



# Transformation: The First Global Economy, 1750–1914 12

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## Abstract

In 1750, most of the world's population lived in conditions that were little changed from time immemorial. In the absence of mechanical cloth production, most people only owned one or two sets of clothes. The cost of all forms of land transport meant that the bulk of production was geared towards local markets. By 1914, however, a totally new world had been created. Across the globe, steam-powered ships and railroad locomotives brought people and goods from near and far. As a global market emerged, competition increased inexorably. In the final analysis, the new global economy was both the creation of new systems of management and the creator of modern management. Initially confined to textile production, a revolution in both technology and management cascaded through the economy. As competition increased, management became more attuned to costs. Managers also sought after increased productivity so as to maximize outputs from a minimum of inputs. Increases in production also led to a spike in real wages. Wage gains, however, were incapable to quelling a rising tide of labor

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unrest, revealing the “human problem” to be management’s major unresolved difficulty.

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### Keywords

Globalization · Industrial revolution · Chandler · Taylor · Technological change · Real wages · Trade unions

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## Introduction

In 1920, John Maynard Keynes penned what is undoubtedly his most readable book, a work that was also in many ways his most profound: *The Economic Consequences of the Peace*. “Before 1870,” Keynes (1920: 7) recalled, the population of Europe, “taken as a whole . . . was substantially self-subsistent.” “After 1870,” Keynes (1920: 7) continued, “an unprecedented situation” prevailed in which the fate of the European “Old World” became intertwined with the New World. In reflecting on this process of integration, Keynes (1920: 9) remembered how a London resident such as himself,

. . . could order by telephone, sipping his morning tea in bed, the various products of the whole earth, in such quantity as he might see fit, and reasonably expect their early delivery upon his doorstep; he could at the same moment and by the same means adventure his wealth in the natural resources and new enterprises of any quarter of the world.

Although Keynes was clearly describing the circumstances that prevailed at the top of the British social hierarchy, he also believed that the new global economy opened up new opportunities for social mobility. Any person, Keynes (1920: 9) reflected, “of capacity or character at all exceeding the average” was capable of joining “the middle and upper classes, for whom life offered . . . conveniences, comforts and amenities beyond the compass of the richest and most powerful monarchs of other ages.” In Keynes’s estimation, the economic relationship between Europe and North America lay at the core of this global economy. Indeed, Keynes (1920: 20) noted, the “prosperity of Europe” was unimaginable without “the large exportable surplus of foodstuffs in America.” Nor was the prosperity of the new world order conceivable in the absence North America’s immigrant population, peoples of mainly European extraction who farmed the land and built “the railways and ships which were to make accessible to Europe food and raw products from distant sources” (Keynes 1920: 8).

In summation, Keynes’s argument was that the modern world with its systems of management, business organization and commercial exchanges only began in the 1870s. By contrast, for the noted management historian, Sidney Pollard (1965: 1), “the genesis of modern industrial management” was found in the Industrial Revolution that occurred in Great Britain between 1760 and 1830. The association of modern forms of work and management with the Industrial Revolution is a common one. Adam Smith (1776/1999: Book 1, para. 5), in one of the opening paragraphs of

*The Wealth of Nations*, ascribed the “great increase of the quantity of work” to not only “the division of labour” but also to “the [recent] invention of a great number of machines which . . . enable one man to do the work of many.” Karl Marx and Frederick Engels also believed that by 1848, industrialization had fundamentally changed the human condition. The result, Marx and Engels (1848/1951: 36) argued, was, “Constant revolutionising of production, uninterrupted disturbances of all social conditions, everlasting uncertainty.” If, however, Pollard, Marx, and others ascribe the origins of modern management and capitalism to the industrialization of Britain, Alfred Chandler famously argued a different position. In Chandler’s (1977: 3) opinion, “as late as 1840 there were no middle managers in the United States.” Nor was there evidence prior to the 1840s, in the United States or elsewhere, of the modern “multiunit business enterprise” (Chandler 1977: 49). The reason for the slow emergence of modern managerial and business forms of organization, Chandler (1977: 49, 78) believed, was largely “technological.” Only with the coming of railroads and telegraphs did the world witness, for the first time, genuine mass markets that demanded greater levels of coordination, both internally within the firm and externally in firm-market relationships.

From the preceding paragraphs, we can discern three broad arguments:

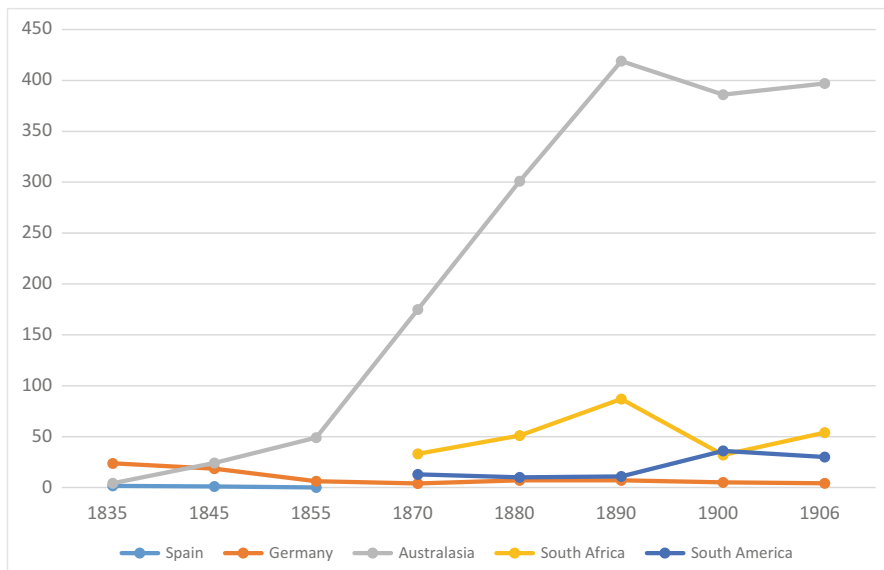
1. That modern systems of management owed their origins to the Industrial Revolution in Britain (1760–1830).
2. That modern forms of management and business only emerged when new forms of transport and communication allowed for mass markets (1840–1880).
3. That the modern world of global capitalist exchanges was a product of a unique set of circumstances that prevailed between 1870 and 1914.

How can we balance these competing arguments which reflect the opinion of some of the greatest minds in economics (Smith, Marx, Keynes) and management and business history (Pollard, Chandler)?

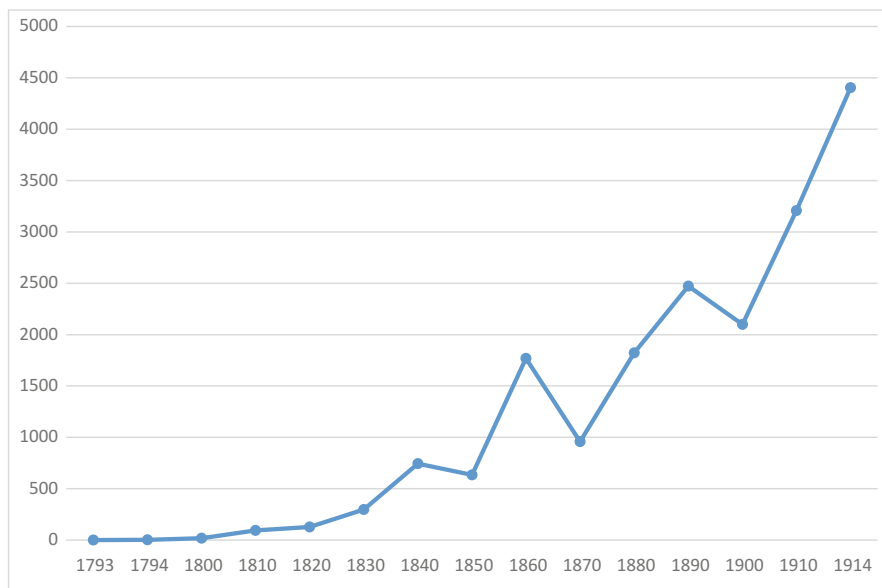
A good place to start is to look at some key measures of economic and managerial progress. Throughout history, the basic requirements for human existence have always been the same: food, clothing, shelter, and heating (both for cooking and warmth). Of these, clothing was historically the most difficult to achieve. Producing a set of clothes from spun fibers was always an inherently time-consuming and expensive business. Throughout history, in consequence, most people only possessed one or two sets of clothes, creating an insatiable demand for second-hand clothes. In the Middle Ages, as we noted in our earlier ► [Chap. 9, “From Feudalism to Modernity, Part I: Management, Technology, and Work, AD 450–1750,”](#) “Peasants were always clothed in rags . . . During epidemics of plague . . . people waited for others to die to take their clothes” (Cipolla 1981: 31–32). Given the demand for cloth, the consumption of wool, cotton, and flax fibers provides a gauge of a society’s capacity to meet a basic need. Historically, Britain’s manufactured exports, like those of neighboring Flanders, were largely associated with woolens. Even though cottons gained a preeminent position during the Industrial Revolution, the output of woolen mills also increased, forcing Britain to import wool from Spain and

Saxony (Germany). British wool imports, therefore, provide a measure of not only British textile production but also of the logistics chain created to service factory demand. With this in mind, a perusal of Fig. 1, which traces wool imports in millions of pounds between 1835 and 1906, highlights two things. First, by 1845, Spanish and German growers were being forced out of the market. Australasian (Australian and New Zealand) producers now dominated. Second, that post-1855 imports – and hence production – were of a different order of magnitude to anything seen before.

The same broad pattern is evident when we turn our attention, as we do in Fig. 2, to the quintessential industry of the Industrial Revolution: cotton textiles. As most business and management historians would be aware, the invention by Eli Whitney of the “cotton gin” – which quickly and easily separated cotton lint from seed – provided cotton growers and manufacturers with an unexpected boost. In the United States, which came to dominate world cotton production, exports grew from a mere 138,328 pounds in 1792 – the year before the introduction of the first cotton gin – to almost 17.8 million pounds in 1820 (Thomas 1997: 569). From this point onwards, American exports and European (largely British) cotton manufacture advanced hand-in-hand. Once more, therefore, production of a resource staple is a pointer to both the level of industrialization and the complexity of the global supply chains that supported manufacture. As Fig. 2 indicates, the increase in the United States cotton exports was extraordinary, the slave-based workforces of the American South underpinning the expansion of British manufacture. By the 1850s, as managerial efficiencies accumulated all along the logistics and manufacturing chain, the price of



**Fig. 1** British wool imports, 1835–1906 (in millions of lbs). (Sources: Clapham 1932/1967: 6; Ville 2005: Table 3; Knibbs 1909: 293)



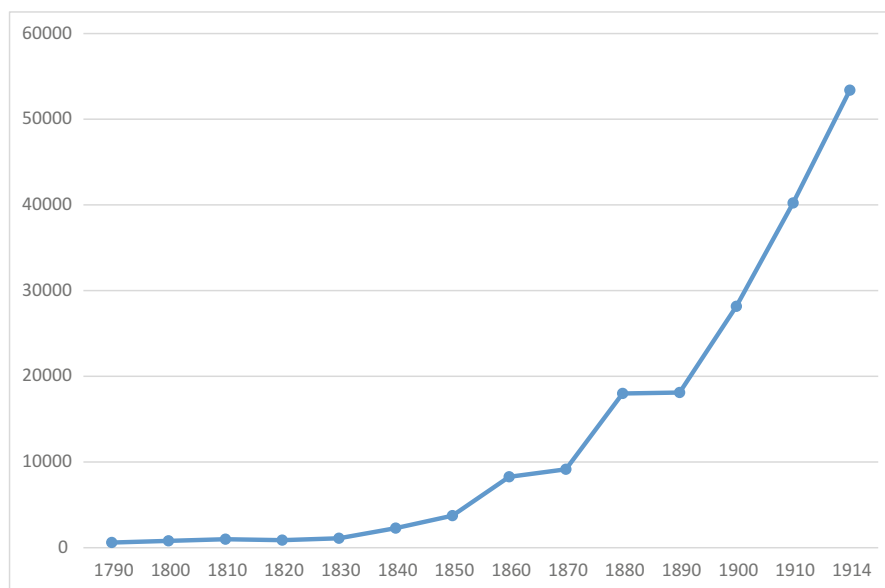
**Fig. 2** The United States cotton exports, 1793–1914 (in millions of lbs). (Source: U.S. Department of Commerce 1975: Series U 274–294)

a piece of British cotton cloth fell to five shillings. In the 1780s, the same piece of cloth would have cost 40 shillings (McCloskey 1985: 59). It is, however, the process of post-1850 expansion that is most remarkable. As the United States cotton exports rose almost sevenfold between 1850 and 1914 – even as ever-increasing volumes of fiber were consumed by America’s domestic factories – breathable and washable cottons came within the reach of the ordinary person for the first time (U.S. Department of Commerce 1975: Series U 274–294).

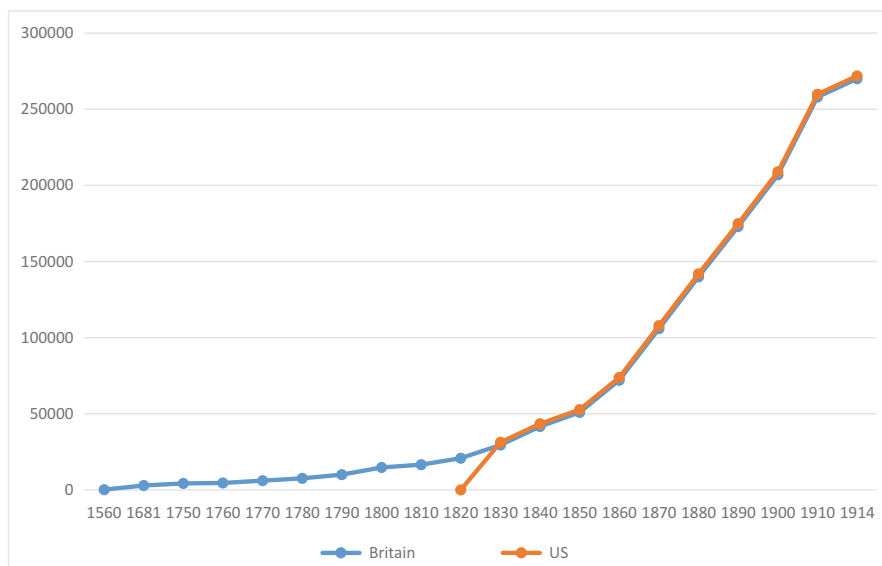
What explains the marked spike in the New World export of both woolen and cotton fiber after 1850? In brief, a revolution in shipping. Although wooden paddle steamers worked the Atlantic routes prior to the 1850s, they restricted their business to high-value passenger and mail services. By 1850, however, higher quality steel allowed for the construction of high-pressure “compound” (i.e., multiple cylinder) engines. Iron screw-propulsion also proved more efficient than side paddles. Greater production of iron and steel allowed for all-metal construction. The efficiency of the new technologies was demonstrated with the construction of the first iron ship using propellers instead of paddle wheels, the collier *James Bowes*. Undertaking its maiden voyage in June 1852, the ship hauled more coal in 5 days than two sailing ships could have carried in a month (Clapham 1932/1967: 71). By the mid-1860s, even though the tonnage of Britain’s sailing ships outnumbered that of the nation’s iron-bottomed ships by more than five to one, it was the latter that carried most cargo (Clapham 1932/1967: 71). The success of Britain’s iron and steel ships rested, in the first instance, on a revolution in shipbuilding. Indeed, by 1870, shipbuilding

represented the apex of Britain's industrial prowess, the typical shipyard employing 570 workers – far more than was the norm in either textiles or the iron and steel industry (Clapham 1932/1967: 116–117). The impact of this revolution in shipping on the all-important Atlantic routes – and by implication on routes connecting Europe with Asia and Oceania – can be ascertained by Fig. 3 which records the tonnage of ships calling in to the United States ports between 1790 and 1914. Once more, 1850 marks a fundamental turning point, the tonnage entering port growing by 221% across the decade. Interrupted by the Civil War, this spike in shipping – carrying migrants to the United States and grain, beef, and minerals to the Old World – continued until 1914 and beyond (U.S. Department of Commerce 1975: Series Q 506–517).

The revolution in shipping, which allowed for a massive expansion in the oceanic transport of people and produce, rested in the final analysis on a dramatic increase in iron and steel production, an increase that was only possible due a revolution in coal mining. As we noted previously in ► Chap. 9, “From Feudalism to Modernity, Part I: Management, Technology, and Work, AD 450–1750,” much of the explanation as to why Britain was the initial pacesetter in the Industrial Revolution is found in its successful exploitation of its coal deposits. By 1700, as John Nef (1932/1966: 322) recorded, “The entire production of the rest of the world did not perhaps amount to much more than a sixth of that of Great Britain.” From the 1830s, the extraordinary British achievement was matched by the United States, as coal production in both nations soared to unprecedented levels. As Fig. 4 indicates, which traces British coal output from 1560 and the United States production from 1820, an outwardly peculiar



**Fig. 3** Shipping tonnages at the United States ports, 1790–1914 (in thousands of tons). (Source: U.S. Department of Commerce 1975: Series Q 506–507)



**Fig. 4** British and the United States coal output, 1560–1914 (in thousands of tons)\*. \*British figures for period 1560–1914. The United States figures for period 1820–1914. (Sources: Pollard 1980: 216, 229; UK Department of Business, Energy & Industrial Strategy 2019; U.S. Department of Commerce 1975: Series M 93–103 and Series M 123–137)

feature of this expansion was the way in which British and the United States production rose in almost perfect tandem from 1830 to 1914. In 1860, for example, the United States production (73.9 million tons) shaded that of Britain (72 million tons) by the barest of margins. In 1914, on the eve of the First World War, a similar situation still prevailed, the United States output (271.9 million tons) exceeding that of Britain (270 million tons) by an inconsequential amount (Pollard 1980: 216, 229; UK Department of Business, Energy, and Industrial Strategy 2019; US Department of Commerce 1975: Series M 93–103, Series M 123–137). This unusual outcome is, however, suggestive of something more than historical coincidence. Rather it points to similar levels of demand, pursued with similar levels of managerial ingenuity, exploiting similar technological advantages.

In returning to the theoretical problem enunciated in our opening paragraph – i.e., was the first truly global economy a product of the Industrial Revolution (c.1750–1830) or of subsequent developments associated with revolutions in transport and communications? – we can conclude that Pollard, Chandler, Keynes, Smith, and Marx were all correct in emphasizing one *stage* of what was in effect a cascading series of interconnected revolutions. Initially, small technological improvements in textile manufacture caused entrepreneurs in Australia, New Zealand, and the United States to initiate managerial innovations that increased supply to the expanding factories. A growth in global logistics chains caused improvements in shipping. The growing importance of steam-powered ships and railroad locomotives in the

logistics chain was, in turn, only possible due to gains in iron and steel production; additions that rested upon a massive increase in coal output.

At first glance, it appears possible to explain the “first global economy” simply through reference to market economics, proof that a market economy is inherently superior to all others in bringing forth innovation and in matching supply with demand. While there is truth in this supposition, it is nevertheless the case that – as Keynes, Chandler, and Marx emphasized – the new global (and even national) markets were as much a creation of this period of history as a creator. In the final analysis, the gains made between 1750 and 1914 were ones made by people: not impersonal market forces. Moreover, every significant advance required a managerial revolution. It is certainly folly to think of the transformation underway by 1750 in terms of “technological determinism,” i.e., as a simple and inevitable flow-on from technological innovation. Nor is it correct to see the cascading series of revolutions that occurred between 1750 and 1914 as simply a product of steam power. For technological and managerial innovation manifested themselves in very different ways in different industries. The massive increase in Australasian wool exports that we identified in Fig. 1, for example, owed very little to steam power and much to a far more prosaic innovation: barbed wire. Realizing that in the benign Australian climate that sheep could be left overnight without protection, pastoral managers dispensed with shepherds, initiating instead a massive fencing project. In the then British colony of New South Wales alone, some 2.6 million kilometers (1.625 million miles) of fencing was built between the 1870s and the 1890s (Glover 2008: 32). Once completed, this fencing project eliminated the need for a significant pastoral workforce outside of the lambing and shearing seasons, when casual labor employed on piece rates was hired. As employment opportunities plummeted, the number of sheep soared, growing from 16.5 million in 1862 to 89.3 million in 1892 (Butlin 1964/1972: 67). This happy managerial outcome made the Australian pastoral sector the most efficient in the world. Despite employing a comparative handful of people, in 1886–1900 it was responsible for 12.8% of Australia’s gross domestic product (GDP). By contrast, the agricultural and manufacturing sectors, each of which employed far more people than the pastoral industry, were responsible for only 5.8% and 11.8% of Australian GDP, respectively (Butlin 1964/1972). In shipping, as well, the gains evident in Fig. 3 would have been impossible without a profound transformation on shipboard patterns of management and work. For the addition of steam power and screw-propulsion required the creation of an entirely new job hierarchy built around technical rather than traditional maritime skills. In turn, this demanded new systems of training, supervision, motivation, and shipboard communication, as those working below deck came to outnumber those employed above deck [Note: Between 1980 and 1988, the author worked as a seafarer both above and below deck on Australia’s last commercially operated steamer].

One of the problems associated with assessing the global economy between 1750 and 1914 is that we are dealing with not only economic and managerial relationships but also political and imperial relationships. In essence, the global economy during this period was primarily directed towards the needs of the industrial districts of the



Atlantic littoral, regions that sucked in foodstuffs and raw materials and spewed out an ever-increasing stream of manufactured products. In the economic relationships created by this pattern of demand and supply, it is a mistake to frame all our thinking in terms of dominance and subservience. Certainly, the wheat farmer on the United States prairies, and the woolgrower in Australia's continental interior, would have taken umbrage with any suggestion that they were subservient to the British wholesaler who purchased their annual output. In such circumstances, a better descriptor of the economic relationship would be interdependence. When we turn our attention to the placement of Africa, the Indian subcontinent and East Asia in the new global economy, however, we are dealing with societies that – if not subject to actual military occupation – were the victims of unequal and militarily imposed treaties. In the continental interiors of Australia and the Americas, and in Oceania, indigenous populations faced the destruction of their traditional ways of life even as many traded with local representatives of the new economic order. In reflecting upon this fact in his oft maligned, *The Clash of Civilizations and the Remaking of World Order*, Samuel Huntington (1996/2003: 51) made the pertinent observation that:

The West won the world not by the superiority of its ideas or values or religion (to which few members of other civilizations were converted) but rather by its superiority in applying organized violence. Westerners often forget this fact; non-Westerners never do.

Yet, even if unequal, economic relationships between the West and the established societies of Africa and Asia offered the latter benefits as well as subjugation. In the wake of the European armies trailed administrators, railroad engineers, bridge builders, doctors, and teachers. In India, British conquerors built the subcontinent's first railroad in 1853. By century's end, the region boasted 38,400 km (24,000 miles) of track. "In the space of a generation," Ferguson (2008: 169–170) observes, the railroads "transformed Indian economic and social life: for the first time, thanks to the standard third-class fare of seven annas, long-distance travel became a possibility for millions of Indians."

What is clear is that, by the closing decades of the nineteenth century, there was barely a corner of the globe that was not – for better or worse – part of the new international economy.

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## Industrial or Managerial Revolution? Britain, 1750–1830

Discussion of Britain's Industrial Revolution immediately conjures up William Blake's (1808/1969: 481) image of "dark Satanic Mills" consuming "England's green and pleasant land." For William Wordsworth (1814/1853: 297), as well, the new industrial factory was the embodiment of evil, "the master idol" that demanded "perpetual sacrifices" of "Mothers and little children, boys and girls." In fact, the Industrial Revolution that occurred between 1750 and 1830 owed more to managerial innovation than it did to steam power, McCloskey (1985: 66) describing it as "an age of improvement" in which managers maximized the benefits obtained from a

comparative “handful” of technological innovations. Even in cotton textiles, where mechanization advanced the most, only spinning witnessed the virtual elimination of hand-powered tools between 1750 and 1830. Other production processes remained the preserve of traditional technologies. One survey, conducted in 1830, estimated the number of power looms in cotton weaving across England and Scotland at no more than 60,000. By contrast, there were still 240,000 handlooms in operation (Clapham 1926/1967: 143).

The idea that the new textile mills were reliant on an unscrupulous use of child labor is also a misnomer. Yes, it is true that the early mills did scour orphanages in search of labor, adults showing an initial reluctance to enter into factory life. As mechanization took hold, however, children were found ill-suited to factory work, where increases in productivity were associated with literacy and training. By 1851, only 30% of English and Welsh children between the ages of 10 and 14 worked. Of those who did, only 15.4% of males and 24.1% of females were found in factories. Among girls, a greater percentage (25.3%) worked in domestic service, an industry where long hours and the likelihood of abuse were arguably worse than in supervised factory work. For boys, agriculture – an industry with many assorted perils – was the principal employer, giving work to 34.6% of those aged between 10 and 14 who were in some form of employment (Kirby 2011: 122–124). Spared work, a majority of children increasingly enjoyed something unique in history: a childhood devoted to schooling. Unlike children, however, who were soon displaced from factory work, females retained a long-term presence in textile manufacture. In 1851, when the first reliable occupational census was conducted, the 272,000 female cotton workers easily outnumbered the industry’s 255,000 males (Clapham 1932/1967: 24). For early Victorian England, this large female industrial workforce was a source of national shame, provoking royal commissions and protective legislation. These female workers were, however, arguably more beneficiaries of the Industrial Revolution than victims. As the great English labor historian, E.P. Thompson (1963: 452–453) noted, the “abundant opportunities for female employment . . . gave women the status of wage-earners.” In consequence, the “spinster,” the “widow,” and the “unmarried mother” were able to free themselves in large numbers from a reliance on male relatives.

On the demand side, the key driver behind the initial take-off of mechanized cotton manufacture was not domestic need but rather the circumstances that prevailed in the Atlantic slave trade. In this highly profitable trade, the principal item exchanged for slaves was textile fabric, Thomas (1997: 318) estimating that before 1750 some 85% of British textiles were exchanged for slaves. Even in the decades after 1750, when lower prices boosted domestic demand, some 40% of British fabric was destined for the “slave coast.” Unfortunately for British merchants, who shipped a record 200,000 slaves between 1740 and 1750 (Thomas 1997: 264), the quality of British fabric was often poor, forcing the importation of highly colored (and expensive) Indian “calicos” that were reexported aboard British slavers. Unsurprisingly, textile producers in the hinterland behind Liverpool and the other north England slave ports saw in this circumstance an attractive business proposition: the substitution of expensive Indian cottons with locally made product.

Although England had long boasted a cotton industry alongside the much more significant wool trade, “the quality of the product was rather poor, and its quantity insignificant” (Mantoux 1961: 199). To boost production, Liverpool’s merchants initially resorted to the same methods that characterized most “manufacturing” at the time: “putting-out” or outsourcing. This saw merchants purchase cotton and then outsource production to “weavers,” who then oversaw a complex process of further outsourcing and collection. Under this system, virtually all the spinning of fabric, and weaving of cloth, was devolved to the household sector, where spinning and weaving provided a significant supplement to agriculture income. The problem with the “putting-out” system was that it allowed for neither innovation nor supervision, outcomes that ensured a continuation of low output and indifferent quality. Between the 1760s and 1810, however, a series of primitive inventions (Hargreaves’s “spinning jenny,” Arkwright’s so-called “water frame,” Compton’s “spinning mule”), a medieval source of power (the water mill) and new systems of management overcame these problems, heralding the birth of what we think of as the Industrial Revolution.

Of the inventions that transformed textile production, the “spinning jenny” invented by James Hargreaves in 1764 was the most primitive. Consisting of little more than a wooden frame that was moved manually backwards and forwards, it nevertheless allowed a single worker to draw cotton fibers on to multiple spindles (Mantoux 1961: 216–218). A more significant “invention” was Richard Arkwright’s so-called “water frame” – so-called because, although most models were eventually located in water mills, in the 1760s the first examples were powered by horses. Too large for manual operation, the “water frame” twisted multiple strands of fabric into “a much stronger thread than the most skilled spinner could have made with a spinning wheel” (Mantoux 1961: 216–218). Only when the new mechanism was transferred to the banks of the Derwent River in Derbyshire, and located within water mills, was its potential realized, Arkwright’s own mill boasting thousands of spindles and 300 workers by 1799 (Mantoux 1961: 224). Like many entrepreneurs who enriched themselves in the Industrial Revolution, Arkwright appears to have been as much charlatan as genius. The plans for the invention that made him famous were, it appears, pilfered from others, namely, James Paul and John Wyatt, Arkwright himself having no previous “knowledge either of spinning or mechanics” (Mantoux 1961: 231). Arkwright’s real skill was as an entrepreneur and manager rather than as an inventor, taking an existing idea, modifying it and bringing it into commercial operation. Like Paul and Wyatt, the inventor of the “spinning mule,” Samuel Compton, gained little from his pioneering in 1779 of a device that “became the spinning machine *par excellence*” (Mantoux 1961: 237). Just as a mule supposedly exhibits the best attributes of a female horse and a male donkey, the “spinning mule” combined the best features of the “jenny” and the “water frame.” Not only was the spinning speed of the “mule” incomparably superior it also exceeded the quality of home-based craft workers, enabling “British manufacturers to outdo the renowned skill of Indian workers and manufacture ‘muslims’ of incomparable delicacy” (Mantoux 1961: 238). None of this production, however, occurred in factories owned by Compton, who vainly pursued legal action against those who profited

from his conception. So successful was the “spinning mule,” however, that by 1812, Britain boasted up to five million operational spindles, worked across hundreds of factories (Mantoux 1961: 237–238).

Much of the success of the early spinning contraptions is attributable to the fact that their construction required little in the way of either capital or skill. Their attractiveness was also enhanced by the fact that they could be powered from a plentiful and inexpensive source of energy, i.e., running water. In 1788, almost three-quarters of England’s 123 cotton mills were located along mountain streams in the Pennines (Lancashire, Yorkshire, Derbyshire, and Nottinghamshire). Of these, almost half were in southern Lancashire, adjacent to Liverpool’s merchants and slave traders (Mantoux 1961: 248). Indeed, the very ease with which one could enter the industry soon proved a major problem for cotton manufacturers as a surge in output drove down prices and profits. It was in this competitive environment that another revolutionary invention, the Boulton and Watt steam engine, gained acceptance. Although the Newcomen steam engine had been used in the coal industry since 1712, the Boulton and Watt engine, manufactured at the Soho factory near Birmingham, differed in being small enough and cheap enough for generalized use. Admittedly, installation of steam engines incurred costs, both in terms of capital investment and running costs (i.e., coal), that were not suffered in water-powered mills. However, numerous cost advantages offset such expenses. As James Watt explained to a potential Scottish customer in 1784, his firm’s engines were “certainly very applicable to the driving of cotton mills, in every case where the convenience of placing the mill in a town, or ready-built manufactory, will compensate for the expense of coals” (cited, Mantoux 1961: 334). The practicability of coal-fired steam engines was also enhanced by the completion of a system of canals across the English Midlands, the first such canal (the Bridgewater Canal) linking Manchester to Lancashire’s coalfields in 1761. A second canal, the Birmingham Main Line, linked Birmingham with the coalfields of the English “Black Country,” a spur line passing the door of Boulton and Watt’s Soho engine factory. This boost to the fortunes of steam engine manufacture was due to more than fortunate happenstance. Prominent among the Birmingham Canal’s private underwriters was Mathew Boulton, the Soho factory’s senior financial partner. The new canal system did more, however, than bring coal within reach of England’s industrial consumers. It also effectively created the world’s first mass market, allowing factories a cheap means of accessing raw materials, wholesalers, retailers, and other end-users. Such was the extent of the English canal system by 1830 that visitors from continental Europe often ascribed the nation’s economic success to its creation. In 1825, for example, a French traveler, Baron Charles Dupin (1825: 181), advised his readers how England’s canals providing an indispensable linkage between “opulent ports; industrious towns; fertile plains; and inexhaustible mines.”

The first stage of the revolution in textile manufacture, it must be emphasized, only related to the *spinning* of yarn. The *weaving* of cloth was still, in large part, done by hand. To avoid the well-known problems of outsourcing, which gave

management little direct control over quality, managers often brought weavers within the newly constructed factories as well. This “solution,” and indeed the new factory system as a whole, brought with it a host of new problems for management. Weavers, long used to an independent existence, soon became dissatisfied with a proletarian existence. Intense competition added to downward pressure on wages, Pollard (1965: 91) observing of the cotton industry, “It was an environment encouraging ruthlessness, not only towards one’s competitors, but also towards one’s employees.” Despite the passage of the *Combination Act 1799*, which outlawed trade unionism, a flourishing of labor organizations occurred across the entire textile industry. In 1812, discontent manifested itself in the most extensive strike ever experienced in Britain to that time. As Sidney and Beatrice Webb (1902: 52) record in their *History of Trade Unionism*, “From Carlisle to Aberdeen every loom stopped, forty thousand weavers ceasing work simultaneously.”

In many ways, the workforce’s propensity to unionize and engage in strike action was the least of management’s problems, not only in the textile industry but also across all the sectors characterized by automation (brewing, potteries, engineering, and mining). The problems faced by management during this period are best summarized by Pollard in the introduction to his classic study, *The Genesis of Modern Management*. Unlike “the builders of the pyramids,” Pollard (1965: 7) corrected identified, the managers of the early industrial age had to relate production efforts “to costs,” selling their output into highly competitive markets. To achieve this end, managers pioneered what we think of as “cost accounting,” generating estimates of costs at each *stage* of the production process. “In the most advanced works,” such as Boulton and Watts’s Soho engineering work, “departmental accounts would attempt to keep the returns of departments separate, down to elaborate schemes for allocating overheads fairly and proportionately” (Pollard 1965: 222). Often these early attempts at cost accounting were crude, if not misleading. Such failings, however, reflected the historically unique circumstances in which managers found themselves. As Pollard (1965: 215) explained, in managerial cost accounting “there was no tradition, no body of doctrine, no literature worthy of the name.” Despite these difficulties, Pollard (1965: 209) nevertheless argued that, “the development of accounting for industry . . . was one of the two main responses of large firms to the problems of management in the Industrial Revolution.”

The second key response of larger firms to the Industrial Revolution was the realization that they needed a class of skilled salaried managers who stood in an intermediary position between the firm’s owners and shop-floor foremen and supervisors. As with cost accounting, the emergence of a class of professional managers was an historic novelty, regarded with suspicion by many of society’s leading members. Writing at the dawn of the Industrial Revolution, Adam Smith, for example, correctly identified the emergence of a class of professional directors and managers as one of the seminal events of his time. Rather than seeing this new class as agents of a more productive society, however, Smith saw them as an impediment to progress, declaring that “being the managers of other people’s money rather than

their own, it cannot well be expected that they should watch over it with the same anxious vigilance [as] . . . their own” (Smith 1776/1999: Book V, Chap. 1, Article 1, para. 18). As there were no business schools or colleges given over to the training of managers, most firms initially recruited managers internally, either through the delegation of family members or by promoting workers from the shop floor. Firms slowly realized, however, that although technical knowledge was a useful attribute in running a business, it was not as important as general managerial ability: a capacity to identify operational problems, recruit and motivate staff, match supply with demand, and look for innovations not enjoyed by competitors. Pollard (1965: 127) notes that Britain’s “northern collieries” were probably the largest suppliers of managers to Britain’s expanding factories and mills. As Nef (1932/1966: 322) had correctly identified, this industry experienced “capitalistic forms of industrial organization” at an earlier stage than any other sector. The industry also pioneered the use of steam power in 1712 with the introduction of the first Newcomen engines. Competition was also historically fiercer, and workforces larger, in coal mining than elsewhere. Strikes and nascent forms of trade unionism were also a common feature of the northern coalfields. All of these experiences, garnered in the hard life of the coalfields, were invaluable elsewhere.

The propensity of workers to engage in disruptive strikes points to another managerial response evoked by the Industrial Revolution: the need to recruit, supervise, and motivate a large class of mechanically minded workers, most of whom boasted skills that would have been unimaginable a generation earlier. Of all the attributes that managers had to inculcate in their workers, however, none was more vital than punctuality and awareness as to the passage of time, E.P. Thompson (1967: 85) arguing “that the contest over time” was seminal to the ultimate success of the Industrial Revolution. Unlike outsourced handicraft work, where it made little difference when a worker chose to commence the operation of their handloom or spinning wheel, a mechanized factory could not operate upon the basis of workers strolling in and out whenever they felt like it. In a world where only the wealthy owned watches the factory siren – announcing various warnings as to the start of the next shift, as well as the commencement and conclusion of meal breaks – became a defining characteristic of the new industrial towns and villages. Whereas people had previously only measured time through reference to the rising and setting of the sun, workers and managers now fought each other over the hours and even minutes of work. Campaigns for the 10-h day and, subsequently, the 8-h day, were a ubiquitous feature of every mechanized industry. Unscrupulous managers, for their part, manipulated the work clocks, one Scottish worker complaining: “The clocks at the factories were often put forward in the morning and back at night, and instead of being instruments for the measurement of time, they were used as cloaks of cheating and oppression” (cited Thompson 1967: 86). Often reduced to the level of petty mindedness, the managerial struggle to impose time discipline on their workforce was nevertheless vital to the very future of industrial civilization. For without control over time, no other form of managerial planning and control can have any meaning.

Profound as they were, the industrial and, more importantly, the managerial effects of the transformation that occurred in Britain between 1750 and 1830 were,



as we have previously noted, largely confined to a minority of the workforce. Outside of textiles, engineering, potteries, coal mining, and brewing, “the applications of novel machinery and of steam power were only tentative” (Clapham 1926/1967: 156). As Figs. 1, 2, and 3 indicated, the effect of the initial stage of the Industrial Revolution on global supply chains was also comparatively modest. The highly profitable slave trade, which provided much of the custom for British textiles, remained geared towards the production of coffee, tobacco, and, above all, sugar, rather than cotton. Most cotton still arrived in Britain from India and Egypt. When the first eight bales of American cotton arrived at Liverpool’s wharves in 1784, disbelieving customs officers seized it as contraband, not crediting Americans with the wherewithal needed to produce and export such fibers (Mantoux 1961: 201, Footnote 3). Even sugar, which remained the backbone of the plantation economies of the Americas, remained a luxury item in the second half of the eighteenth century. Only with the post-1850 revolution in shipping did sugar become an item of everyday consumption. Whereas prior to 1850, Mintz (1985: 148–149) observed in his study of the global sugar trade, sugar “did not make a significant caloric contribution to English working-class diet,” after 1850 it became the “most important addition to the British working-class diet.” By 1900, sugar – consumed either with tea or in the form of confectionary, biscuits, cakes, and “puddings” – made up a sixth of the British working-class diet (Mintz 1985: 149).

Although British manufactured exports prior to 1830 were miniscule compared to what was to follow, they were not without their global effects. Nowhere was this more evident than in the trade with India. As Marx (1853/1951: 315) noted in his study of *British Rule in India*, “From immemorial times, Europe received the admirable textures of India,” produced by “myriads of spinners and weavers,” paying for these magnificent textiles with “precious metals.” As we noted above, prior to Compton’s invention of the “spinning mule,” Europe was incapable of matching the high-quality yarn and fabric of Indian “calicos.” By the 1820s, however, the boot was firmly on the other foot. Not only did Britain’s manufactured product drive Indian textiles out of European markets, they also began the conquest of India’s home market. Between 1818 and 1836, Marx (1853: 315) noted, British textile exports to India rose 5200-fold. By 1824, British was selling 1,000,000 yards of cloth (914,000 m) into the Indian market. Thirteen years later, this total had risen to 64,000,000 yards (58,521,600 m). The social consequences were devastating, Marx (1853/1951: 313), advising his readers that, “the misery inflicted by the British on Hindostan [India] is of an essentially different and infinitely more intensive kind than all Hindostan had to suffer before.”

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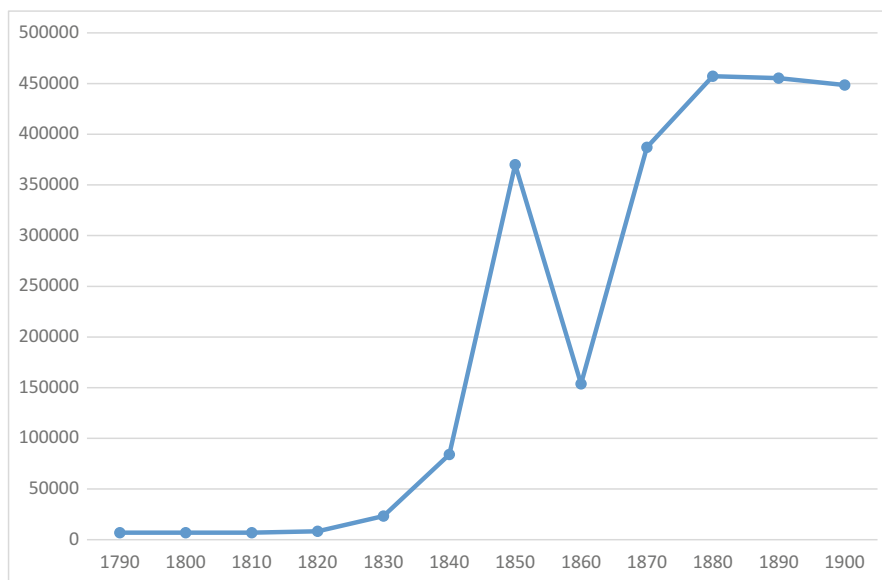
## Conquering Time and Space: The Global Economy, 1830–1890

In arguably the most influential work in Australian business and management history, *The Tyranny of Distance*, Geoffrey Blainey (1966: 70) observed “that anyone circumnavigating the [Australian] continent in 1800” – more than a decade after initial European settlement – “would have seen, after sailing from Sydney, only

smoke rising from aboriginals' fires in remote places." Thirty years later not much had changed, European settlement amounting to little more than a collection of "isolated ports," some "flourishing," others "gasping or dead." A number of these isolated ports (Brisbane, Newcastle, and Hobart) were convict settlements. Others were the temporary abode of whalers and sealers, busily engaged in the mass slaughter of local marine life. Not only were European settlements in Australia and New Zealand remote from each other, they were also a long way from the European heartlands. The first fleet of convict ships to arrive in Australia took more than 9 months to sail the route from England, arriving in Sydney in January 1788. By the early 1850s, when the discovery of gold brought a rush of immigrants to Australia, things had theoretically improved due to the arrival of American-designed (and often built) "clipper" ships on the Australasian route. "The American clipper," Blainey (1966: 70) noted with admiration, "was the consummation of centuries of shipbuilding, the most glamorous ship that ever went before the wind." Although famously associated with the transport of the "American 49ers," the gold-seekers who ventured to California in 1849 in search of riches, it was the Australian route that held the key to the economic success of the clippers (Blainey 1966: 183). Capable of covering 400 miles per day (644 km), the clippers dramatically reducing sailing times, one skipper (dubiously) claiming to have undertaken the voyage to Australia in 74 days (Blainey 1966: 191). Even on the clippers, however, the journey to the Antipodes was no idyllic cruise. Under the battering of the Southern Ocean, the condition of the clippers rapidly deteriorated. William O'Carroll (1862/1863: 430–431), an Irish immigrant, described the ship that carried him to Australia as "a wretched, crazy-looking hulk, miserably provisioned in every respect." Another immigrant recounted how, "Our skipper was an uneducated man, who treated all passengers like dogs . . . We had but sixteen sailors, three of whom were all more or less disabled. But for the passengers, the ship would never have been worked" (cited Jordan 1864: 926). Personal tragedies were all too common, one immigrant recounting how "a child of mine was one of the many that died aboard the ship . . . from absolute exhaustion produced by a want of sufficient food" (cited, Queensland Government 1863: 431).

Although the remoteness of Australia and New Zealand made voyages to these destinations particularly arduous, there were comparative few who even risked the perils of an Atlantic crossing before the 1850s. As Fig. 5 indicates, few people immigrated to the United States before 1850, when a record 369,980 people arrived in the American republic, many of them fleeing the great Irish "potato famine." This single-year total far exceeded the *combined* total recorded between the ending of the War of Independence (1783) and 1819, during which time a mere 250,000 immigrants dared the Atlantic crossing. Even in 1840, when 84,060 individuals made the journey, the level of immigration was only 22.7% of that recorded a decade later. Interrupted by the Civil War, immigration returned to, and then exceeded, its pre-conflict peaks after the ending of the hostilities. Between 1880 and 1900, some 450,000 new citizens typically landed each year (U.S. Department of Commerce 1975: Chap. C, 97). As we noted in the introduction, the key to the post-1850 transformation was a revolution in shipping, underpinned by a massive expansion in

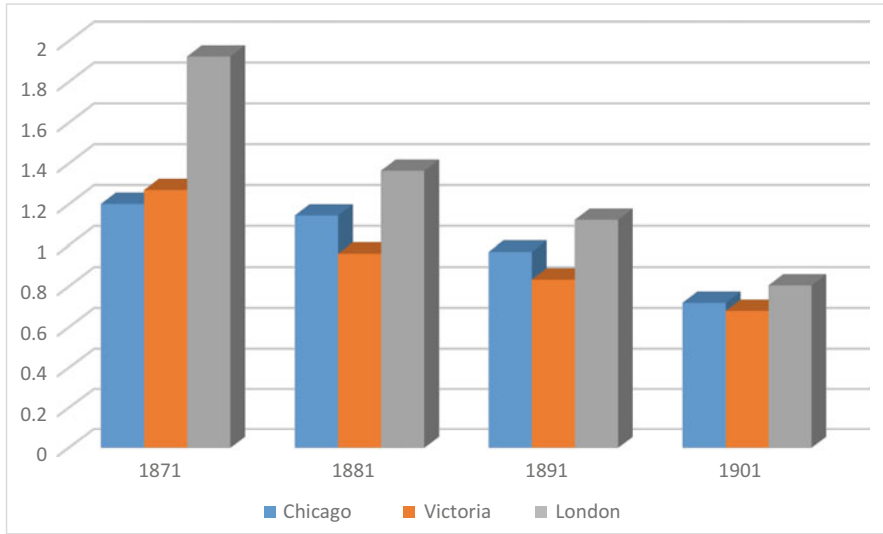




**Fig. 5** Immigration to the United States, 1790–1900. (Source: U.S. Department of Commerce 1975: Series C 89–119)

iron and steel production and coal output. On the Atlantic route after 1830, first steam-powered paddle wheelers, and then iron-hulled screw-propulsion ships, rapidly displaced sail. Screw-propulsion ships were also sturdy enough to risk voyages in the Southern Ocean, a region where paddle steamers feared to go. In Australia, a flood of new arrivals made Melbourne the second city of the British Empire, the city's metropolitan area boasting a population of 387,000 by 1890. Thousands more lived in adjacent urban areas. In this sophisticated New World city, no more than wind-swept wilderness in 1830, some 2.7 million passengers commuted to work on the suburban rail network in 1890–1891. Millions of others commuted on the city's steam-powered cable cars (Speight 1892).

The creation, for the first time in human history, of a genuine global economy, characterized by the free movement of people and goods on an unprecedented scale, was the great novelty of the 1830–1890 period. As urban life became the norm across Western Europe and the eastern seaboard of the United States, so whole nations became utterly dependent on logistics chains that stretched around the globe. This dependency was most evident in wheat, the staple of the European diet. Writing of the role of the railroads in the post-1850 agricultural settlement of the New World, Walt Rostow (1963: 14) observed how, the “rising grain prices of the 1850s . . . made the massive laying of the rail lines attractive.” Although there were local benchmark prices for grain – the Chicago wholesale price assuming a position of preeminence in the United States – the creation of a single global market made the London benchmark the ultimate arbiter of price. The good fortune of a wheat farmer in Manitoba (Canada), Victoria (Australia), or Minnesota (the United States) rested not



**Fig. 6** Benchmark wheat prices: Chicago, London, and Victoria, 1871–1901 (historic US dollars). (Sources: *Victorian Statistical Register* 1871–1902; Wallace 1930)

only on their efforts, and the benevolence of local climate, but also on the global balance between supply and demand. Reflecting on the compression of global wheat prices in the latter half of the nineteenth century, the American economist and sociologist, Thorstein Veblen (1892: 82), in an article entitled *The Price of Wheat Since 1867*, identified 1882 as the “turning point” after which date prices were determined by “the aggregate volume of the world’s crops.”

As Fig. 6 indicates, in 1871, there was a significant price difference between what wheat wholesaled for in London when compared to either Chicago or Melbourne, then Australia’s largest city. Whereas the London benchmark price averaged – when expressed in historic US dollars – \$1.92, the benchmark price in Melbourne and the other port towns of Victoria averaged two-thirds of this (\$1.27). In Chicago, the benchmark wheat price (\$1.20) was 62.5% of the London wholesale price. This price differential made the growing, export, and transport of wheat and other grains (barley, corn, oats, etc.) a highly profitable affair. As railroad expansion brought an ever increasing acreage into production, however, the world grain market came to favor buyers rather than sellers. By 1901, the London benchmark (\$0.81) had lost 58.2% of its 1871 value (Wallace 1930; Dunsdorfs 1956; Victorian Government 1882, 1902). As falling London prices rippled through the global market, the prices paid to New World farmers collapsed. By 1901, the Victorian and Chicago benchmark wheat prices were, respectively, a mere 46.4% and 40.1% of their 1871 levels.

The creation of a global market place, organized around revolutionary new technologies, created unprecedented levels of competition. At the heart of this global economy was something fundamentally new in the human experience: the *creation* of wealth through the *destruction* of economic *value*. In other words, the *value* of

any given commodity (wheat, cloth, and oil) became constantly cheaper for the consumer due to increased supply, an outcome that left any producer utilizing constant inputs (labor, technology, and raw materials) with ever shrinking profits. In almost every area of life, a process of price deflation necessitated technological innovation, greater economies of scale through firm consolidation, and greater levels of managerial expertise. In textiles, the real purchase price for a meter of British factory-made cloth in 1860 was 13% of that charged in 1780 (McCloskey 1985: 60). In the oil industry – where the discovery of large reserves in western Pennsylvania in 1859 made kerosene lamps an affordable household item – the price of a Pennsylvania “barrel” (42 gallons or 159 litres) collapsed in the face of increased supply, falling from \$12 in 1864 to \$2.40 in 1866 (Chernow 1998/2004: 129). Not only was there a tendency for prices to fall, the same propensity was also evident in employment. In Britain, for example, the population in 1901 (37 million) was 76.2% higher than it had been in 1851 (21 million). As Figs. 1 and 2 indicated, the importation and manufacture of woolen and cotton fibers was vastly higher than it was earlier. Nevertheless, as Clapham (1932/1967: 29) indicated, the British textile industry employed fewer people (994,000) in 1901 than it did a half century before (1.1 million). The capacity to make more goods with fewer people caused Marx (1867/1954: 635–637) to identify an inevitable social cataclysm, in which increased productivity led to vast numbers of unemployed: what he referred to variously as “relative surplus-population” and “an industrial reserve army.” What Marx failed to understand with this erroneous prediction was that technological and managerial innovation created entirely new industries: electricity, automobiles, and retail department stores. Such outcomes were not a mere by-product of industrial “take-off.” They were a precondition for sustained growth in both production and employment. As Rostow (1963: 9) noted in his famed study of industrial “take-off,” sustained economic growth in industrial societies always “requires the organization around new technology of new and vigorous management; new types of workers; new types of financing and marketing arrangements. It requires struggle . . . against the constraints of the traditional society.”

Falling prices across virtually every economic sector reflected more than simply increased supply. It reflected what Joseph Schumpeter (1950/1975: 84) described as a fundamentally new type of competition “which strikes not at the margins of the profits and the outputs of the existing firm but at their very foundations and their very lives.” Famously describing this process as “creative destruction,” Schumpeter (1950/1975: 84) argued that the new type of competition was not, primarily, caused by price differentials. Rather, it was characterized by the replacement of outdated forms of technology by more advanced manifestations, and by the displacement of old forms of firm organization by “the new type of organization (the largest-scale unit of control for instance).” In the period between 1830 and 1890, this process of “creative destruction” took many forms. In the British cotton-spinning industry, the first to experience mechanization, there were no technological transformations comparable to those which occurred in the pre-1830 period. Gains stemmed instead from “continuous minor improvements” as factory managers experimented with variations in machine parts and work practices (Clapham 1932/1967: 80). The

collective effect of these incremental managerial improvements was profound. Whereas the average mill hand spun 3700 pounds of yard in 1859–1861, by 1880–1882, the typical textile worker was spinning 5500 pounds of yard – a 48.6% increase (Clapham 1932/1967: 81). A far more brutal example of “creative destruction” was provided by the United States oil industry, where John D. Rockefeller’s Standard Oil Company gained a near monopoly of the production, refining, and transport of crude, allowing Rockefeller to buy cheap and sell dear. First, Rockefeller drove rival refiners out of business through a secret agreement with America’s major railroad companies – the Pennsylvania, the New York Central, and the Erie. From 1871, Rockefeller received a discount price for the transport of his oil, allowing him to undercut his rivals. Rockefeller then destroyed the oil custom of his railway partners, constructing pipelines to the eastern seaboard from whence refined product was shipped to Europe (Chernow 1998/2004: 135, 219). Ruthlessly destroying all opposition, and corrupting the political process to obtain his personal ends, Rockefeller has understandably suffered poor press. Yet, it was largely due to his efforts that the oil industry made the strides it did between 1860 and 1890. As Chernow (1998/2004: 151) notes, “When Rockefeller took over competing refiners, he retained plants with up-to-date facilities and shuttered obsolete ones.” Rockefeller not only conceptualized the idea of a network of oil pipelines, he also made it a reality.

Of all the industries that characterized the global economy of the mid-nineteenth century, none was more important – and more managerially complex – than the railroads. Everywhere, in both the Old World and the New, the railroads were at the center of economic advancement, assembling huge workforces and requiring a complexity of managerial organization unprecedented in human history. In the vast continental spaces of North America, Australia, Russia, Mexico, Argentina, and India, the railways assumed particular importance. Commenting upon nineteenth century American railway development, Stromquist (1987: 5) observed how the railroads “created the connecting sinews of a national market for American manufactured goods and an international market for the agricultural surplus of the West.” A similar comment is applicable to virtually every other New World society. For the hundreds of thousands who entered into railway service, working life was shaped by where one stood in a complex job hierarchy. At the bottom of the pecking order was a host of semiskilled occupations that included navvies, porters, and freight handlers. At the top of the job hierarchy were the skilled craftsmen in the workshops and the engine drivers on the locomotives. Invariably, the railroads overshadowed other nineteenth century business organizations in terms of not only the size of their workforces but also in their level of capital investment. Of the mighty Pennsylvania Railroad, Chandler (1977: 204) noted that in 1891 it employed more than 110,000 workers, a number that exceeded the combined total of the United States defense forces and the postal service. In the Australian colony of Victoria – where the railroads were less important than in the geographically larger, pastorally oriented colonies of New South Wales and Queensland – the capital invested in state-owned railroads between 1886 and 1890 exceeded private sector investment in agriculture, the pastoral sector, mining, manufacturing, and non-residential construction, combined (Linge 1979: 210–211).

## Alfred Chandler, Railroads, Management, and Markets

Nineteenth-century railroads have a special significance in business and management history due to their centrality to Alfred D Chandler, Jr's, schema: an analysis that provides a sweeping but well-researched explanation as to the rise of the modern world that has had a profound theoretical influence over the last half century. Initially spelt out in an article published in *Business History* in 1965, "The Railroads: Pioneers in Modern Corporate Management" – and then more fully in *The Visible Hand: The Managerial Revolution in American Business* and *Scale and Scope: The Dynamics of Industrial Capitalism* – Chandler (1965, 1977, 1990) argued a number of key propositions. First, he reasoned that it was the railroads rather than canals that were responsible for the world's first mass markets. It asserting this proposition, it should be noted, Chandler (1965, 1977, 1990) was well aware that by 1830 canals were already carrying significant volumes of bulk freight in not only Britain but also in the United States and most other Western European societies. Nevertheless, Chandler argued that canals were best suited for low-value bulk commodities (coal, grain, etc.) and ill-suited to either large-scale passenger movement or the haulage of high-value manufactured goods. Although the noted American economist, Robert Fogel (1962, 1964), mounted a case for the continued importance of canal systems during the "railroad age" – pointing to the fact that the United States canal freight tonnages were comparable to those of rail well into the nineteenth century – most historians accept Chandler's argument that railroads offered qualitative and quantitative advantages over canals. Unlike the canals of northern Europe and North America, railroads did not freeze over in winter. Unlike canals, they could also transverse the dry continental interiors of South Africa, the Ukraine, India, Australia, Argentina, and North America with relative ease. Above all, they "provided the fast, regular and dependable transportation and communication so essential to high-volume production and distribution" (Chandler 1977: 79). The railroads also made long-distance travel an inexpensive exercise. In France, for example, prior to the coming of the railways, it took up to 5 days to travel from Paris to the nearby Norman town of Caen. With the coming of the railroad, this journey could be comfortably completed in a few hours, regardless of the weather or the season (Braudel 1986/1990: 473). The railroads also facilitated the creation of entirely new industries. The movement of livestock by train, for example, allowed for high-volume meat-processing plants. In the vast spaces of the Argentine pampas, the American prairies and the Australian outback, railroads allowed commercial cattle-raising on an industrial scale. Refrigerated freight trains brought affordable meat supplies to the family table. Mail-order catalogues permitted even remote farming household a capacity to peruse and purchase the latest fashion, knowing that the sought-after item would be delivered within a short span of time.

If Chandler's argument that the railroads created the first mass markets has attracted broad agreement – Braudel (1986/1990: 467) noting with regard to the French situation that "before the coming of the railways, France was not really a national market" – his other propositions are more contentious. For whereas classical

economics argued that it was market forces that determined the relationship between supply and demand in a capitalist economy, Chandler argued a fundamentally different proposition. On the opening page of *The Visible Hand: The Managerial Revolution in American Business*, Chandler (1977: 1) stated that although the “market” still generated *demand* for goods and services, the “modern business took over the functions of coordinating flows of goods and services through existing processes of production and distribution.” At a subsequent point in *The Visible Hand*, Chandler (1977: 12) articulated his position in more unambivalent terms, arguing:

The visible hand of management replaced the invisible hand of market forces when and where new technology and expanded markets permitted a historically unprecedented high volume and speed of materials through the process of production and distribution.

It is clear that Chandler’s key thesis as to the relationship between management and markets was influenced by Oliver Williamson’s (1976: 8–9) understandings of “transaction cost economics.” This framework holds that the uncertainties of market exchanges create costs for a firm that are often higher than if they were internalized (i.e., it would be cheaper if the firm produced a good itself rather than purchasing it in the marketplace). Chandler’s analysis, however, went much further than Williamson as he brought to the fore *the* most important issue in economics and management studies, namely the relationship between management and markets. In Chandler’s view, *modern* management differed from *premodern* management precisely, because new technologies had created mass markets that exposed producers in one location to competition from more efficient firms located in distant locales. At the same time, Chandler believed, modern management also had far more tools at its disposal (improved communication, better understanding of consumer demand, and a greater understanding of costs) than previously, allowing it a proactive capacity to not only match supply to demand but also the ability to manipulate consumer perceptions and create new markets. Such explanations provide a more original insight into the *actual* workings of modern capitalism than what is typically found in economic textbooks, where most lend support to John Stuart Mills’s (1848/1965: 795) premise that “every restriction” of competition “is an evil, and every extension of it . . . is always an ultimate good.” For large modern firms invariably seek to destroy rather than facilitate competition. The reasons for this are *not* those typically expounded by economists, who link reduced competition with monopolistic behavior and *higher* prices. Instead, the drive to reduce competition stems from the problems inherent in business operations where most costs are found in capital investments rather than in labor or variable costs. As became obvious in the railroads of the mid-to-late nineteenth century, a highly capitalized business typically gains little by curtailing production when selling at a loss. Most of its costs are fixed and thus incurred whether or not the business produces anything, meaning that some income is better than none. Accordingly, as the nineteenth century American economist, Arthur Hadley (1885: 40, 70–71) noted, “Whenever there is a large fixed investment, and large fixed charges, competition brings price down below cost of service . . . . Then

we have bankruptcy, ruin to the investor.” In such situations, the logic of production leads to continued output that flies in the face of the logic of the market, which calls for curtailment of production when supply matches demand. Invariably, problems of this sort are resolved not by the “market” but rather by proactive managerial initiative that manifests itself in a number of ways: firm mergers, selling cartels, reorienting production towards other markets, etc.

Chandler (1990: 253) also famously argued that the railroads of the nineteenth century were responsible for the “first managerial hierarchies with lower, middle, and top levels of management.” Even in Britain, Chandler (1990: 253) suggested, management as we understand it (i.e., a class of professional managers organized in a hierarchy) only emerged through the demands imposed by the railroads. Previous factory manifestations were, in his opinion, less consequential. In the case of the United States, Chandler (1977: 3) argued, “as late as 1840 there were no middle managers.” Only with the railroads did the nation first witness this social novelty, an innovation that was soon replicated in other industries. Where the United States differed from other nations, Chandler (1977, 1990) believed, was not in the “managerial hierarchies” that were common to all but rather in the pioneering of a new form of business organization: the “multiunit enterprise.” With this organizational structure, “autonomous units” were given the capacity for strategic decision-making while garnering the financial, buying, and marketing resources of the entire organization. This could see a firm organized around geographical divisions (i.e., mid-western states, mountain states, etc.), functional divisions (i.e., freight haulage, passenger services, marketing, etc.), or a combination thereof. In Chandler’s estimation, the reason behind the supposed American pioneering of the “multiunit enterprise” is found in “the geographical extent” of the American nation. Put simply, a geographically larger and more populous nation demanded the construction of a “far greater mileage . . . than in other industrial countries” (Chandler 1990: 53). This high American mileage, Chandler believed, entailed a complexity of managerial problems that was beyond the capacity of a single chain of command, necessitating a delegation of responsibility to semiautonomous units.

Although few business or management historians would disagree with Chandler’s assessment that the railroads were central to the creation of a modern global economy, many would quibble with his suggestions that American managerial performance was inherently superior to that of all other nations, either within the railroads or without. Where Chandler saw in the railroads of nineteenth century America a story of efficiency and human progress, others (Kolko 1965; Berk 1994; Perrow 2003; White 2011) perceived a tale of rapacious greed, squandered resources, and the building ahead of a demand that, not infrequently, never arrived. Of the vast transcontinental railroads built across the United States from the 1860s onwards, White (2011: xxxvii–xxxviii) declares them “transformative failures” that “never paid for themselves.”

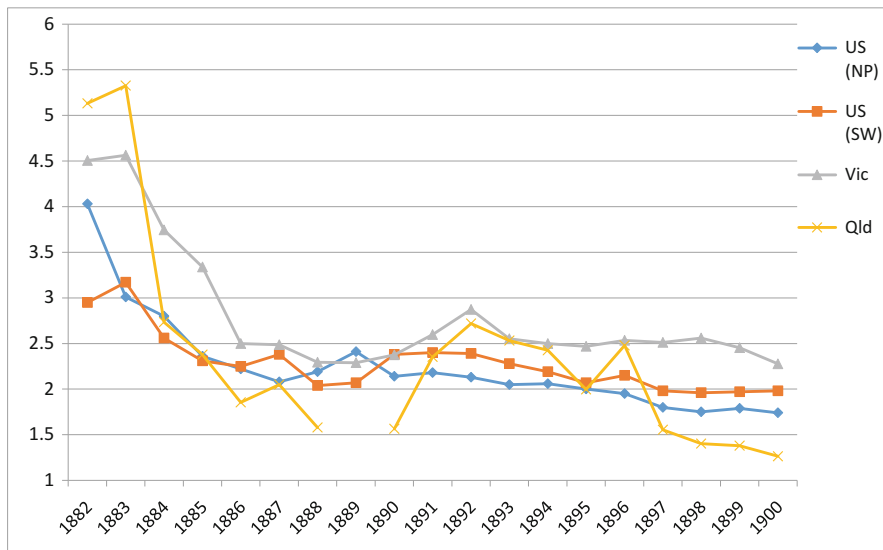
Certainly, the claims by Chandler as to the managerial efficiency of America’s nineteenth century railroads appear at first glance to be contradicted by the fact that many were constantly on the verge of bankruptcy. The business circumstances of the railroads west of the Mississippi River, which relied upon agricultural custom, was



particularly precarious, one newspaper editor recording how “the [financial] condition of the railroads is deplorable in each Western state” (Robinson 1890: 23). Chandler explained away such difficulties in three ways. First, Chandler (1977: 134) suggested, financial difficulties primarily stemmed from competition, which produced not only negative attributes (bankruptcies) but also positive attributes (innovation and efficiency). Secondly, he pointed – as Adam Smith (1776/1999: Book V, Chap. 1, Article 1, para. 18) had done before him – to the fact that investors and managers had distinct and separate interest. Of America’s railroad managers, Chandler (1977: 171) observed that, “They were willing to risk bankruptcy to assure the continuing, long-run flow of traffic across their tracks. Even if the investors lost their investments, the managers had their [rail] system.” Finally, Chandler (1977: 126) noted that railroad freight rates were tied to the custom being carried, and that managers could only “charge what the traffic would bear.” Accordingly, the haulage of low-value freight – while socially and economically beneficial – was often unprofitable.

While there is merit in all three of Chandler’s explanations, there are also serious flaws in his thinking that highlight a common failing of management historians. Whereas economists typically overstate the importance of market forces and understate the proactive role of entrepreneurs and managers, the analysis made by management historians often suffers from the reverse problem, i.e., they overstate the proactive capacities of managers and understate the continuing importance of markets. As I (Bowden 2017: 301) argue elsewhere, the fundamental problem with Chandler’s analysis stems from a lack of understanding of market forces. For when Chandler refers to “competition,” he is referring to competition between railroads in meeting a *direct* demand (i.e., people want to ship their wheat by rail). However, when he is referring to charging “what the traffic would bear,” he is referring to *derived* demand (i.e., a baker in London wants wheat from which they can make bread). The fundamental problem that New World railroads suffered from is that they were *always* at the mercy of far-distant sources of derived demand. By increasing mileage in virgin territory, and bringing land under the plough, they were creating not only new sources of revenue. They were also creating the mechanism for eventual global oversupply. This is evident in Fig. 7, which compares the per ton freight income received by the railroads of two Australian colonies – Queensland and Victoria – with that obtained in two American regions, namely, the Northern Plains (Minnesota, Nebraska, Iowa, Wyoming, Montana, and the Dakotas) and the South-West (Arkansas, Kansas, Colorado, Missouri, New Mexico, Oklahoma, and Texas). Given the fact that Australian railroads were state-owned monopolies, whereas those of the United States were private competitors, one would expect little similarity between Australia and American railroad rates during this period. However, as is self-evident, railroad rates in all four regions followed an almost identical pattern. Falling away sharply in the early 1880s, each suffered new lows in the mid-to-late 1890s. The immediate driver of this common pattern of railroad rate decline is found in Fig. 6 which records the secular decline in wheat prices that occurred after 1871. The ultimate determining factor was the new global economy that the railroads themselves did so much to create, bringing new competitive pressures into almost every part of the world.





**Fig. 7** Per ton freight income in US dollars: Victoria, Queensland, US Northern Plains, and US South-West, 1882–1900\*. (Source: Bowden 2017). \*No Queensland figures for 1889 due to change to financial year measurement)

## Management, Slavery, and Colonial Subjugation

In the New World societies inhabited by people of predominately European ancestry (North America, Argentina, Australia, and New Zealand), the new global market offered both threats and opportunities. Things were, however more problematic in regions dominated by non-European workforces. Although slavery was abolished in the British Empire from 1834, slavery remained a fact of life in most of the plantation economies of the Caribbean and the Americas. Writing of the efforts to curtail the slave trade during the 1830s and 1840s, Thomas (1997: 750) observes of the situation in “the Cuban slave-powered economy” that anti-slavery campaigns had only “the slightest effect.” The reason for the lack of progress in Cuba, Brazil, and elsewhere, Thomas (1997: 751) concluded, was simple: “The profits were too high to ignore.” Of the situation that prevailed in the United States South in 1860, Byrer (2012: 528) observes that the region’s 400,000 slave owners “possessed 93.1% of the South’s agricultural wealth, having on average 13.9 times the wealth of non-slave owners.” Those who had many slaves invariably fared better than those with comparatively few. The top 10% of slave owners, who held 44% of the region’s slaves in shackles, boasted 40% of the South’s agricultural wealth.

The continued existence of a slave economy well into the nineteenth century has continually caused problems for economic and management historians, just as it was a source of anxiety for the people of the time. In their recent *A New History of Management*, for example, Cummings et al. (2017: 62) argue that Adam Smith was a

fervent opponent of slavery, arguing “radical,” “anti-slavery” positions. To support this view, Cummings et al. (2017: 78) provide a quote from Book III, Chap. II of Adam Smith’s *The Wealth of Nations*. In this chapter, Smith (1776/1999: Book III, Chap. II, para. 10) observed that, “The experience of all ages and nations, I believe, demonstrates that the work done by slaves, though it appears to cost only their maintenance, is in the end the dearest of any.” In making these comments, however, Smith was discussing the transition from slavery to free labor in the early medieval world, the chapter being titled, “Of the Discouragement of Agriculture in the Ancient State of Europe after the Fall of the Roman Empire.” This does *not* mean that he opposed legal interference in the system of slavery that existed in his own time, Smith believing that slaves were the legitimate private property of their owners. For in discussing slavery in North America, Smith (1776/1999: Book IV, Chap. VI, Part II) declared any action by a “magistrate” that “protects the slave, intermeddles in some measure in the private property of the master,” and that “he dare not do this but with the greatest caution and circumspection.” As is evident, Smith is loath to consider any action that “protects” a slave. There is no mention of freedom. The Marxist historian, Rob Bryer (2012), also adopts some convoluted theoretical positions in arguing that the slave plantations of the American South were not “capitalist.” In Bryer’s view, they could not be “capitalist” as they did not employ waged labor. Nor did the slave owners, in Bryer’s opinion, demonstrate a sufficiently acquisitive and calculative capitalist mentality. To exclude the American South from the global capitalist economy of the nineteenth century, however, is difficult. American cotton was central to the success of the Industrial Revolution. Slave owners, moreover, profited inordinately from their participation in the system.

Were then the slave owners who grew cotton in the American South “managers” in the modern sense? It comes down to what we mean by the term “management.” If we go by the standard textbook definition – that “management” amounts to “planning, organizing, leading and controlling” – then the answer must be “yes.” However, from the very first chapter in this *Palgrave Handbook* (Chap. 2, “What I Management?”), I have argued in favor of a broader definition, associating “management” with attention to costs, competitive markets, legal protections of person and property, and the need to motivate legally free workforces. By this definition, the answer as to whether or not the slave economies of the Americas were examples of “modern management” must be “no.” For in the end, the slave economies of the Americas – as with the enserfed workforces of Tsarist Russia – proved incompatible with a modern, capitalist system of management. That oceans of blood were shed during the American Civil War to bring about an end to slavery is proof that, in the final analysis, modern management and free-market capitalism are incompatible with systems of slavery and subjugation.

The problematic nature of the new global economy was also evident in the areas subject to colonial occupation in Africa and Asia. In the case of India, Ferguson (2008: 217) notes that between 1757 and 1914, the per capita Gross Domestic Product (GDP) of Britain went up by 347%. During the same period, in India – the crown jewel of the British Empire – per capita GDP grew by a mere 14%. This was no accident. Britain ruled India with British interests in mind, not Indian

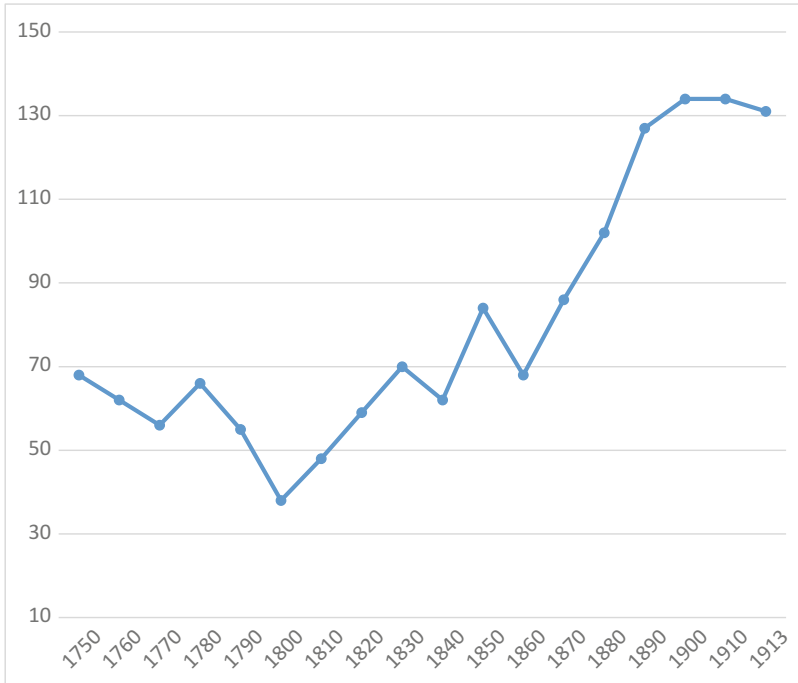
concerns. Nevertheless, as Ferguson (2008: 216) also highlights, a large share of Britain's accumulated wealth was invested in India. Whereas only 5% of Indian land was irrigated in the precolonial era, by the time the British left 40% of fields were irrigated. A coal industry was created from nothing, the industry producing 16 million tons per year by 1914. Indian life expectancy increased by 11 years due to immunization for smallpox and other diseases. British systems of management and language became the norm in Indian businesses. Whether the cost-benefit ratio worked in India's favor is a matter of subjective opinion. What is nevertheless clear is that by the close of the nineteenth century, India – like the rest of Asia – was an integrated component of the new global economy.

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## New Economy, New Workers, New Problems

In writing of the initial stages of Britain's Industrial Revolution, the labor historian, E.P. Thompson (1963: 217) declared it a "truly catastrophic experience." "For most people," Thompson (1963: 217–218) continued, "the crucial experience of the Industrial Revolution was felt in terms of changes in the nature and intensity of exploitation . . . an intensification of two intolerable forms of relationship: those of economic exploitation and of political oppression." While any debate as to lived working-class experiences always engenders strong opinions, Thompson's emphasis on exploitation does an injustice to what is a complex question. In previous chapters, I have referred to the Phelps-Brown (1956) real wage index in relation to changing patterns of wealth across the centuries. In Fig. 8, we return to this index by looking at changes in the real wage of skilled building workers in southern England on a decade-by-decade basis across the 1750–1913 period. As is self-evident, it is certainly true that real wages did fall between 1750 and 1800. Only in 1830 did real wages for skilled building workers surpass those obtained in 1750. How much of the 1750–1800 decline is attributable to the Industrial Revolution is, however, unclear. It is likely that the social dislocation inaugurated by the Industrial Revolution caused *some* of the decline. It is also probable, however, that much of the decline was caused by the Napoleonic wars, and the stresses and strains caused by a generation of warfare. What is nevertheless clear is that from 1800 real wages began an unprecedented ascent. By 1900, real wages were 352.6% higher than they had been in 1800. Even Frederick Engels (1892/1951: 376), a fierce opponent of capitalism, acknowledges that by the early 1890s the economic position of skilled workers organized into "Trades' Unions" was "remarkably improved." Such workers, Engels (1892/1951: 376) added, "have succeeded in enforcing for themselves a relatively comfortable position."

Engels, in his reflections upon the state of working-class life in the early 1890s, worried about a loss of revolutionary zeal. Others, however, saw the opposite: a rising tide of worker militancy, organized into powerful trade unions that were distrustful of management. Writing of the British situation, Sidney and Beatrice Webb (1902: 452) estimated that in the 1890s, there were 20,000 part-time trade union officials serving as "Secretaries and Presidents of local Unions." "These men,"



**Fig. 8** Real wage of skilled building worker in Southern England, 1750–1913 (1447 = 100). (Source: Phelps Brown and Hopkins 1956: Appendix B)

the Webbs (1902: 452) argued, “were the backbone of the Trade Union world . . . Dependent for their livelihood on manual labour, they retain to the full the workman’s sense of insecurity, privation, and thwarted aspirations.” Everywhere, the Webbs (1902: xvii) noted, workers and their unions demanded acceptance “of the principle of Collective Bargaining,” a principle premised on the belief that managers were unfit to unilaterally decide wages and working conditions. This distrust of management was not confined to Britain. Across all Western European societies and their New World offshoots (Canada, Australia, New Zealand, the United States, and South America), there was a profound sense that the rich had no intention of sharing either their wealth or their power with the new industrial working-class. Distrust of society’s magnates – and employers more generally – found cogent expression in *The Iron Heel*, the novel penned by the American social activist, Jack London, in 1908. In this book, London (1908/1947: 135, 142) recalls a conversation with a member of the Philomath Club, comprised of “the most select” members of “Pacific Coast” society, in which London is supposedly advised:

When you reach out your vaunted strong hands for our palaces and purpled ease, we will show you what strength is. In roar of shell and shrapnel and in whine of machine-guns will our answer be couched. We will grind your revolutionists down under our heel, and we shall walk

upon our faces. The world is ours, we are its lords, and ours it shall remain. As for the host of labor, it has been dirt since history began . . . And in dirt it shall remain.

In the United States, the period between 1890 and 1914 witnessed the most violent industrial strikes in the nation's history. In the Homestead steel strike of July–November 1892, at least 10 people were killed in armed clashes between striking workers and Pinkerton company guards employed by Carnegie Steel. In the United States railroads a rising tide of militancy culminated in a national stoppage in 1894, the so-called Pullman Boycott, Stromquist (1987: 24) describing the railroad disputes of the time as “the clarion call of a new class.” Along the Rocky Mountains, members of the militant Western Federation of Miners clashed with company guards and local militias at Coeur d’Alenes, Cripple Creek, and Leadville, the union’s president calling upon “every miner” to arm themselves with “a modern rifle and a supply of ammunition” (Haywood 1929: 65). From these western mining conflicts emerged the most militant union in the American experience, the Industrial Workers of the World (IWW), colloquially referred to as the “Wobblies.” In the preamble to its constitution (cited Haywood 1929: 185), adopted in 1905, the IWW declared, “The working class and the employing class have nothing in common. There can be no peace as long as hunger and want are found among the millions of working people.”

In Australia, as well, the 1890s saw the most significant strikes in the nation's history. In 1890, a maritime strike closed the waterfronts. Pastoral strikes followed in 1891 and 1894, curtailing production in the nation's preeminent industry for months at a time. In the course of the pastoral strike of 1891, Henry Lawson, arguably Australia's best loved poet, penned the following verses (cited Fitzpatrick 1944/1968: 123), published in a trade union newspaper,

So we must fly a rebel flag,  
As others did before us,  
And we must sing a rebel song,  
And join the rebel chorus.  
We'll make the tyrants feel the sting  
Of those that they would throttle.  
They needn't say the fault is ours,  
If blood should stain the wattle.

In reflecting upon the great strikes of the 1890s, William Spence (1909: 111), the leader of Australia's largest mining and shearing unions, declared 1890 to be the “great turning point in the history of Australian Labor.” It is also arguable that 1890 was the “great turning point” in Australian history more generally. As was the case in Britain and New Zealand, the union militancy of the 1890s gave strength to newly formed Labor parties. Committed to a social democratic program of social welfare, and government intervention in the economy, these Labor parties soon gained a mass following. In Australia, success came early with the election of the first federal Labor government in 1904. Across Europe, powerful new socialist and social democratic parties gained a mass following, Robert Michels (1911/2001: 165) referring to the

German Socialist Party of 1911 as a “gigantic and magnificently organized party.” For private-sector managers, the emergence of an organized labor movement, embracing tens of millions of followers around the globe, created unprecedented problems in terms of workforce management. The new labor and social democratic movements also became, however, a significant and novel form of managerial organization in their own right. As Michels (1911/2001: 165) astutely observed in his famed study, *Political Parties: A Sociological Study of the Oligarchical Tendencies of Modern Democracy*, the “gigantic” new working-class parties invariably required “a no less gigantic apparatus of editors, secretaries, bookkeepers, and numerous other employees, whose sole task is to serve the colossal machine.” Over time, thousands more professionalized workers – many recruited from the shop floor – found employment in unions associated with the various labor and social democratic parties. Even more found work as local, state, and federal politicians, or as bureaucrats associated with such political figures. The inevitable result of this, Michels (1911/2001: 229) was “a new dominant minority,” a working-class oligarchy that progressively entrenched their own interests “in the name of socialism.”

Among labor and management theorists the so-called “labor problem,” which manifested itself in strikes, trade unionism and a political contest for control of the economy, produced two main responses in the pre-1914 period. The first of these, associated with Beatrice and Sidney Webb in Britain, and John Commons and the so-called Wisconsin School in the United States, called for an industrial compact between management and organized labor. In every sector of the economy, the Webbs (1897/1920: 279, 281) noted, the prime objective of the various unions was a “Common Rule” that would standardize wages and conditions across the entire industry. Such standardization, the Webbs (1897/1920: 716–718) believed, benefited both management and labor, forcing managers to do their “utmost to raise the level of efficiency so as to get the best possible return for the fixed conditions.” In other words, labor regulation worked to enhance, rather than retard, productivity and workplace efficiency. In the United States, John Commons, in a book entitled *Trade Unionism and the Labor Problem*, argued a similar thesis. Industry-wide collective agreements, Commons (1905: 11) suggested, benefited the fair and honest employer by “taking wages out of competition,” thereby depriving the unscrupulous employer of any unfair advantage.

Perhaps unsurprisingly, relatively few early twentieth century employers showed much interest in a compact with organized labor. Greater curiosity was shown in the ideas of a professional engineer and business consultant, Frederick Taylor, who published his *The Principles of Scientific Management* in 1911. As most readers would be aware, Taylor’s views on “scientific management” have always garnered divided opinion, both within his lifetime and since. The premises from which Taylor operated, however, are perhaps best summed up by Edwin Locke (1982: 15), who observed that Taylor believed that conflict between management and organized labor could be avoided “as long as the [economic] pie were large enough.” Because the pie was larger, workers could look forward to higher wages, even as employers secured higher profits. To achieve this desirable

outcome, Taylor advocated five basic principles to improve workplace efficiency. The first of these, which is typically overlooked in most accounts of scientific management, emphasized the need for a “close, intimate, personal relationship” between management and the individual worker, a relationship in which the manager provided their workers with “the most friendly help” (Taylor 1911/1967: 26). Without such personal relationships, Taylor argued, all other prospective changes would almost certainly come to nought. The second reform that Taylor (1911/1967: 36) called for was for a revolution in managerial thought and practice, in which managers assumed “new burdens, new duties, and responsibilities never dreamed of in the past.” Building on his call for a managerial revolution, Taylor articulated his best-known principle: that management had to instruct workers in the “one best method” of doing each and every work task (Taylor 1911/1967: 25). In doing so, Taylor (1911/1967: 21) argued in favor of his fourth key principle, whereby managers were advised to overcome “systematic soldiering” by employees, a silent conspiracy waged by workers so as to maintain control of the (slow) pace of work. Finally, Taylor (1911/1967: 32–33) linked increased worker productivity with a system of “special incentives” such as higher pay, reduced hours of work, and faster promotion.

By 1914, the industrializing societies of both the Old World and New World found themselves in a paradoxical situation. As Fig. 8 indicated, real wages had never been higher. A revolution in transport, associated with steam-powered ships and railroad locomotives, made transport to even fast distant locations an easy and comparatively inexpensive task. Children had largely disappeared from the workplace, their parents sending them off instead to long years of schooling. Clothing had become an inexpensive item in the household budget. Slavery and serfdom were distant memory. Yet, at the same time, evidence of social unrest and worker disquiet was all too obvious. Reflecting back on the years that immediately preceded World War I, George Dangerfield (1935: vii, 207) in his *The Strange Death of Liberal England*, recalled how “by the end of 1913 Liberal England was reduced to ashes,” destroyed in part the industrial militancy of the “workers of England.” Such was the level of worker discontent, Dangerfield (1935: 207) added, that militancy “might have reached a revolutionary conclusion” but for the intervention of war, when workers abandoned strike action to rally around the flag. The problems over which Dangerfield and others fretted pointed to a failure by management to resolve the “labor problem.” For the fundamental failing of the pre-1914 solutions to the “labor problem,” whether advocated by the Webbs, Commons, or Taylor, was to largely associate worker satisfaction with extrinsic rewards (i.e., money, shorter hours, and promotion). What was missing in such calculations was an understanding of what was lost in the transition to an industrial society. Yes, it is true: industrialization had delivered untold material benefits which few workers wished to throw away. But it also caused a loss of autonomy, a feeling that the individual worker was no longer the master of their own destiny. On the other side of the Great War, it was these concerns – relating to human dignity, emotion, and sense of worth – that was to increasingly preoccupy management, rather than traditional concerns relating to production and efficiency.



## Conclusion

Often talk of historic “turning points” and “revolutionary change” turns out to be more literary hyperbole than an accurate reflection of lived reality. The period between 1750 and 1914 was, however, a time of truly revolutionary change on an unprecedented scale. In 1750, even in England, most people lived and died within sight of where they were born. If they lived away from the coast, where water transport allowed the importation of products from distant locations, they had to make do with goods made locally. Land transport was simply too slow, too expensive, and too risky to allow for significant internal markets. Among the vast bulk of the population, there was little understanding of time, beyond the rising and setting of the sun and the passing of the days. In the absence of clocks, and the accurate measurement of time, there could be little understanding of labor efficiency, i.e., the capacity to produce a good or service in a specified period. The absence of artificial lighting, other than smelly and expensive tallow candles, meant that work had to be curtailed at sunset. Hand spinning and weaving of cloth made clothing an expensive household item. Most people owned no more than two sets of clothes, one or both of which would typically be hand-me-downs. By the late nineteenth century, however, life was profoundly different at every level. Mechanization, railroads, steam-powered shipping, the ever-present factory clock and siren, and artificial lighting (kerosene lanterns, gas and electric lighting) transformed life across the world. Mass markets brought not only much cheaper goods within range of the typical household but they also brought competition, with all its transformative and destructive effects. Even in the remote villages of the Indian Punjab or the Ganges Valley, there was no escaping the new economic and managerial order. Across the subcontinent, railroads brought cheap British-made products into the local marketplace.

The new world order that emerged after 1750 was both the creation of a new system of management and the creator of modern management. In many areas, management built on past achievement. Double-entry book-keeping and efficient systems of accounting were a late medieval inheritance, the product of long-distance commerce. As Cipolla (1981: 180) noted, the post-1750 world also inherited from medieval Europe a mechanical “inventiveness,” proving itself “extraordinarily receptive” to technologies imported from elsewhere. In England, moreover, the pre-1750 expansion of coal production allowed it to overcome the “main bottleneck of preindustrial communities . . . the strictly limited supply of energy” (Cipolla 1981: 113). Across Western Europe, a long series of battles had gradually ensured the protection of private property. In the final analysis, however, all of these pre-1750 achievements only brought England, Europe, and subsequently the whole world to the cusp of a new economic and managerial order. The final step required innovation, risk taking, and a certain level of ruthlessness. As McCloskey (1985: 67) accurately noted, ultimately the “explanation of the [industrial] revolution must be sought in . . . human effort and spirit, and in the luck of invention.” Initially, in the first stage of the Industrial Revolution (1750–1830), innovation was largely confined to textile production. Technological and economic take-off in this sector of the economy, however, soon led to a cascading series of revolutions in logistics, transport, and agriculture that integrated



the New World into the new systems of production and management. Along the way, management had to confront novel problems. In the new factories, shipyards, and steel works, the most difficult task was arguably that associated with the recruitment, training, and motivation of legally free workforces. Almost immediately, this new industrial workforce gained a fair measure of bargaining power. At the individual level, they could walk away, finding work in another factory or catching the train to a distant region. Collectively, they could and did form trade unions, threatening employers with widespread industrial stoppages. The growth of mass markets brought with it increased levels of competition, forcing managers to constantly improve and innovate. Competition also made an understanding of internal costs a necessity. Attentiveness to costs led to a focus on productivity, i.e., the maximization of outputs from a minimum of inputs. An emphasis on productivity caused management to be attentive to time-measurement as managers increasingly focused on the intensity of work and the efficiency of labor. Competition and high capital costs also forced firm specialization in its intended area of “comparative advantage.” As real wages rose, and the number of middle-class managers and professionals grew, so too did pools of savings. By accessing these large pools of small individual savings, investors were able to engage in more capital-intensive activities. As Bryer (1991: 447) noted in reflecting upon investment in Britain’s railroads, most of the money tapped for railroad expansion came not from “the very wealthy” but rather from “provincial merchants,” “entrepreneurs,” and the “middle-classes.” After 1860, it was these capital-intensive activities – shipping, steelmaking, oil drilling and refining, and, above all, the railroads – that became the defining characteristic of the new global economy.

If the achievements of the 1750–1914 period are indubitable, there was nevertheless by the time of the First World War a deep sense of pessimism as to the future. Writing after the war, Keynes (1920: 217, 213) detected a decline in productivity that he feared was irreversible, warning his readers that, “The danger confronting us . . . is the rapid depression of the standard of life of the European populations to a point which will mean actual starvation.” Although Keynes clearly underestimated the managerial and entrepreneurial capacities of the new industrial societies, the problems he identified were, in part, attributable to managerial failings. Pre-1914 managers typically paid more attention to the *costs* of production than the *purpose* of production. As Chester Barnard (1938: 82) observed in his pioneering study, *The Functions of the Executive*, “efficiency” was meaningless without “effectiveness,” an attribute which he defined as “the relevance of its purpose to the environmental situation.” Even greater problems were evident with the so-called “labor problem,” a difficulty that manifested itself after 1914 in armed revolution in Russia, Hungary, Germany, and Italy. This problem and these revolutions were proof that satisfaction of material needs was no guarantee of either employee happiness or social harmony. As Elton Mayo (1933: 165, 172) was to note in his *The Human Problem of an Industrial Civilization*, the “modern condition” often manifested itself in “social disorganization,” “personal maladjustment,” and a sense of “personal futility.” The redress of this “human problem” was to become – and remain – the central problem of management in the post-1914 world.

## Cross-References

- ▶ [Conflicting Understandings of the Industrial Revolution and its Consequences: The founding Figures of British Management History](#)
- ▶ [What Is Management?](#)
- ▶ [Work and Society in the Orthodox East: Byzantium and Russia, AD 450–1861](#)

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