. There was little ground for complacency as competition caused Britain to lose export markets in America, industrialised Europe and underdeveloped countries. By 1913 Britain's share of world trade in manufactures was 25.4 per cent as compared with 37 per cent in 1883 (in the same period Germany increased her share from 17 per cent to 20 per cent and the United States from 3.4 per cent to 11 per cent). In a group of fifteen manufactures, British exports to protected foreign markets between 1895 and 1907 increased by 44 per cent while those of Germany and America increased by 125 per cent and 500 per cent respectively. The same exports to identical markets in the British Empire registered an increase of 91 per cent for Britain as against 129 per cent and 559 per cent for Germany and the United States. By 1913, textiles still accounted for one third of total exports, while the share of total exports of the new categories (machinery, chemicals and electrical goods) stood at only 15.9 per cent in 1910. The fastest growing export category before 1914 was the staple product coal; in general Britain tended to retain her specialisation in the older lines rather than in the more recently developed products – inorganic rather than organic chemicals, locomotives rather than motor vehicles, textiles and farm machinery rather than machine tools and electrical goods.

The entry of the United States into world markets occurred in the mid-1890s and appeared to have fewer harmful effects on British exports. This was partly because her export structure was complementary to Britain's rather than competitive, and partly because American export growth was concentrated on areas like Canada and Latin America. Industrialization in the United States, behind tariff barriers,

affected British exports to the American markets. Germany, on the other hand, posed a far greater threat. Together with Belgium she made great strides in capturing European markets which were former British preserves: by 1913 Germany was selling more than Britain to nearly every European country. She was also expanding her trade more rapidly with the economically underdeveloped countries such as Russia, Latin America and Turkey. By 1913 Germany monopolised the Russian market, her exports to that country being four times greater than those of Britain.⁶

Clearly there seemed to be something 'radically wrong' both with regard to industrial productivity and to Britain's ability to sell goods abroad. Few students, of the period after 1870, deny that there was a slowing down in the rate of economic growth during the final quarter of the century. Some argue that a break occurred in the 1870s, whereas others point to the 1890s. If figures for real income per head are examined, it is evident that the real check to growth, apart from a temporary break in the 1870s, did not occur until towards the end of the nineteenth century. On the other hand, in the case of exports and industrial production, the break in growth trends occurs somewhat earlier, probably around the 1870s. Thus whilst it is generally accepted that there was a slowing down of the rate of economic growth sometime after 1870 there is no measure of its exact timing, its extent or its causes.

The Great Debate about Britain's decline was begun by the Victorians themselves. There was little doubt in the minds of contemporary observers in the late nineteenth century that a decline had set in in Britain's industrial progress. A flood of documentary evidence was produced which, although prejudiced, was not entirely inaccurate for the more scholarly and analytical accounts contained similar conclusions. There must have been an element of truth since informed opinion was almost unanimous on the question. Up to recent years, there was a consensus also among twentieth century historians that a decline had set in between 1870 and 1914, a decline which was attributable to a failure of British industry and to management in particular. Serious reservations however are now being expressed.

Contemporary observers and earlier historians based their assessments on statistics relating to industrial output and trade figures which clearly indicated a 'relative decline' vis-a-vis Britain's competitors. Economic historians of more recent times, on the other hand (in particular mathematical economists and econometricians), have attempted to provide an assessment based on quantitative tests using a variety of more sophisticated economic measures. Their results, whilst invalidating many earlier arguments, have at the same time triggered off a spate of arguments and counter-arguments over the applicability of these methods.

Was there a 'failure' of the British economy as a whole to maintain the momentum of the earlier years? There may well have been individual industries which were deficient, but it appears that such a charge may no longer be justified for British industry as a whole. Indeed, an extreme view is that there is little left of the dismal picture of British failure painted by historians and the conclusions of a conference of economic historians in 1970 was that 'during the critical period 1870 to 1900 when the balance tilted from dominance to dependence the British economy . . . performed as one would expect a competitive and prosperous economy to perform'.⁷ Nevertheless, the argument about Britain's 'assured failure' is by no means over.

Of the many factors advanced as being contributory to the failure of British industry to innovate and increase production as rapidly as its competitors, two have stood out as being of overriding importance; these were the quality of entrepreneurs and the role of education and training.

The theory of entrepreneurial failure reached its culminating point with David Landes' (1969) *Unbounded Prometheus* in which he points to the leads lost, the opportunities missed and the markets relinquished that need not have been. The theory embraces familiar accusations of amateurism, indifference and complacency; incompetent and indifferent salesmanship involving the unwillingness to try new products; a stubborn refusal to suit goods to the needs of potential clients or to engage technical salesmen with a facility in foreign languages; lack of dynamism and adventurousness by managers; technical and organizational lag within individual firms; conservatism in the face of new techniques and a reluctance to abandon individuality and tradition. Because England industrialized early English entrepreneurs were second or third generation entrepreneurs in the critical period 1879 to 1900 and were more likely to be distracted from business life by social life. Furthermore, their lack of formal training told against them – they lacked technical expertise and were less able to judge the commercial prospects of particular innovations.

The early entrepreneurs, pioneers of the Industrial Revolution, had been untutored, lacking formal education, products of the ancient traditions of British craftsmanship – men such as Crompton, Smeaton, Bramah and Maudslay. The Industrial Revolution, it seemed, owed little to education systems or to direct action from the state. At mid-century the prevailing philosophy was that Britain owed her success to the natural character and qualities of her entrepreneurs, to her craftsmen and engineers endowed with native ability. These, allied to daring entrepreneurship and individualism, had brought Britain to the top. What indeed was owed to education?

In 1851 Lyon Playfair, in his lecture to the School of Mines, drew attention to the fact that the ready availability of cheap natural resources had been in Britain's favour but in the future, with the widespread development of transport and communications systems, the race would go to the nation which commanded the greatest scientific skill. But belief in individualism and the superior qualities of British workmanship, together with a dislike of state interference, held back state intervention to create systems of scientific education and training. Arnold (1892) summed up the British attitude to the state in the words 'as an alien, intrusive power in the community, not summing up and representing the action of individuals, but thwarting it'. This attitude, together with 'our high opinion of our own energy and prosperity'⁸ were stumbling blocks to progress. In Germany – the main continental rival – there was extensive state and municipal support for education, whereas the attitude to education in England is well represented by a statement of Robert Lowe when Chancellor of the Exchequer: 'I hold it as our duty not to spend public money to do that which people can do for themselves'.⁹ These attitudes led to grave deficiencies in secondary and higher technical education and to a lack of central direction by Government. The absence of an overall plan or blueprint led

to a situation which contrasted the haphazard British system with the organized German system.

Despite the impressive performances of British industries in winning medals at the Great Exhibition, England was one of the few major competing countries without an organized system of technical education. The aim in the early part of the century was to produce an industrious workforce. The conviction grew during the first quarter of the century that, with increasing industrialization, there was a need for the industrial worker, variously described as a mechanic or artisan, to have a knowledge of science related to his industrial practice. Consequently, technical education, from its origins, became associated in the public mind with the education of the artisan. At elementary level, prior to mid-century, education was in the hands of the voluntarists. The church bodies were anxious to preserve their dominant position and the progress of a state system of education was hindered by the secular-religious power struggle over the control of education. Manufacturers and landowners, too, had their own economic interests to defend whenever the state attempted to introduce new legislation requiring school attendance. The first central government support came in the form of a grant of £20,000 in 1833, but not until 1870 were the proper foundations of a system laid down. Widespread poverty and apathy and indifference to educational needs were common among the populace. A comprehensive survey by the Newcastle Commission, which reported in 1861, discovered that the average attendance at elementary schools was only 76 per cent; one third of pupils attended for less than a hundred days, and less than one fifth stayed on after the age of ten. Following Robert Lowe's Revised Code of 1861 the passing of examinations in the three Rs became the necessary condition for the award of grants to schools. Government policy and action in the next two decades were more often activated by the concern for cheapness rather than efficiency. Prior to this many teachers had taken a delight in teaching elementary science, but as it now no longer counted for grant purposes innovation and experimentation of this kind disappeared from the schools.

Deficiencies in day school education were compensated for by the evening schools. The principle of supplementary early schooling and of remedying defects had been adopted by the Sunday Schools and adult schools at the end of the eighteenth century. By the mid-nineteenth century, evening schools and night schools had become an established part of the educational scene. They were very much a second best, and their grave deficiencies were revealed by Michael Sadler, Professor of the History and Administration of Education at Manchester University, in 1907. They were

in some respects little but a makeshift for what should have been done in elementary day schools. Much that was attempted in the evening schools would have been better done by a well organized system of day schools . . . There was no legal compulsion to attend them and they left untouched large sections of the community.¹⁰

In Sadler's (1907) view:

the question to be decided is whether we in England gain more through

stimulating and rewarding the energy of the few by our voluntary system of continuation schools than is lost through our failure to raise the general average of trained and disciplined efficiency by means of compulsory attendance for all. The same question comes up in some form or other in every attempt to balance the advantages of what may broadly be distinguished as the English and German forms of educational organization. The Germans make thriftier use of their average material than we succeed in doing . . . Can we afford the waste which our lack of organization entails?¹¹

In the field of secondary education there was a greater reluctance on the part of the state to interfere or to allocate adequate resources. Government action was largely confined to the setting up of numerous Commissions, few of whose recommendations were implemented, and of a Charity Commission whose function it was to oversee the considerable number of endowments, many of which were grossly abused. In the 1860s and 1870s, three Royal Commissions under the Chairmanship of the Earl of Clarendon, Baron Taunton and the Duke of Devonshire all revealed that Britain had remarkably little education, much of it inadequate in quality, and drew attention to the deplorable state of scientific education. Thirty years later the Board of Education in its Report of 1905–6 concluded: 'The most conspicuous fact that emerges is of how much there is yet to be done in secondary education . . . the short-comings are too often less than disastrous'. A few years later it highlighted a fundamental weakness when it pointed to the lack of positive state action:

That the state has any concern with secondary education is a comparatively modern idea in England . . . This isolation and consequent neglect of secondary education over so long a period is at the root of the difficulties which have had to be faced in the last few years in all grades of education in England . . . The formidable inertia of the nation reinforced by intense jealousy of state interference and dislike of public control held up much needed reforms.¹²

A cohesive pattern of secondary education was not laid down until the turn of the century. By the time the Bryce Commission was appointed in 1894 there were numerous bodies participating in the provision and funding of secondary education. Fragmentation and lack of cohesion were the hallmarks. There was an uneven distribution of endowments; an overall inadequacy of finance; an absence of inspection; a too narrow curriculum and a paucity of free places. The Bryce Commission was the first body to attempt a visionary definition of secondary education. It was the springboard for the formation of the Board of Education in 1899 and the Education Act of 1902. To overcome 'the usual results of dispersed and unconnected forces, needless competition between the different agencies and a frequent overlapping of effort' the Bryce Commission proposed a single statutory body presided over by a Minister, which would supervise action by local authorities in whom responsibility for secondary education was to be invested.

Throughout the greater part of the century the main middle-class schools – the

public and grammar schools – were almost exclusively classical. The Devonshire Commission (1872) carried out an extensive survey of the place of science in the schools:

We regret to observe in many of the larger schools the number of science masters is totally inadequate. We fear that the fewness of the science masters in the great schools and the slowness with which their number is allowed to increase must, to a certain extent, be due to an inadequate appreciation on the part of the authorities of those institutions of the importance of the place which science ought to occupy in school education.¹³

In defending themselves against criticisms the schools sought a scapegoat in Oxford and Cambridge which offered few scholarships and fellowships in the sciences; the vast majority being awarded for classics. Sir John Lubbock, a member of the Devonshire Commission, observed:

They do not prepare them (in science) at schools because there is not the same number of awards for it in the universities and the universities do not award them because science is not taught in the schools and the schools do not teach them because they are not rewarded in the universities.¹⁴

Few products of the leading schools went on to study science and engineering, with the notable exception of some schools. A Committee set up under Sir J.J. Thomson in 1916 found a deplorable state of affairs fifty years after the Clarendon Commission had first drawn attention to the poor state of science education:

Not for the first time educational conscience has been stung by the thought that as a nation we are neglecting science . . . We cannot regard it as anything but unsatisfactory that it should be impossible to form even a rough estimate of the number of children receiving secondary education in this country nor of the value of that education.¹⁵

The fortunes of the leading schools were bound up with the ancient universities and a great deal of blame attached to the latter. Oxford and Cambridge, with their continued adherence to traditional studies and their neglect of science, were a stumbling block to progress. They were a perpetual thorn in the flesh of those who viewed with concern the rise of the German universities and technical high schools. Royal Commissions to Inquire into the State, Discipline, Studies and Revenues of the Universities and Colleges were set up in the 1850s. They discovered that the wealth of the Universities resided in the colleges which resisted reforms and were reluctant to devote funds to science. The Devonshire Commission discovered that the funds devoted to science were 'lamentably deficient'. Of a total of 449 fellowships, 212, (46 per cent) were in classics and 125, (27 per cent) were in mathematics, whereas seven only were in natural science. Teaching was predominant over research, of which little was done.

Early in the nineteenth century the two London colleges – University and King's – had been established to provide for the sons of the middle classes studies which were not available at Oxford and Cambridge. Later (beginning with Owens College,

Manchester, in 1851) a spate of 'civic' colleges were set up in the major cities with the teaching of science and technology as a principal aim. These colleges were handicapped in their development by government indifference; financial support not forthcoming until the first Treasury Grant in aid of £15,000 was awarded in 1889 – the colleges having to rely on donations and subscriptions from individuals, civic leaders, manufacturers and traders. Chronic lack of funds led to a paucity of research scholarships. Professor Moore, the first holder of the chair of biochemistry at Liverpool University, wrote in 1911:

It is much to be regretted that in the financial system of our universities no separate provision is made for the endowment of research apart from undergraduate teaching . . . The result is a perpetual struggle between teaching and research for the partition of a sum of money inadequate to supply completely the needs of both and in such a struggle, research, though equally or even more important, comes off worst because it is usually regarded by administrators as a luxury whereas teaching is deemed an essential function in the work of a university.¹⁶

The underlying philosophy of English education was 'class based'. The grammar and public schools were exclusively middle class, whereas the cornerstone of technical education was the artisan; the perceived needs of the artisan underpinned thinking about technical education throughout the greater part of the century. The widespread concern felt about the general education of the artisan, and in particular the lack of basic instruction in science, gave rise in the second quarter of the nineteenth century to the Mechanics' Institutes which were to provide instruction in the various branches of science related to the industrial arts which the members practised. Government action in the early 1850s led to the creation of a Division of Science being added to the Department of Practical Art to form a new Department of Science and Art for the encouragement of the teaching of the applied sciences. But the working man, due to the absence of efficient primary and secondary systems of education, lacked the basic educational skills necessary to enable him to benefit from such provision created for him. An even greater weakness in technical education was middle and higher technical education. There was little provision at higher levels until the formation of technical schools and civic university colleges during the final quarter of the century, and these were badly handicapped by lack of adequate funds and suitable pupils. In contrast, higher technical education in Germany was catered for by a system of well endowed state-sponsored technical high schools which produced cadres of well trained and qualified scientists and technicians for the rapidly expanding German industrial machine. The neglect of 'higher' technical education can be seen as a fundamental weakness of the English scene. In Germany money was allocated according to pre-determined needs and the whole of education was characterised by zeal and systematic thoroughness.

Professor Margaret Gowing in her Wilkins Lecture,¹⁷ delivered to the Royal Society in 1976, lists five factors as affecting Britain's industrial progress. These were finance, administrative structure, social class, the Church and imperial purpose. She points to the absence of any wide and sustained interest in scientific and technical

education among the upper and middle classes, and quotes Professor Rolleston, Professor of Physiology at Oxford who, in evidence to the Devonshire Commissioners, referred feelingly to a French report of higher education in Britain which talked of ‘*snobisme as a vanité très Anglaise*’.¹⁸ According to Professor Gowing (1977), obsession with social class, which appeared on almost every page of the great educational reports, was a cause of British backwardness. She observes that it is

strange that a country which had experienced such swift social mobility in the eighteenth and nineteenth centuries, and which had much admired its self-made industrial and engineering heroes, was so dominated by class and so reluctant to accord social prestige to science and technology. In some other European nations class divisions were as rigid, and in France much more bitter. In no other Western country did the class differences prevent scientific and technical education from permeating national life.

The administrative structure of education was a weakness. The Education Department at Whitehall which looked after elementary education and the Department of Science and Art both came under the Privy Council Committee on Education, but they were geographically and administratively separate. Secondary education fell in the gaps between the Departments while yet another body administered the endowed schools. Administrative practice was too complex. The Department of Science and Art’s voluminous and ever-changing rules were unintelligible to local committees and students; it was a ‘nest of nepotism’ with strangely mixed functions and it remained the arbiter of scientific and technical education. Professor Gowing concludes ‘the late Victorians, sometimes portrayed as creative administrative reformers, emerge in this story as patchers, improvisers and procrastinators’.

Notes and References

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- 2 HOBBSBAWM, E.J. (1968) *Industry and Empire*, Pelican Economic History of Britain, Vol. 3, Harmondsworth, Penguin Books, p. 13.
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- 11 *Ibid.*, pp. 70–1.
- 12 *Board of Education Reports 1905–6*, pp. 31–2.

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- 13 *Royal Commission on Scientific Instruction and the Advancement of Science* (Devonshire Commission) (1872), Vol. III, Sixth Report, p. 5.
- 14 *Ibid.*, Vol. I, p. 32.
- 15 'Natural Sciences in Education' in the *Report of the Committee on The Position of Natural Science in the Educational System of Great Britain*, (Thomson Committee) (1918), p. 11.
- 16 *Researches in Biochemistry*, 1908–11, Harold Cohen Library, University of Liverpool.
- 17 GOWING, M. (1976) *Science, Technology and Education*, The Wilkins Lecture, reprinted from notes and records of the Royal Society of London, Vol. 32, No. 1, July, 1977.
- 18 *Royal Commission of Scientific Instruction and the Advancement of Science Papers*, Vol. 25, p. 3731.

The Economy, Management and Foreign Competition

Derek H. Aldcroft

The retardation debate

It seems to be a favourite pastime of the British public to criticize the performance of their country's economy. For a century or more now Britain's economic performance and her industrialists have been under close scrutiny by economists, historians, journalists and others and, generally, the tenor of their observations has been unfavourable. British businessmen, in particular, have frequently been the target for critical comment, if not outright abuse, and it is curious that a country which pioneered the breakthrough into modern industrial growth should have so little admiration for its industrial leaders.¹ Indeed, the present author, while having a high regard for thrusting and dynamic enterprise, has contributed his share to tarnishing the image of industrialists and, ironically, it has been foreign observers, notably American scholars, who have come to the rescue of the maligned British businessman.

The origins of the businessmen's 'bad press' date from the latter part of the nineteenth century.² This was the period when Britain's industrial supremacy began to be challenged by the newer industrializing nations and when, by all accounts, Britain's economic performance began to falter. Much has been written about the nature and extent of this decline and it is not the purpose of this paper to rehearse all the arguments and data yet again. While acknowledging the fact that the subject is still somewhat controversial, there are several points on which a broad measure of agreement has been reached. First, no one would dispute the fact that in the half century or so up to 1914 Britain steadily lost her former supremacy as industrialization proceeded abroad (notably in Germany and America) and foreign competition consequently increased. In terms of both world production in manufactures, and world trade in those products, Britain's importance declined considerably through to 1914; a not unexpected happening given her domination in the middle of the nineteenth century. Second, rates of growth of total output and industrial production decelerated in this period, though the timing and the extent of that deceleration are still being debated.³ Not only was growth less rapid than it had been previously but it also compared unfavourably with the growth performance of some of the later