

THE GENESIS
OF THE INDUSTRIAL REVOLUTION
IN FRANCE AND GERMANY
IN THE 18th CENTURY

The end of the Napoleonic wars has often been regarded as a suitable point at which to embark upon a discussion of the industrial revolution on the Continent. Clapham emphasised the importance of the year 1815 because "the mere cessation of wars which have been almost continuous for over twenty years is in itself an economic event of some magnitude"¹. Georges Bourgin suggests that Dunham started his study of the industrialisation of France in 1815 because that year was as significant from an economic as from a political point of view². The accounts by Sombart, von Waltershausen and Benaerts of Germany's transformation from an agrarian to an industrial country all start after the Treaty of Vienna³.

While the period of reconstruction after the Napoleonic wars was an important phase in the evolution of the French and German economies the genesis of the industrial revolution must be sought in the years 1740–1815⁴. The first steps towards industrialisation had

1. Sir JOHN CLAPHAM, *The Economic Development of France and Germany 1815–1914*, 3rd edn., Cambridge 1928, p. 1.

2. "Napoléon tombé, le régime administratif qu'il a édifié, ou pour le moins mis au point, subsiste, l'ère des guerres est close, et l'industrie, qui a commencé à se créer en partie avant son règne, mais qui s'est organisée grâce aux effets du blocus, grâce aussi au travail des grands conseils techniques qui ont renseigné l'Empereur sur les problèmes essentiels de la production, du commerce et de la main-d'œuvre". G. BOURGIN in preface to A. L. DUNHAM, *La révolution industrielle en France 1815–48*, Paris 1953, p. ix.

3. WERNER SOMBART, *Die deutsche Volkswirtschaft im 19. Jahrhundert ...* 7th edn., Berlin 1928; A. SARTORIUS VON WALTERSHAUSEN, *Deutsche Wirtschaftsgeschichte 1815–1914*, 2nd edn., Jena 1923; PIERRE BENAERTS, *Les origines de la grande industrie allemande*, Paris 1933.

4. For the industrial expansion of France, Germany and Russia in the 17th and 18th centuries see JOSEF KULISCHER, "La grande industrie aux xvii^e–xviii^e siècles (France-Allemagne-Russie)", *Annales d'Histoire économique et sociale*, vol. iii, 1931, p. 11–46. For the development of the Continental textile industries in the 17th and 18th centuries see PAUL LEULLIOT, "Commerce et industrie en Europe

already been taken before the French revolution and then the wars of 1792-1815 fostered the production of iron, armaments and cloth while beet sugar refineries and Leblanc soda works expanded because of the exceptional circumstances of wartime. Despite the damage inflicted upon some branches of industry by the Continental System the economies of France and Germany were probably stronger in 1815 than they had been in 1789.

So rapid was the growth of British industry in George III's reign that the significance of parallel, though more modest, developments in France and Germany may be overlooked. If the pace of British industrial expansion be taken as a yardstick of economic development then the progress made by Continental countries between 1740 and 1815 was relatively slow. But if the extension of manufactures in France and Germany be studied without reference to so exceptional a standard it will be seen that important economic advances were being made.

I

Adam Smith thought that "the most decisive mark of the prosperity of any country is the increase in the number of its inhabitants"⁵. One factor which influenced British industrialisation was undoubtedly the increase in population⁶. Finlayson estimated that England's population rose from 5,100,000 in 1720 to 9,180,000 in 1811. On the Continent too population was increasing. Between 1700 and 1789 the population of France probably rose from about 18,000,000 to

du XVI^e siècle: les industries textiles", *Relazioni del x. Congresso Internazionale di Scienze Storiche*, Vol. IV: *Storia moderna*, Rome 1955. For the economic development of Germany in the 16th, 17th and 18th centuries see WILHELM TREUE, *Wirtschafts- und Sozialgeschichte vom 16. bis zum 18. Jahrhundert*, Sonderabdruck aus GEBHARDT, *Handbuch der deutschen Geschichte*, Vol. II, 8th edn., 1955.

5. A. M. CARR-SAUNDERS, *The Population Problem*, Oxford 1922, p. 23.

6. For Britain's population in the 18th century see G. TALBOT GRIFFITH, *Population Problems of the Age of Malthus*, Cambridge 1926; M. C. BUER, *Health, Wealth and Population in the Early Days of the Industrial Revolution*, London 1926; T. H. MARSHALL, "The Population Problem during the Industrial Revolution", *Economic History*, Vol. I, 1929, p. 429-456; and H. J. HABAKKUK, "English Population in the 18th Century", *Economic History Review*, second series, Vol. VI (1953), no. 2, p. 117-133.

24,000,000⁷ while Prussia's population is estimated to have grown from 2,380,000 to 5,750,000 (1740-83), Saxony's from 1,600,000 to 2,000,000 (1722-1802), and Württemberg's from 343,000 to 614,000 (1707-94). There was at this time a tendency for people to move from the countryside to the towns and for the number of large cities to increase. In the eighteenth century London probably grew from 675,000 to 865,000 inhabitants, Paris from 500,000 to 670,000, Vienna from 175,000 to 232,000, and Berlin from 29,000 to 141,000⁸. The migration of skilled artisans to regions in which new industries were being developed was another feature of population movements both in Britain and on the Continent. Frederick the Great, for example, succeeded in attracting many skilled workers to Prussia in the period of reconstruction after the Seven Years War.

Population growth and urbanisation normally foster an increase in agricultural output. New mouths have to be fed while expanding industry needs more raw materials such as wool, flax, hemp, hides and madder. In Britain scientific farming, enclosures and the extension of the area of farmland led to a substantial increase in agricultural output in the eighteenth century. Did similar changes occur in France and Germany at this time? Although scholars are not agreed on the answer to this question much evidence is available to suggest that—despite many adverse factors—the level of agricultural output in these countries did increase in the eighteenth century. In France Arthur Young⁹ praised the progress that was being made on many farms in Flanders, Alsace and Languedoc while the rise in the value of agricultural land suggests that farming was becoming

7. Necker, writing in 1784, estimated the population of France at 24,800,000 while three years later Calonne gave an estimate of 23,000,000. E. Levasseur's estimate of 26,000,000 for 1789 is generally considered to be too high. For France's population in the 18th century see also T. R. MALTHUS, *An Essay on the Principle of Population...*, 1st edn., London 1798; new enlarged edn. London 1803; Everyman edn. in two volumes, Book II, ch. 6 and 7.

8. J. KULISCHER, *Allgemeine Wirtschaftsgeschichte...*, Vol. II, München 1929, ch. 1; HANS HAUSHERR, *Wirtschaftsgeschichte der Neuzeit*, Weimar 1954, ch. 12; M. R. REINHARD, *Histoire de la population mondiale de 1700-1948*, Paris 1950; and articles on "Bevölkerungswesen" in the *Handwörterbuch der Staatswissenschaften*, Vol. II, Jena 1899, p. 653 *et seq.*

9. See ARTHUR YOUNG, *Travels in France during the Years 1787, 1788, 1789*, ed. by M. Betham Edwards, London 1915, and French translation (*Voyages en France...*), ed. by H. Sée (3 vols., 1931).

more profitable and this in turn suggests that output was expanding. In various parts of Germany clover, lucerne, potatoes, beet, hops and tobacco were introduced in the eighteenth century; the amount of fallow was reduced; indoor winter feeding of cattle was extended; the quality of livestock was greatly improved; and marshes and heathlands were being reclaimed. Developments of this kind played their part in promoting industrial expansion.

One major factor which fostered British industry in the eighteenth century was the invention of many new machines and processes. Progress in the manufacture of textiles was associated with the invention of the water-frame, the mule jenny and the power loom while the iron and steel industry was revolutionised by the substitution of coal or coke for charcoal in the blast furnace and by the introduction of Huntsman's method of making cast steel. The invention of the steam engine greatly increased the pace of industrialisation.

Improvements in industrial technique were not confined to Britain at this time. Though the metallurgical industries of France were relatively backward in the eighteenth century¹⁰ some progress was made since Réaumur popularised new methods of producing malleable cast iron and of turning wrought iron into steel while Louis Clouet made cast steel. Notable advances were made in the manufacture of textiles since Jacquard invented a silk loom; Oberkampf and Widmer made a cylinder for printing cloth; and Macquer and Berthollet discovered a better method of dyeing cloth. Leblanc made artificial soda and Chappe invented the semaphore¹¹. The training of engineers was fostered by the establishment of the *Ecole des ponts et chaussées* (1747), the *Ecole des mines* (1793) and the *Ecole polytechnique* (1794)¹² while information concerning inventions was dissemi-

10. For the backwardness of the French steel industry in this period see, e.g., RENÉ TRESSE, "Le développement de la fabrication des faux en France de 1785 à 1827..." in *Annales: Economies, Sociétés, Civilisations*, x (July-Sept.), Paris 1955, III, p. 343.

11. See S.T. McCLOY, *French Inventions in the Eighteenth Century*, University of Kentucky Press, 1952, and J. BERTRAND, *L'Académie des sciences et des académiciens de 1666 à 1793*, Paris 1869.

12. The *Ecole des ponts et chaussées* and the *Ecole polytechnique* trained engineers and architects for the public service while, later, the *Ecole centrale des arts et manufactures* (founded 1829) trained technicians for private industry. For the *Ecole des ponts et chaussées* see DE DARTEIN, "Notice sur le régime de l'ancienne Ecole

nated by learned societies¹³, the publication of scientific journals¹⁴, the setting up of industrial museums¹⁵, and the holding of industrial exhibitions¹⁶. Few notable contributions to the advancement of technical knowledge were made in Germany in the eighteenth century though reference may be made to a water-pressure engine constructed by Winterschmidt, to new dyes invented by Diesbach and Barth¹⁷, and to the establishment of the world's first beet-sugar refinery by Achard¹⁸. In Germany considerable progress was made in higher technical education¹⁹. Berlin had its Academy (1799); Brunswick had its *Collegium Carolinum* (1745); Hamburg had its Commercial College (1767); and there were excellent mining colleges at Freiberg (1765-66) and Clausthal (1765). New learned societies, such as the *Patriotische Gesellschaft* of Hamburg (1763)²⁰, were centres from which scientific and technical information spread throughout Germany.

Details concerning English inventions were soon available in

des Ponts et Chaussées..." in the *Annales des Ponts et Chaussées*, Paris 1906, Part 2, p.5-143 and the extracts from LECREUBE, "Essai historique sur le corps des Ponts et Chaussées" which appeared in the *Mémoires de la Société historique et archéologique de l'Orléanais*, Vol. xxxix, Orléans 1905, p.415-572.

13. E.g. the *Société pour l'encouragement de l'industrie nationale* (founded 1801); this society published a bulletin which played an important part in spreading technical knowledge.

14. E.g. the *Journal des Mines* (founded 1795) which became the *Annales des Mines* after 1816.

15. E.g. the *Conservatoire des arts et métiers* (founded 1794).

16. Industrial exhibitions were started in Napoleon's day by François de Neuchâteau and by Comte Chaptal (Minister of the Interior). The first was held in 1798.

17. Diesbach invented "Berlin blue" in 1707 while Barth invented "Saxon blue" in the 1740's.

18. A German chemist named Marggraf discovered that sugar could be extracted from sugar-beet. Achard's pioneer sugar-beet refinery at Kunern in Silesia was erected in the 1790's and was subsidised by the King of Prussia. In the three years 1811-13 the number of sugar refineries in France increased from 66 to 213.

19. See K. KARMARSCHE, *Geschichte der Technologie*, München 1872.

20. The *Patriotische Gesellschaft* of Hamburg and Napoleon's *Société pour l'encouragement de l'industrie nationale* were modelled on the Royal Society of Arts (founded 1754); see D. HUDSON and K. W. LUCKHURST, *The Royal Society of Arts 1754-1954*, London 1954, p. 150.

France and Germany despite the efforts of the British authorities to keep such information secret. The export of certain machines and blueprints and the emigration of skilled artisans was forbidden. Some "industrial spies" were caught and punished as when Charles Albert was fined and imprisoned in 1792 for trying to smuggle men and machinery to France. But many foreigners visited—and even worked in—English factories and defied the law by sending abroad machines, models and blueprints. In 1764 Gabriel Jars looked over collieries near Newcastle on Tyne, studied Huntsman's method of making cast steel at Sheffield, and examined Roebuck's blast furnaces at the Carron ironworks. In 1775 Marchant de la Houlière saw several ironworks and engineering establishments in the Midlands and at Newcastle. German engineering experts who travelled in England in the second half of the eighteenth century included von Reden, Stein, Eversmann, Baader and Reichenbach. They were mainly interested in ironworks and engineering establishments such as the Soho works of Boulton and Watt.

By these means some Newcomen and Watt pumps were erected in mines on the Continent; a few coke furnaces were introduced into ironworks; fly shuttles, waterframes and mule-jennies appeared in some of the textile factories and rotative steam engines were set up to work cornmills and textile machines. There were probably about two hundred steam engines in France in 1810.

Moreover English experts crossed the Channel to introduce machines to the Continent and to show local workers how to use them. Some English experts settled permanently abroad. John Kay spent many years in France where he introduced his fly-shuttle and card-making machine. John Holker, an exiled Lancashire Jacobite, fostered the development of the Normandy textile industries and as an Inspector General of Factories he travelled widely in France to promote the adoption of new textile machinery. Michael Alcock established metalworks at la Charité, Saint-Etienne and Roanne. William Wilkinson supervised the erection of a royal cannon foundry at Indret and set up, at the Le Creusot ironworks, the first furnace on the Continent to use coke successfully. Later he smelted lead ore with coke in a Prussian State mine at Tarnowitz (Silesia). A steam pump, one of the first to be erected in Germany, was supplied to this mine (the *Friedrichsgrube*) by John Wilkinson—William's brother—in

1787–88. John Baildon erected coke furnaces in Silesia at State ironworks at Gleiwitz and Zabrze and at the privately owned *Hohenlohehütte*²¹.

The improvements in communications promoted the progress of manufactures in Britain in the eighteenth century. On the Continent, too, the construction of roads, bridges, canals and harbour-works increased industrial efficiency by improving the transport of raw materials to the workshops and of finished goods to the consumers. In France D. C. Trudaine reorganised the administrative arrangements for maintaining the highways (1743–69) and the general standard of roadbuilding was improved by engineers trained at the new *Ecole des ponts et chaussées*. Pierre Tresaguet invented a new method of road building which was particularly successful in the Limousin district in the days when Turgot—Intendant of the *Généralité* of Limoges, 1761–74—was in charge of the local government of this region. Turgot substituted a tax for forced labour on the roads and he engaged contractors to repair bridges and highways. The local inhabitants viewed his methods with some suspicion but the authorities in Paris agreed to give the new scheme a trial. Arthur Young subsequently declared that the Limousin roads were among the best in the country. By 1789 France had a network of 40,000 km of roads²².

Stein's highways in the County of Mark may serve as an example of road improvements in Germany at this time. Stein came to the County of Mark—which included part of the Ruhr coalfield—in 1784 as a Prussian mining official. But he soon accepted new responsibilities in the wider field of local government. Stein, like Turgot,

21. For British influence on the industrialisation of France and Germany, see W. O. HENDERSON, *Britain and Industrial Europe 1750–1870*, Liverpool 1954. For Holker see ANDRÉ RÉMOND, *John Holker, Manufacturier et grand fonctionnaire en France au XVIII^e siècle, 1719–1786*, Paris 1946; and for the Wilkinsons see W. H. CHALONER, "John Wilkinson, Ironmaster", *History Today* (London), May, 1951, p. 63–69.

22. For D. C. TRUDAINE see the obituary notice (*éloge*) in the proceedings of the French Academy of Sciences (1769) and E. CHOULLIER, *Les Trudaine*, Arcis sur Aube 1884; PIERRE TRESAGUET, *Mémoire sur la construction des chemins dans la généralité de Limoges*, 1775; for Turgot see J. A. N. DE CONDORCET, *Vie de Monsieur Turgot*, London 1786, and JOHN MORLEY, *Biographical Studies*, London 1923, p. 1–91. For the history of the French roads see HENRI CAVAILLES, *La route française*, Paris 1946.

dispensed with forced labour in the building of roads. He secured funds from government grants, local rates and loans and he even paid some of the contractors' bills out of his own pocket. His roads from Siegen to Herdecke and Meinerzhagen and from Herdecke to Soest laid the foundations of the modern system of highways in the Ruhr²³.

Some progress, too, was made in the improvement of inland waterways. In France no great waterway was built which could compare with Colbert's Languedoc Canal but there was considerable government activity in improving the waterways of the northern industrial region²⁴. In Prussia in the eighteenth century the Havel and the Oder were joined by the Finow Canal. The Plauer and the Templin canals were completed in 1745; the Fehrbellin Canal in 1766; the Bromberg Canal in 1774; and the Klodnitz Canal in 1806. The navigation of the River Ruhr was improved in the 1770's²⁵.

II

Industrial expansion requires capital as well as machinery and communications. In Britain this was provided by landowners whose wealth came from rents; by merchants who had made money in home or overseas trade; and by entrepreneurs who ploughed profits back into industrial undertakings. "The Bank of England, the London financial houses, the country banks and various exchanges provided the necessary financial framework within which new industrial enterprises could expand"²⁶. Similar developments occurred on the Continent on a more modest scale. Thus in Upper Silesia some of the great feudal lords financed collieries and foundries

23. See H. ACHENBACH, "Geschichte der kleve-märkischen Berggesetzgebung und Bergverwaltung bis zum Jahre 1815", *Zeitschrift für das Berg-, Hütten- und Salinenwesen in dem preussischen Staate*, Berlin, Vol. xvii (1869), p. 178 *et seq.*, and W. SERLO, "Des Freiherrn vom Steins Verdienste um die Bergwirtschaft", *idem*, Vol. LXXIX, Part B.

24. H. SÉE declares that in this region "tout un réseau fut achevé" (*La France économique et social au XVIII^e siècle*, Paris 1946, p. 113).

25. For canal building in Germany see the British Admiralty *Geographical Handbook on Germany*, Naval Intelligence Division, Vol. iv (1945), ch. 5.

26. W. O. HENDERSON, *Britain and Industrial Europe 1750-1870*, Liverpool 1954, p. 1.

on their estates while in Saxony the Lauchhammer ironworks owed their existence to aristocratic landowners²⁷. The investment mania associated with John Law's Mississippi scheme suggested that ample funds were available in France but they were attracted to public loans, chartered trading companies and tax-farming rather than to industrial enterprises.

Comparatively little wealth from overseas trade found its way into industrial enterprises on the Continent at this time. France's expanding colonial trade²⁸ received a setback when Canada and India fell into English hands. The profits from Germany's exports to Latin America financed the purchase of tropical products rather than the establishment of industrial enterprises²⁹. In Prussia legal restrictions hampered the flow of capital from the ports to the hinterland. In the 1780's and 1790's however, some of the leading French and German ports were in a flourishing condition. Arthur Young declared that "the commerce, wealth and magnificence" of Bordeaux greatly surpassed his expectations and that "we must not name Liverpool in competition with Bordeaux"³⁰. Hamburg's commerce expanded after the American colonies gained their independence since direct trade with North America now became possible. The number of ships entering the Elbe in 1796 was 239. At this time Hamburg handled large quantities of grain in transit from Baltic to English ports and also took over some of the trade of Amsterdam when that port fell into French hands.

The leading Continental banks in the eighteenth century were to

27. For the Lauchhammer ironworks see FRITZ REDLICH, "A German Eighteenth Century Ironworks during its First Hundred Years", *Bulletin of the Business Historical Society*, Vol. xxvii (ii), June 1953, p. 69 *et seq.*

28. The significance of France's trade with the colonies in the 18th century may be judged from the fact that nearly half the sugar consumed in the world came from San Domingo. It has been stated that "by 1738 San Domingo was exporting twice as much sugar as Jamaica, and both Martinique and Guadeloupe were more prosperous than Barbados" (*Admiralty Geographical Handbook on France*, Naval Intelligence Division, Vol. II (1942), p. 111).

29. The value of Germany's exports to the Spanish and Portuguese colonies alone in 1807 was estimated at between ten and fifteen million pesos (PERCY ERNST SCHRAMM, *Deutschland und Übersee*, Braunschweig/Berlin/Hamburg/Kiel, 1950, p. 41).

30. ARTHUR YOUNG, *Travels in France during the Years 1787, 1788, 1789*, ed. by M. Betham Edwards, London 1915, p. 67.

be found in Switzerland and Holland rather than in France or Germany. The Bank of Hamburg, however, grew in importance in this period. The trade of north Germany, Scandinavia and the Baltic was facilitated when this bank established the *Mark Banco*. This was not a coin in actual circulation but a unit of "bank money" used on invoices, bills of exchange and other commercial documents. Its value was fixed whereas many of the German currencies were debased from time to time. Moreover the activities of the Berlin merchant David Splitgerber³¹ who acted as Frederick the Great's financial agent, showed how in Prussia the function of private banker was beginning to be differentiated from that of merchant.

Since Continental manufacturers frequently found it difficult to raise sufficient funds for their needs, governments themselves invested money in industry and also tried to tempt private investors by granting various privileges to manufacturers. In Britain, in the age of *laissez-faire*, people were satisfied if the State maintained law and order, established a sound currency and pursued a commercial and navigation policy which gave adequate protection to farmers, manufacturers and shipowners. But there was no nationalised sector of the economy and the State did not own or manage industrial enterprises³². In France and Germany, however, the climate of public opinion was entirely different. In those countries governments were expected to promote industrial expansion in many different ways. The establishment of nationalised mines, foundries, mills and factories and the granting of State aid to private firms were regarded as normal methods of fostering economic prosperity.

Many factors influenced the attitude of Continental governments towards economic affairs in the eighteenth century. The years 1740–1815 marked the initial phase of a transition in the structure of the economy, the consequence of which did not become fully apparent until after the Napoleonic wars. Many contemporaries failed

31. W. TREUE, "David Splitgerber, Ein Unternehmer im preussischen Merkantilstaat, 1683–1764", *Vierteljahresschrift für Sozial- und Wirtschaftsgeschichte* (Stuttgart), Vol. xli, Heft iii.

32. The government, however, maintained an arsenal at Woolwich and several naval dockyards (e.g. Portsmouth and Chatham). It built roads in the Highlands of Scotland after the Jacobite revolt of 1745 and later subsidised the construction of the Holyhead-London road. The post office was run by the State.

to appreciate that a significant change was taking place. For them mercantilist principles represented a policy which had proved its worth since the days of Colbert. The force of tradition was strong and it was natural that the policy of the State towards agriculture and industry should follow well established precedents. But in the second half of the eighteenth century there were manufacturers, merchants, civil servants and ministers of State on the Continent who realised the importance of changes that were taking place on the other side of the English Channel. They saw that a new industrial economy based upon coal, iron, machinery, steampower and factories was making Britain both wealthy and powerful. They believed that similar opportunities lay within their grasp but that—for various reasons—what was being accomplished in Britain by private enterprise alone could hardly be achieved on the Continent unless the State gave effective assistance and encouragement to private manufacturers. The industrial policy of Continental governments in the eighteenth century was thus partly the continuation of a traditional policy which aimed at strengthening an old established economy and partly an attempt to adapt well tried methods to the needs of a changing age.

Werner Sombart has discussed the significance of the armaments industry and of certain luxury industries in the history of the evolution of modern capitalism³³. All countries were obviously bound to make adequate defence preparations. It was common for States to establish foundries (for casting cannon); factories for the manufacture of small arms, gunpowder and ammunition; and dockyards for building naval vessels. The French naval ironworks at Indret and the Prussian royal foundry at Berlin were establishments of this type. The motive for fostering the production of luxuries was different. Silks, porcelain, glassware, carpets and curtains were articles of high value in relation to their weight and bulk which could be sent long distances without incurring high transport costs. Their export secured foreign currency with which to pay for essential imports. The Gobelins tapestries, the porcelain of Sèvres, Meissen and Berlin were among the many luxury products made in nationalised workshops. Sometimes a branch of manufacture originally founded as a luxury industry expanded so that it produced cheaper articles for a wider

33. WERNER SOMBART, *Luxus und Kapitalbildung*, München und Leipzig 1913, and *Krieg und Kapitalismus*, München und Leipzig 1913.

market. The development of the glass industry in France illustrates this. In the seventeenth century the output of this industry, which grew up under the shelter of State patronage, consisted largely of high quality glassware. In the eighteenth century, however, French glassmakers were turning out not only luxury articles but also bottles and other types of glassware in common use. Relatively large factories, using coal for fuel, were now taking the place of the old fashioned small woodburning workshops³⁴.

During Colbert's administration the French government spent some 7,500,000 livres in promoting the cloth, silk, lace and carpet industries. Colbert established State workshops and granted subsidies to privileged "royal manufacturies"³⁵. After his death less money for subsidies were available and several establishments founded by Colbert were closed down. Later his policy was revived and between 1740 and 1780 the government gave or lent 6,800,000 livres to manufacturers and merchants while the King invested heavily in chartered overseas trading companies in the early stages of their development³⁶.

Frederick the Great of Prussia—like Colbert—made great efforts to promote the growth of industry and trade³⁷. Here again some of the branches of manufacture fostered by the State did not long survive the death of their founder. But the silk industry of Krefeld and the

34. For the early development of the French glass industry see three articles by P.-M. BONDOIS in the *Revue d'histoire économique et sociale* (Paris), Vol. XXIII (1936-37), p. 49-72, 237-261 and 333-361.

35. For Colbert's industrial policy see P. CLÉMENT (ed.), *Lettres, instructions et mémoires de Colbert* (8 parts in 10 vols.), Paris 1861-73, and P. CLÉMENT, *Histoire de Colbert et de son administration*, 2 vols., 1874.

36. For the work of the French Council of Commerce in the 18th century see P. BONNASSIEUX, *Conseil de commerce et Bureau de commerce, 1700-1791*, Paris 1900.

37. For Frederick the Great's industrial policy see the documents in *Acta Borussiae* (Berlin): *Denkmäler der preussischen Staatsverwaltung*:

- (a) *Getreidehandelspolitik* (4 vols., 1896-1931);
- (b) *Handels-, Zoll- und Akzisenpolitik* (2 vols. in 3 parts, 1911-1928);
- (c) *Münzwesen* (4 vols., 1904-1913);
- (d) *Seidenindustrie* (3 vols., 1892);
- (e) *Wollindustrie* (1933).

See also CONRAD MATSCHOSS, *Friedrich der Grosse als Beförderer des Gewerbetreibenden*, Berlin 1912, and A. ZOTTMANN, *Die Wirtschaftspolitik Friedrichs des Grossen*, Vienna 1937.

collieries and ironworks of Silesia were among several Prussian industries which continued to flourish in the nineteenth century. In Frederick the Great's reign the output of existing state mines, foundries, saltworks and armament factories was expanded and new nationalised establishments were set up. Private manufacturers were encouraged by subsidies, loans and export premiums. The King established the Royal Bank of Berlin and the Overseas Trading Corporation (*Seehandlung*). The acquisition of the port of Emden enabled him to promote commercial ventures beyond the narrow confines of the Baltic. The mining and metal industries of Silesia owed much to the active interest which the King took in the economic development of his new province. Blast furnaces and ironworks were erected near Oppeln at Malapane, Kreuzburg (1753-54), Jedlitz (1775) and Dembiohammer (1784). Reden, the exceptionally able official who took charge of the Breslau Mining Office in 1779, played an important part in developing the coal and iron industries of Upper Silesia. He established a State lead-silver mine (*Friedrichsgrube*) and smelting works (*Friedrichshütte*) at Tarnowitz (1784-86), State coal-mines at Königshütte (1790) and Zabrze (1791), and State foundries and engineering workshops at Gleiwitz (1796) and Königshütte (1797-1801). He brought steam pumps and coke furnaces to Silesia and he promoted the building of the Klodnitz Canal to link Gleiwitz with the River Oder. He laid the foundations of the future expansion of one of Germany's major industrial regions³⁸.

III

In France and Germany, as in Britain, industrial expansion even before 1815 was characterised both by the development of large units of production and the geographical concentration of manufactures in particular regions. Some of the regions on the Continent which became important in the nineteenth century were already of some significance in an earlier period. Two examples may be given—the industrial areas of French Hainault and the Saar. The coal and iron industries of French Hainault made striking progress in the eighteenth

38. For Reden see A. SCHWEMANN, "Friedrich Wilhelm Graf von Reden", in *Beiträge zur Geschichte der Technik und Industrie*, ed. by Conrad Matschoss, Vol. XIV, Berlin 1924.

century. When Hainault was partitioned in Louis XIV's reign the French government invited mining experts to prospect for coal in that part of the territory which was now in French hands. In 1716 Vicomte Jacques Désandrouin decided to search for coal at Fresnes where his brother owned glassworks which imported their fuel from Mons. Coal was found near Fresnes in 1720 but the workings were flooded soon afterwards. Further seams were subsequently discovered in the same district but the quality of the coal was poor. In the 1720's Désandrouin and his partner Taffin began prospecting in the Anzin region and here they were more fortunate. Good quality coal was found and mining commenced in 1736. Almost immediately the price of imported Mons coal fell from 15 to 12 francs per ton. By 1756 Désandrouin's interests in the new coalfield had expanded to such an extent that he employed 1,500 men of whom 1,000 worked underground. In the following year Désandrouin and Taffin joined a rival concern run by the Marquis of Cernay to form the Anzin Company and shortly afterwards the Prince of Croy who owned large mining concessions in the district became a new partner in the company³⁹. The iron industry of French Hainault was concentrated in the hands of only three families in the last quarter of the eighteenth century. The most important was the Despret family which owned numerous blast furnaces and forges in this region. Their interests extended beyond French Hainault to Lorraine, Champagne and the Austrian Netherlands⁴⁰.

The development of the Saar industrial region between 1740 and 1768 shows that the rulers of small German states were just as

39. For the origins of the Anzin Company see R. SAMUEL-LAJEUNESSE, *Les grands mineurs français*, Paris 1948, p. 48-55, which includes extracts from a memorandum of 1756 entitled "Observations sur le local, les travaux et l'utilité des mines à charbon de terre du Hainaut français découvertes et exploitées par le Vicomte Désandrouin et consorts en vertu de privilège"; and A. DE SAINT-LÉGER, *Les mines d'Anzin et d'Aniche pendant la Révolution*, Part I: *Mine d'Anzin* (2 vols., 1936-38).

40. BERTRAND GILLE, *Les origines de la grande industrie métallurgique en France*, Paris 1947, p. 175-177. The Dietrich family in Alsace (Niederbronn) and the de Wendels in Lorraine (Hayange) dominated the iron industries of the eastern provinces of France. For François-Ignace de Wendel see an article by JEAN CHEVALIER in the *Annuaire de la Société d'Histoire d'Archéologie de la Lorraine* (Metz), Vol. XLII (1932), p. 181 *et seq.*

anxious as their more powerful neighbours to promote the economic expansion of their territories. Prince Wilhelm Heinrich of Nassau-Saarbrücken expanded the State ironworks at Fischbach, Geislautern, Sulzbach and St. Ingbert and established several nationalised coalmines. Moreover he gave every encouragement to Count William Stuart, Röchling and Heuss who tried to smelt iron with coal or coke instead of charcoal⁴¹. After 1768, however, his successor (Prince Ludwig) handed over the management of the State ironworks and the collection of certain taxes to a French undertaking (Leclerc-Joly). Claude Savoye, the representative of this firm in the Saar, became the leading entrepreneur in the district. In 1792-93 the French occupied the Saar and remained in possession for twenty-two years. A State Mining Office controlled the coalmines until 1797 when they were leased to the *Compagnie J. B. Equer*. In 1808 the Saar coalmines were again taken over by the State and this arrangement lasted until 1814. The French authorities actively promoted the development of the Saar industrial region. The coalfield was carefully surveyed by Duhamel and a mining school was set up at Geislautern in 1806-07. A canal was planned to link the Saar collieries with the saltworks of Chateau-Salins and Dieuze but only a small portion had actually been completed by 1814. Although there does not appear to have been any marked expansion of output of either coal or pig iron in the Saar between 1792 and 1814 the work of French mining engineers prepared the way for the future expansion of the Saar industrial region when it became part of the Prussian province of the Rhineland in 1815⁴².

41. For the Saar in the 18th century see J. GAYOT and R. HERZ, *La métallurgie des pays de la Sarre moyenne jusqu'en 1815*, Nancy/Paris/Strasbourg, 1928, and W. KRÄMER, *Geschichte des Eisenwerkes zu St. Ingbert mit besonderer Berücksichtigung der Frühzeit*, Speyer 1933.

42. For the Saar under French rule between 1792 and 1814, see A. H. DE BONNARD's report of 1807 in the *Journal des Mines* (Paris), Vol. xxv (1809); a series of articles by P. SAINTE CLAIRE DEVILLE in the *Annales des Mines (Mémoires)*, Paris, Series XII, Vols. 13 to 19 (1928-1931) and Series XIII, Vols. 1 to 4 (1932-1933); R. CAPOT-REY, *Quand la Sarre était français*, Paris 1928, and H. OVERBECK, "Die Saarwirtschaft um 1800", *Vierteljahrsschrift für Sozial- und Wirtschaftsgeschichte* (Stuttgart), Vol. xxvii (1934), p. 209-234.

IV

In the light of the available evidence it may be suggested that the genesis of the industrial revolution in France and Germany may be sought in the second half of the eighteenth century rather than in the years following the Napoleonic wars. De Tocqueville has pointed out that in France a new spirit began to influence the Ancien Régime after about 1740⁴³. The same might be said of the Germany of Frederick the Great and other enlightened rulers. In both countries a new vigour animated both the central government and the provincial authorities. Men like Trudaine, Turgot and Necker in France and Hagen, Heinitz and Reden in Prussia pressed forward with schemes for expanding industry and commerce. In both countries private enterprise responded to this stimulus. In both countries the growth of population encouraged farmers to produce more food and manufacturers to produce more consumer goods. For both countries the industrial revolution in Britain was an example to be followed. Eighteenth century statistics are far from reliable but there is evidence to suggest that in France in the closing years of the Ancien Régime the total output of both iron and textiles was greater than the contemporary British output.

Of course the economic progress made in France and Germany between 1740 and 1815 should not be exaggerated. Throughout this period there were many regions and industries which were as yet hardly affected at all by the new machines and the new methods of

43. He wrote: "Environ trente ou quarante ans avant que la Révolution éclate, le spectacle commence à changer; on croit discerner alors dans toutes les parties du corps social une sorte de tressaillement intérieur qu'on n'avait point remarqué jusque-là... J'ai dit ailleurs que le contrôleur général et l'intendant de 1740 ne ressemblaient point à l'intendant et au contrôleur général de 1780. La correspondance administrative montre cette vérité dans les détails. L'intendant de 1780 a cependant les mêmes pouvoirs, les mêmes agents, le même arbitraire que son prédécesseur, mais non les mêmes visées: l'un ne s'occupait guère que de maintenir sa province dans l'obéissance, d'y lever la milice, et surtout d'y percevoir la taille; l'autre a bien d'autres soins; sa tête est remplie de mille projets qui tendent à accroître la richesse publique. Les routes, les canaux, les manufactures, le commerce, sont les principaux objets de sa pensée; l'agriculture surtout attire ses regards..." (*L'Ancien Régime* (1856), Oxford 1925, p. 176-177).

production. There was, however, a sufficient move towards industrialisation to justify the view that it is in the eighteenth century that the origins of the industrial revolution on the Continent are to be found.

University of Manchester
(United Kingdom)

W. O. HENDERSON

SUMMARY

The purpose of this paper is to examine two aspects of the genesis of the industrial revolution in France and Germany. It has sometimes been assumed, first, that it was only after the Napoleonic wars that the origins of modern manufactures can be discerned in France and Germany and, secondly, that the general pattern of industrial development was much the same on the Continent as it had been in Britain. Both these assumptions require modification. Although several writers of standard works on the economic development of France and Germany have taken the year 1815 as their starting point there is ample evidence that the genesis of the industrial revolution in these countries had already occurred in the eighteenth century. And although there are no doubt important similarities between the early phases of industrialisation in Britain on the one hand and in France and Germany on the other it is also true that the industrial revolution on the Continent was marked by special features—such as very active State encouragement and the importance of the development of both the armaments and the luxury industries—which were of less significance in Britain.

ZUSAMMENFASSUNG

Die Anfänge der industriellen Revolution in Frankreich und Deutschland im 18. Jahrhundert. Der vorliegende Artikel untersucht zwei Aspekte der Entstehung der industriellen Revolution in Frankreich und Deutschland. Es wird bisweilen angenommen, dass die Anfänge des modernen Fabrikbetriebes in Frankreich und Deutschland in die Zeit nach den Napoleonischen Kriegen fallen und dass die industrielle Entwicklung auf dem Kontinent und in England in ihren allgemeinen Zügen weitgehend dieselbe ist. Beide Annahmen müssen modifiziert werden. Obwohl verschiedene Verfasser von Standardwerken über die Wirtschaftsentwicklung in Frankreich und Deutschland das Jahr 1815 zum Ausgangspunkt nahmen, lässt sich doch zeigen, dass die Ursprünge der industriellen Revolution in diesen Ländern bereits im 18. Jahrhundert zu finden sind. Und obschon zweifellos bedeutende Ähnlichkeiten zwischen den ersten Phasen der Industrialisierung in England einerseits, in Frankreich und Deutschland andererseits bestehen, so war doch die

industrielle Revolution auf dem Kontinent durch Merkmale ausgezeichnet, die in England weniger in Erscheinung traten, wie zum Beispiel die starke aktive Unterstützung durch den Staat sowie die Bedeutung der Waffenfabrikation und der Luxusindustrien.

RÉSUMÉ

La genèse de la révolution industrielle en France et en Allemagne au xviii^e siècle. L'objet de cet article est d'examiner deux aspects de la genèse de la révolution industrielle en France et en Allemagne. On admet parfois que les origines des manufactures modernes en France et en Allemagne ne remontent qu'à la période consécutive aux guerres napoléoniennes et que les grandes lignes du développement industriel sur le continent sont sensiblement les mêmes qu'en Angleterre. Ces deux assertions doivent être révisées. Bien que plusieurs auteurs de manuels concernant le développement économique de la France et de l'Allemagne aient pris l'année 1815 comme point de départ, il est amplement prouvé que la genèse de la révolution industrielle dans ces pays remonte au xviii^e siècle déjà. Et bien qu'il y ait indéniablement d'importantes similitudes entre les premières phases de l'industrialisation en Grande-Bretagne d'une part, en France et en Allemagne de l'autre, il est tout aussi vrai que la révolution industrielle sur le continent a été caractérisée par des traits particuliers – tels que le soutien très efficace de la part de l'Etat et l'importance du développement, à la fois de la fabrication d'armes et des industries de luxe – qui furent moins accusés en Grande-Bretagne.