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during the mid-19thcentury and became widely used by the 1880s. It has traditionally been usedto describe dramatic transformations occurring in manufacturing industrybetween approximately 1750 and 1850 that set the pattern forindustrialization. The first Industrial Revolution occurred in GreatBritain, and profoundly altered its economy and society. The most immediatechanges were in production: what was produced, as well as where and how.

Labour was transferred from provision of primary products to the productionof goods and services. Far more manufactured goods were produced than everbefore, and technical efficiency rose dramatically. In part, the growth inproductivity was achieved by systematic application of scientific andpractical knowledge to the manufacturing process. Efficiency was alsoenhanced when large agglomerations of enterprises were located withinlimited areas. Thus, the Industrial Revolution involved urbanization, through migration from rural to urban communities.

Perhaps the most important changes occurred in the organization of work. Ingeneral, production took place within the firm or the public enterpriseinstead of the family or manor. Tasks became increasingly routine andspecialized. Industrial production became heavily dependent upon theintensive use of equipment produced for the express purpose of increasingefficiency. A reliance on tools and machinery allowed individual workers toproduce more goods, and commitment to a particular task or devicereinforced the trend towards specialization.

The industrial landscape of mid-19th-century Britain was vastly differentto that of the mid-18th century; evidently some sudden change in theBritish economy did occur in the intervening period. The move from agrarianand primarily rural-based occupations to urban, and subsequent industrialand service, employment rapidly increased. This transformation wasaccompanied by social and political unrest in the form of rioting, machine-breaking, and political campaigns aimed at reforming hours of labour andother working conditions, as well as Poor Law legislation. Agriculture wassufficiently developed, having undergone its own Agricultural Revolution, to allow the economy to support a growing urban labour force. The growth inpopulation in turn enlarged the domestic demand for goods and services.

Marketing techniques were devised which primarily targeted the wealthymiddle and upper strata of society. Trade became increasingly associatedwith a developing laissez-faire ideology that was gradually absorbed byBritish institutions. These unprecedented changes were focused inparticular sectors and regions of Britain. Furthermore, the organization ofmanufacturing techniques cannot be separated from changes within Britain’sdeveloping commercial infrastructure, marketing, finance, emergingconsumerism, established handicraft skills, and the expansion ofinternational trade. All these factors and more played a large andinterconnected role in the Industrial Revolution.

Foundations for the Revolution: Capital, Credit, and EmpireThe Industrial Revolution was fuelled by the prior accumulation of capital.

The release of capital and labour from the land was faster in Britain thanin any other country in Europe. This, together with efficient Britishagriculture and a growing industrial workforce enabled rapid populationgrowth and urbanization to be sustained. Contemporary observers in Britainand the European continent certainly looked on in awe at the changessweeping the country.

The formation of capital continued to increase during the IndustrialRevolution, as did the manufacture of goods for export. The expansion offoreign markets for British goods was greatly assisted by the establishmentof a fiscal-military state, the British Empire and its domesticinstitutional base, in which overseas markets were carved out during warsoften motivated by trade and defended by British military might. TheCarnatic Wars in India, for example, were fought between the British EastIndia Company and its French rival (with their Indian allies) forcommercial supremacy in India; the War of Jenkins’ Ear in 1739 wastriggered by British traders’ incursions into the Spanish Empire. Thedoctrine of mercantilism, which inspired the 17th- and 18th-centuryNavigation Acts, specifically advocated the use of the State’s armed mightto defend and promote the nation’s economic interests.

To finance such wars, the government raised funds through loansunderwritten by the State’s ability to collect revenue through taxation.

The majority of war revenue was, however, raised on the London capitalmarket. The government thus formed a close alliance with the Bank ofEngland and leading London financiers. The interest payments on the Britishnational debt by the end of the 18th century amounted to 40-50 per cent ofall the revenue raised through tax. The South Sea Bubble was an ill-fatedattempt to make merchants shoulder this debt in return for tradingprivileges; but the incident showed how Britain’s military expenditure hadhelped create a thriving capital market ready to invest in trading andspeculative schemes. Much of the tax income came from the collections madeby the Excise Department on home-produced goods. The Customs Department wasfar less efficient at taxing imports and only managed to provide for afraction of the costs involved in meeting Britain’s huge naval needs.

Consequently, it was indirect taxation that propelled Britain to globalmercantile leadership during the 18th century-primarily through its role inunderpinning wars.

As well as both creating and guarding new markets for British goods, military investment created a demand for military products, and led toinnovative engineering developments. For example, the demands of the War ofthe Austrian Succession led to pioneering improvements in coke-smeltingtechniques, while the Seven Years’ War (with its needs for large numbers ofuniforms) corresponded with the introduction of the fly shuttle for looms.

However, the major impact of war was the growth in export demand forBritish goods. The resulting monopoly on carrying and re-export tradesensured communication with distant and European markets, while encouragingshipping and shipbuilding. Wars also soaked up many of the unskilled andpotentially unemployed sections of the workforce.

Military ventures, however, did crowd out possibilities for the governmentto invest in the country’s own infrastructure. Indeed, it was Britishbusinessmen and investors who financed the construction of regionalnetworks of turnpike roads, canals, and ports. Nor did the governmentinvest in education, science, or technology (apart from that involving themaritime and military sectors). These external political policiesencouraged private enterprise. Naval power protected the British Isles frominvasion, and provided the security for capitalists to invest in the long-term future of the economy.

British currency for much of the 18th century was in a poor state. Fixedunit prices and parities encouraged the export of gold and silver bullionand the melting down of coins. Consequently, a network of financialintermediaries developed to provide paper substitutes (in the form ofbanknotes, bills of exchange, book credit, and cheques) for coins. Privatecommercial enterprise thus underpinned the developments needed to supplythe nation’s money, and consequently produced a financial system whichmanaged to bring the country through eight wars and an IndustrialRevolution.

IndustryBritish manufacturing in the Industrial Revolution benefited considerablyfrom new technology. Thomas Newcomen had patented a steam-pumping engine in1707; in 1769 James Watt dramatically improved the design, and in 1801Richard Trevithick first used it to power a vehicle. In 1733 John Kayinvented the flying shuttle for weavers, while James Hargreaves developedhis spinning jenny in 1764, closely followed by Richard Arkwright, whopatented his spinning machine in 1769 and combined it in his factories withsystematic industrial organization techniques. Edmund Cartwright patentedthe first power loom in 1786. Meanwhile, the work of Abraham Darby and hisdescendants at Coalbrookdale in Shropshire typified the developing Britishmastery of cast-iron manufacture which gave the world its first major cast-iron structure at Ironbridge in 1777-1779. National emphasis on trade hadhelped direct these inventors’ minds towards production of textiles andiron and steel manufacture, drawing on a scientific tradition epitomized bythe foundation of the Royal Society in 1660, and their ideas found fertilesoil where they might have withered in other countries.

The expansion of a credit society greatly assisted industry. However, theaccumulation of fixed capital during the Industrial Revolution wasthwarted, partly because many manufacturers rented their premises, andpartly because machinery was often cheap. Further machines and steamengines were frequently hired, while it was quite common to find severalconcerns sharing manufacturing space and sources of power.

Many customary working practices underwent organizational changes to meetthe realities of a harsh, dynamic, and competitive market. The factorysystem emerged from proto-industrialization, in which part of the labourforce had already been organized and disciplined. Numerous manuals onfactory organization and management appeared during the early 19th century, including works by James Montgomery on cotton-spinning, and Charles Babbageon the economy of machinery and manufactures. The high profile journalistsgave to the factory raised its visibility in the public mind. However, afar more common feature of the contemporary British industrial landscapewas more traditional handicraft forms of manufacture, often organized incompetition with factory production. This pattern carried on well into the19th century. It was typical for 18th- and 19th-century cottonmanufacturers to combine a mixture of steam-powered spinning in factorieswith the large-scale employment of handloom weavers. This spread financialrisk, since early machinery was often unreliable, and female labour andchild labour were cheap. Consequently, the traditional sector oftenreinforced the modern.

Nevertheless the age of the machine was certainly imminent, and wasbecoming a reality on the labour market by the second half of the 18thcentury. For example, in one of the earliest recorded labour disputesduring the 1750s and 1760s, skilled coal-heavers in Newcastle upon Tyneprotested for higher rates of pay. Consequently, a new machine was devisedto unload the coal. It was also during this period that industrialistsstarted to take into account the relationship between wages andproductivity, and natural philosophers started thinking about the measureof labour as a source of power. Thus, in some industrial sectors humanlabour was beginning to be viewed as simply a competing source of powerwith alternatives, such as horses and ever-more-efficient machines.

Numerous changes also took place in more traditional industries. Forexample, there were new industrial uses for coal which affected brewing, brick-making, malting, sugar-making and soap-boiling. Transformations inmaterials changed certain luxury industries, such as hat-making andjewellery production. Product changes in textile industries greatly reducedthe finishing time for certain products. The success of the calico-printingindustry in the late 18th century was due to a reorganization anddisciplining of intensive labour. The Staffordshire Potteries weretransformed from 1759 by the entrepreneurial genius of Josiah Wedgwood, whose talents were as much for early marketing and manipulation ofcontemporary Neo-Classical taste as for technical innovation, and later bySpode and Minton.

Any account of industrial change has to take into consideration regionaldifferences and variations between patterns of development for differentproducts, so one grand picture cannot be applied to the whole of Britain.

Some areas flourished while others stagnated or declined. For example, thewool textiles of the West Riding district of Yorkshire overtook the south-west and the East Anglia region. South Lancashire dominated cottontextiles, and the Midlands created a successful manufacturing complex ofsmall metalwares and hardwares. Worcester porcelain was probably inspiredby Oriental wares entering the country from Bristol, and used transfer-printing methods to speed production. Coalfields increasingly dictatedwhere iron-processing, steel manufacture, and later shipbuilding developed.

Before there was a national system of transport and communications, thelocal district was the most important geographical unit for establishingits own transport, commercial, and credit networks. The developments intransport facilities, such as improved turnpike roads and canals, wereprimarily regionally based, while district banks and commercial tiesformed, by which most capital rarely left its area of origin. The growth ofprovincial towns led to local lobby groups, often in opposition to theinterests of powerful economic groups in London. Indeed, the metropolitaneconomy of London and the south-east was of a different structure to thoseof industrializing areas of the north. However, even though capital marketswere primarily regional, London was crucial in underpinning and expandingthe role of credit involved in both domestic and international trade.

Certain historians have pointed to Britain’s industrial fresh watersources, mineral ores, and rich coal supplies as the key factors in itsindustrialization. However, although coal was obviously important, manyproto-industrial areas had already become well established before it becamea major factor of development or source of energy. More important indefining original industrial locations were social and institutionalfactors peculiar to particular regions. For example, resistance toinnovation and mechanization tended to occur in areas characterized by well-established structures in trade and the organization of labour. Countiessuch as Yorkshire were far more accommodating to innovations than rivalwool districts such as the West Country. The latter, for example, had atradition of solidarity and collective action, while the domestic systemprevailing in the West Riding was characterized by a lack of specializationand was consequently more amenable to technological and organizationalchange. Furthermore, local merchants in this area monitored changing tastesand fashions in Europe, and bought for cash or short-term bills ofexchange, thereby enabling manufacturers to quickly acquire funds. Regionssuch as Lancashire, and to a certain extent the Midlands, experiencedchanges similar to those in the West Riding. In the coal areas of the north-east a diversified economy had been forming since at least the 16thcentury. Other areas, such as the Weald and perhaps even Cumbria, underwentmanufacturing decline during this period.

Social Upheaval and ProtestThe Industrial Revolution was accompanied by rapid population growth andurbanization. It was also attended by a huge increase in the wage-earningportion of the population, as well as a bourgeoisie whose income cameprimarily from the profits made in industry, in addition to the traditionallanded aristocracy whose wealth stemmed mainly from rents. Marketconditions were beginning to dictate the social structure. Thepaternalistic agrarian world of the 18th century was being transformed, andwith this came social unrest. Protest at the changing moral economymanifested itself in riots over agricultural enclosure and supplies ofgrain, as well as incensed gangs of machine-breakers. More than ever, thepoor and low-paid were seen as a real threat to social stability. It istherefore not surprising that a heightened sensitivity to crime emerged, accompanied by a rapid increase in recorded crime rates. The pillar of 18th-century criminal law-the so-called “ Bloody Code” (periodical publichangings as a deterrent)-was no longer seen to be working. New ways ofdealing with criminals were established, mainly through a large programmeof prison-building. The early 19th century also saw the emergence ofregional police forces. For many contemporary commentators, crime becamedirectly associated with industrialization.

Workplaces were often built to house a greater number of workers, toimprove the efficiency of production. This required greater regulation andcentralization of the labour process. To achieve this often required therestructuring of traditional skills and working rhythms. The emergence of acentralized factory system generally met with equal resistance in allregions. Such a system challenged traditional apprenticeship and theregulation of production methods. These changes also came at a price forthe owners of production, since they enabled workers to build up acollective alliance through common interests, which in turn led to theformation of organized and more effective protest against their employers.

However, the reorganization of skills and the labour process did not followsome determined re-skilling path. For example, many areas of industryremained distinctly fragmented, and sweatshops, workshops, and putting-outexisted alongside centralization and the emerging factory system. Any viewof the Industrial Revolution has to appreciate the diverse and innovativealternatives to the factory system. Nonetheless, by the mid-19th centuryindustrial management had become far more involved in the organization ofwork.

Although the factory system never dominated production, it was certainlyvery apparent in certain regions, and had undoubtedly become embeddedwithin 19th-century culture. During this period, labourers in all spheresof production, from factories and workshops to cottage industries, did losesome control over the rhythm and nature of their work. They also becameincreasingly subject to the demands of larger industrialists or merchantsfor either credit or work. More often than not, there was no securityagainst unemployment, and social unrest was the only means of protestavailable. Certain regions became identified with protest movements-forexample, factory reform became associated with Yorkshire and Poor Lawreform with Lancashire.

The most exploited members of the working population were women andchildren. The woollen and cotton industries primarily employed these groupsbecause their labour was plentiful and therefore cheap. Subsequently, manynew work regimes were first tried out on this section of the workingpopulation, and indeed some machines were developed with children in mind-for example the original spinning jenny was designed for children betweenthe ages of 9 and 12. Women’s work was generally seen as less skilled, andof a low status. This was partly legitimated via biological notions thatwomen were not as robust and intelligent as men. Consequently, byincreasing and intensifying this cheap source of labour, the substitutionof capital for labour was often discouraged.

PopulationAs early as 1700 nearly half of Britain’s population was employed outsideof direct agricultural labour. Britain had an agricultural capacity readyto support its rising population. It also had accumulated stocks of skilledlabour necessary for the construction of an urban and industrial society.

The distinctive tenurial system of land ownership was characterized bygreat estates and enclosed, consolidated, and relatively large farms, whichencouraged agriculture to adjust to the growing pressure of an expandingpopulation. This also released capital and labour for rapidly expandingurban areas. By the 1840s Britain was more urban than any other Europeancountry.

The rapid growth in population during the Industrial Revolution was alsodependent on region, occupation, and social rank. For example, fertilityand migration patterns were very different for textile and miningdistricts. Obviously, mortality rates were higher for the unemployed andlow-paid, and greatly increased in urban areas. Consequently, the spread ofurbanization required the immigration of labour from rural areas, sinceurban mortality far exceeded its birth rates. In many ways the high urbandeath rate acted as a check on the spiralling rural birth rate.

Furthermore, rapid bursts of population growth often followed a major war, famine, or outbreak of disease. Clearly one of the most important factorsto affect the population was an improved diet, and to a certain extentdevelopments in medicine.

TradeDemand for goods within the domestic economy was primarily restricted tothose with large incomes. The vast majority of the population couldprobably not afford to consume fashionable products. However, the expansionof the proletariat did increase the demand for certain basic products, suchas clothes, candles, beer, butter, and crockery. It was the wealthiermembers of the increasing middle class who provided the market for massmanufacturers. Ironically, upper- and middle-class consumerism may havenegatively affected the production of domestic products in the search forindividual and fashionable items.

Britain’s external trade was crucial, since exported goods consistedprimarily of home manufactures. Many of these products had the potential tobe mass-produced, such as textiles, iron, and metalwares. During theIndustrial Revolution, imports and exports rapidly grew, while re-exportsincreased ninefold. Because of European protectionism, the main market forBritain was British colonies-mainly the West Indies and North America.

Britain’s excellent coastal and internal waterways provided an idealplatform to exploit an expanding Atlantic economy. With the loss of NorthAmerica the situation altered during the 1780s. Invariably, during economicdepressions Britain would use its military might to expand its tradingconquests. One of the most important commodities of British trade duringthe 18th century was slaves. These underpinned the dynamic growth of theAtlantic economy, and also built up elaborate trade routes for other goods.

Africa was the second-largest destination after the United States forBritish iron in the mid-18th century, and took almost a quarter of Britishcotton by the 1790s. The most important domain for British trade from the1830s was India, which made up for the decline in trade with the WestIndies.

Accompanying overseas expansion came much more sophisticated forms ofcommercial and financial organization, including joint-stock insurancecompanies and private banks. Investments were made in internal transportsystems such as canals and roads, in dockyards, and in mining industries.

By the late 18th century Britain dominated the seas, supported by aneffective internal financial complex. External trade was a fundamentaldeterminant of the shape British industrialization took. Withoutinternational markets, the cotton trade would not have existed, both thewoollen and iron industries would have been much smaller, and agriculturewould have evolved much more slowly.

Changing Views of the Industrial RevolutionOver the past three decades the idea of an Industrial Revolution hasundergone serious revision. Indeed, the very notion of a revolution hasbecome a highly contested issue. Broadly, there are two competingperspectives. Those who maintain there were momentous changes point todevelopments in technology, the organization of work, and economic growth.

They claim that these encouraged a rapid increase in population, urbanization, the transference of labour from agriculture to manufacturingindustry, social class formation, and the restructuring of the family.

However, this account has been challenged by recent economic historianswho, primarily through an examination of contemporary statistics, claimthat Great Britain, far from experiencing a dramatic surge in economicexpansion, actually only experienced slight growth.

This revisionist account claims that many of the so-called revolutionarydevelopments associated with this period were in fact evolutionarytransformations which retained traditional economic and social patterns.

Evidence cited includes slow growth, limited saving and investment, staticstandards of living, a predominance of liquid capital as opposed to fixedassets, and limited personal consumption. Consequently, the idea of anIndustrial Revolution is put in doubt and replaced by a continuity thesis, which emphasizes developments stemming from an earlier period. The Britisheconomy is described, instead, by traditional sectors and familiarproduction methods.

Critics of this gradualist view argue that the Industrial Revolution shouldnot be equated with macroeconomic growth, and that there really weredramatic social and institutional transformations in economic organization, as well as new products and processes. Technological change under thisbanner includes changes in skills and tools, as well as simply machineryand capital-intensive plant and equipment. Furthermore, certain sections ofthe economy which seemed to have been growing only slowly were in factexperiencing transitional changes in mechanization and restructuringtowards a factory system, examples being the wool industry, and chemicalindustries such as soap and candle-making. Change did not always result ineconomic growth. Equally, rapid growth did not always mean a revolution inthe production process. Furthermore, the statistical data used in producingthe economic figures of the gradualist approach have been questioned, making the conclusions potentially unreliable.

AssessmentThe Industrial Revolution is no longer perceived as a straightforwardjuncture in British history. Traditional accounts of sudden and rapideconomic growth, or a mass exodus of capital from land to industry, are nolonger viewed as sound. Nor can we say with confidence that there was auniversal evacuation of agricultural labour to the manufacturing sector, ora defiant rise to dominance of the machine and the factory system. Rather, there was a mixture of established and innovative systems of production, either competing or working together.

Nevertheless, the changes were such that the period was one of socialturmoil in the shape of protest movements and rioting, coupled with rapidpopulation growth sustained by agricultural capacity, and increasingurbanization. Of particular importance was the development throughout the18th century of a fiscal-military state. This carved out new trading routesand expanded the demand for British-made goods, while simultaneouslycreating a robust and sophisticated credit network. We can conclude bysaying that the Industrial Revolution was concentrated in certainindustries and fuelled by foreign trade.

During the 1960s it became fashionable to look at the British IndustrialRevolution as a model which all proto-industrial countries had to copy inorder to become industrialized. However, it is now generally recognizedthat those countries that caught up with Britain displayed more contrastsand varieties than similarities with the British experience. The firstIndustrial Revolution was unique, and economists no longer see it as anecessary stage which proto-industrializing countries have to go through.

By the time of the Great Exhibition of 1851, the eyes of Europe and NorthAmerica were firmly set on British industrialization. The jewels of Britishindustry were displayed for all the world to see, within the impressivesurrounds of the glass Crystal Palace. In many ways, however, VictorianBritain was already beginning the slow descent of industrial decline. Asother nations flocked to the exhibition to view British industrial power, it also became apparent from the products displayed by other nations thatBritain’s industrial lead was being quickly eroded. Indeed, the second halfof the 19th century saw the rapid acceleration of German, French, and NorthAmerican industrialization at the expense of Britain. 1———————–1″Industrial Revolution,” Microsoft Encarta 97 Encyclopedia. 1993-1996 Microsoft Corporation. All rights reserved.