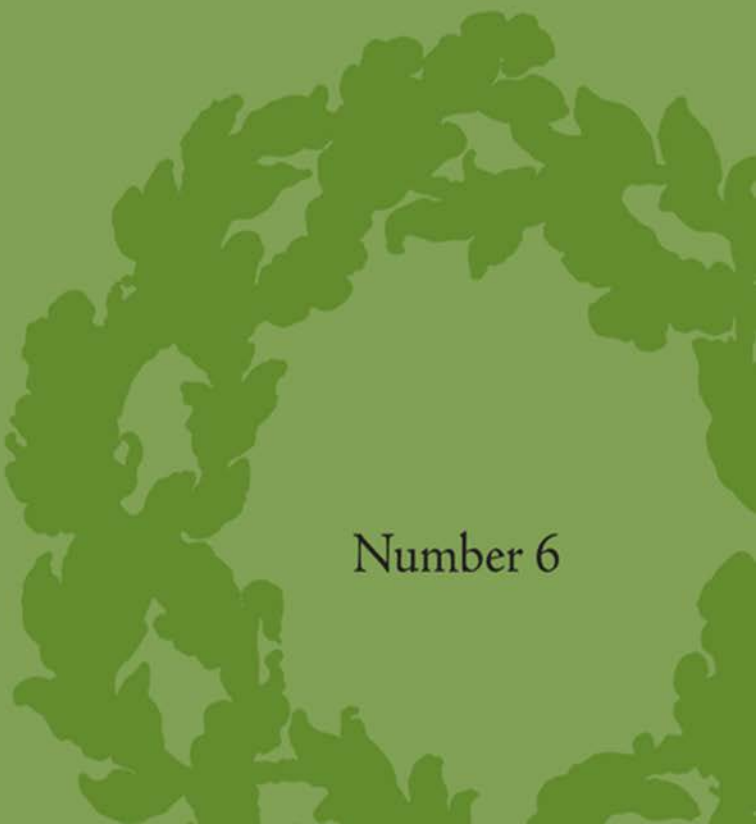
Studies in Business History

Henri Fayol, the Manager

Jean-Louis Peaucelle and Cameron Guthrie



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HENRI FAYOL, THE MANAGER

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HENRI FAYOL, THE MANAGER

BY

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FOREWORD

Jean-Louis Peaucelle and Cameron Guthrie's *Henri Fayol, the Manager* provides readers with a comprehensive, in-depth study of Henri Fayol's approach to the job of the manager and how he developed his theory from his managerial experiences and actions taken. This is the first full-length, fully documented book about Fayol's life, work and contribution to management knowledge available to English readers. The authors rely on French archival sources and publications in French to meticulously examine corporate records, correspondence, minutes of meetings of boards of directors and firm and industry data to portray Fayol's lengthy and successful career as managing director of Commentry-Fourchambault and Decazeville. This research reveals new and additional insights into the pioneering work of Fayol whose writings provide much of our modern understanding of the activities of managerial work.

The authors use the archival records to bring a new focus on specifics of Fayol's theory and avoid generalizations that result in less understanding and applicability. Readers of Fayol have noted how he often generalizes, offering aphorisms to managers, without explaining how and why such advice would be useful. An example is Fayol's presentation of fourteen principles of management offered 'as flexible and capable of adaptation to every need' and when necessary 'to make allowance for different and changing circumstances'. The list of fourteen, he notes, is not exhaustive but ones he found useful in his experience. The authors do not focus on each principle but provide correspondence and records that allow an understanding of how principles such as 'equity' or 'order' or 'remuneration' could be ideas growing from Fayol's work as a manager and suggesting to him these ideas were important in becoming successful.

Fayol's principles have been called 'proverbs of administration' by critics because of this vague, ungrounded offering of advice without adding the experiences that led to his thinking about management that would be improved by better practices. Guthrie and Peaucelle's analysis, based on the records, enlighten us about what is not just good advice but *why* it is good advice.

The authors' findings for Fayol's elements of administration form the substance of how experiences led to theory. Planning, organizing, commanding,

coordinating and verifying form a larger part of the archival records and provide substance to how each element of managerial work was applied and could be generalized to broader applications. Planning emphasizes how the future was anticipated, forecasts made and the contingency nature of plans when unexpected circumstances arose. The other elements are supported with examples of decisions that support a more fundamental understanding of organizing, commanding, coordinating and verifying. Fayol's accounting department, for example, gives the reader an illustration of how this information-gathering served business practice and all elements of administration. His study of accounting at the National School of Mines at Saint-Etienne enabled an understanding of the function of an information system for Commentry-Fourchambault. Data flowed into the department from sales, purchases, expenses, etc. and, when necessary, flowed outward as reports for managers, stockholders and others who needed information for decision-making. Accounting information became a connection between the elements of administration and the functions of the firm to be found in Commentry-Fourchambault.

Readers who are new or who are refreshing their memory of the place of Henri Fayol in the history of management thought will find his career beginning in the late nineteenth century, and his active writing years in the early twentieth century, in France. Management, as we are familiar with this word, was not a formal subject of study in academics and no body of knowledge or writings on how to manage existed beyond anecdotal advice for those wishing to become managers. It was considered an innate ability, one being born to manage or lead, or an ability to be acquired through experience on the job, preferably under the tutelage of an older, experienced practitioner. The Wharton School of Finance and Economy at the University of Pennsylvania, USA., was founded in 1881 to teach business subjects, but management was not one of them.

During a period roughly parallel to Fayol's years as managing director of Commentry-Fourchambault, the American industrial engineer, Frederick Winslow Taylor, was formulating ideas about improving production performance in workshops and factories. Setting performance standards through the study of work to reduce waste, improving worker selection, providing wage incentives, planning workflows, establishing accounting standards and other ideas were offered as means to systematize and improve performance. Taylor's *Shop Management* (1903) proposed methods for increasing efficiency in the production activity of a firm. Numerous followers promoted Taylor's ideas and his *Principles of Scientific Management* (1911) became a classic and the prevailing view of management in France and other countries.

Fayol was familiar with Taylor's ideas but noted this approach to shop-level management did not fit his experiences. For example, Taylor advocated a planning department for scheduling the flow of work, dispatching orders and following

work through the shop to its successful completion. Fayol's experiences found all managers planned to various degrees, devoting a portion of their time to planning in their particular activity within the firm – sales, production, accounting, finance or security. Planning, in this case, becoming a portion of each manager's time and effort and not relegated to a separate department. As managing director, Fayol was responsible for the entire task of planning for the firm in order for Commentry-Fourchambault and Decazeville to fulfill its objectives.

Taylor's ideas then, and now, were applicable when improving shop-level performance and today can be readily found largely in industrial engineering education. Fayol's ideas, however, were more appropriate when the economics of the firm called for planning efforts, guiding the enterprise toward its goals, coordinating the efforts of the different functions of the firm, and verifying how well the firm performed. If it is not too trite to summarize – Fayol viewed management from the top, Taylor from the shop. Fayol's view of the job of the manager did not achieve the early recognition of Taylor's but times change. Over a period of years, these giants of our management literature, Frederick Taylor and Henri Fayol, would find their respective places in furthering our study and practice of management.

It is unusual to discover a practising executive writing about the practice of management, even more remote to find one gathering and putting forth ideas that become the standard framework for the teaching and research about the job of the manager. Henri Fayol was both of the above, plus a successful managing director of a firm that was in financial difficulty when he came to office. Commentry-Fourchambault recovered and competed successfully over decades, paid substantial dividends and, not incidentally, had an outstanding record of mine safety for its workers. Further, Fayol achieved recognition for his scientific findings, was prominent in professional associations, was reimbursed well for his consulting on methods to extinguish mine fires and was rewarded with the top salary of his firm. His peer respect was so great a Center for Administrative Studies was founded in his honour.

Why, then, at age seventy-five did he not rest on his laurels, but prepare the *magnum opus* that Peaucelle and Guthrie analyze and use to explain how he built his management doctrine from his experiences? Readers are entitled to form an opinion about this and each may be arguably defensible. My reading, based on what is developed in the text plus years of study of Fayol, is that he had the curiosity of a scientist whose inquisitive mind led to the pursuit of knowledge, demonstrating for others how to inquire, examine and improve for the sake of knowing how to do something better – in this case, manage. Fayol's scientific abilities are well known – extinguishing mine fires, the formation of coal deltas, spontaneous combustion of coal and so forth. He applied his curiosity and scientific abilities into the study of how to manage and, for modern readers, how to manage better.

The book is organized logically to present the reader with the industrial context for Fayol's managerial career, corporate governance for the firm, the elements of his administrative function and the functions found in Commentry-Fourchambault. The industrial setting is a longitudinal case study and supports a conclusion of Fayol as a manager over a long term of technological and industrial change. He was not a quick-fix director but took actions to build and sustain the firm into prosperous years. In discussing Fayol's work with the directors and shareholders of the firm, the authors illustrate corporate governance in action over a substantial period of years. The importance of finance, with some corporate politics included, is described as critical to Commentry-Fourchambault remaining competitive during a lengthy period, in which they replaced depleting iron and coal resources, adopted new steel-making technology and developed specialty steel products to compete with substantially larger firms. These give the reader a richer understanding of the challenges and confrontations Fayol endured.

The elements of Fayol's administrative function follow and become his enduring legacy for management. *Planning* for the short and the long term, remaining flexible by building contingency plans; *organizing* by structuring relations with managers and workers; *coordinating* the efforts to achieve a wholeness for the firm; *commanding* as instructions for actions to be taken; and *verifying* to determine whether or not plans had been achieved and deciding what corrective action may be needed. The authors provide a useful translation of what Fayol intended as follow-on action for comparing plans with results, by substituting 'verify' for the long-accepted use of 'control' in English. The French verb *contrôle* does not translate well into English, as it carries connotations of unilateral, top-down management and may encourage resistance to positive decision-making. 'Verify' as a part of the manager's job improves our understanding of Fayol's thinking, and should become an addition to a more positive view of monitoring plans and performance to gauge a firm's progress toward achieving its goals.

Separating the elements of administration from the functions of the firm enabled Fayol to make his long-lasting contribution to the study of management. The functions of the firm – commercial, technical, etc.– would be different depending on the type of business or activity of a particular organization. The elements of administration, in contrast, were found in all firms, varying in degrees by a person's location in the managerial hierarchy, and could be separated for study and teaching. Fayol built these elements from his experiences as a manager: planning, organizing, commanding, coordinating and verifying.

Henri Fayol, the Manager makes a lasting contribution to management history and theory by replacing aphorisms with details about how Fayol's experiences became his management doctrine. With examples from practice his ideas become less abstract and yield a more firmly embedded flow of ideas about managerial work. Management theory is more firmly grounded in practice and, as a

consequence, will ask us to extend these ideas as we seek further understanding. Fayol thought his theory was correct because Commentry-Fourchambault and Decazeville succeeded. This is partially correct – Fayol's theory is sound because of its longevity in teaching and practice and our continuing unfolding evidence about its foundation.

Daniel A. Wren, David Ross Boyd Professor Emeritus,
University of Oklahoma, USA

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INTRODUCTION

In 1916 Henri Fayol (1841–1925) published his book on the theory of business management, *Administration Industrielle et Générale*. The work was translated into English in 1930 by J. A. Coubrough, and then by J. Storrs in 1949 with the title *General and Industrial Management*. It has since been regularly re-edited, lastly by Wren and Sasaki in 2004.[1] Fayol writes of the principles of good management yet these principles cannot be understood if we forget that their author was the managing director of the Commentry-Fourchambault et Decazeville Company – a large mining and steel firm for 30 years. Fayol drew his theory from his everyday practice of management, with a concern for theorizing such as that of the scientist who knows that a theory, if it is true, corresponds to a large number of practical cases. The more general the theory, the wider its application. Yet the degree of abstraction used by Fayol has no doubt often hampered our comprehension of his thought. His theory becomes clearer when it is confronted by the facts and it gains depth and flexibility when we consider how Henri Fayol himself acted as a manager. For example, Fayol's theory of 'planning' appears rigid, yet his practice shows that he continually adapted his plans as his vision of the future changed. This management-tool was flexible by necessity.

We examine Henri Fayol's concrete management actions such as the management of workers, sales, strikes and the coordination of operations between geographically dispersed sites. His day-to-day management is similar to what can be observed in companies today, and while they are a century apart the many similarities with yesterday's practices help better appreciate how managers work today.

Fayol describes a 'managerial function' that anticipates actions (planning), structures the company (organizing), transmits orders (commanding), ensures the coherence of actions (coordinating) and verifies the results (verifying).

To make each of these five 'elements of management' more concrete, Fayol proposed the concept of 'management tools',[2] each matched to an element of management. In doing so, he anticipated a large number of today's management practices. Management tools help managers anticipate and avoid common mistakes. For example, the objective of cost pricing is to ensure that sales prices are not fixed too low. Meetings of department heads allow leaders to ensure that

orders given to subordinates are feasible. He presented the management tools as a way of compensating for a manager's eventual lack of skill. Fayol believed, as did others at the time, that while a manager must have a large number of qualities, in practice this is rarely the case. He himself, for example, personally lacked knowledge in steel metallurgy. Fayol also argued that leaders should make up for their weaknesses by forming a 'staff' of advisers who help them in areas where their skills are lacking. His ideas were original at the time and are no doubt still relevant today. We will examine how Henri Fayol personally used and deployed management tools during his thirty-year tenure as managing director at the Commentry-Fourchambault et Decazeville Company.

This book follows and builds on the work of others that have studied the Commentry-Fourchambault et Decazeville Company. Tsuneo Sasaki was the first to write about the company in 1984[3] and Donald Reid wrote a historiography of the Decazeville coal miners in the nineteenth and twentieth centuries in which he studied the points of view of the miners and their unions as well as the role played by corporate management, including Henri Fayol.[4] Alain Boscus studied industry in the Aveyron department at the beginning of the twentieth century,[5] widening our understanding of the workings of the Decazeville factory. Alain Auclair has published several works on companies in the Allier department during the nineteenth century, including the Commentry-Fourchambault Company. He notably analysed the company's technical and financial evolution in detail.[6] These are all excellent works and are often cited here.

This book takes a wider perspective by considering all establishments irrespective of their locality. The period it covers is more restrained, limited to the twenty-six years between Henri Fayol's nomination as managing director in 1888 and the outbreak of World War I in 1914. We have chosen to ignore the war years as French companies at the time were strictly controlled by the Ministry of War, thus limiting the freedom of action of managers.

The main difference from previous works is the accent this book places on the relationship between Henri Fayol's theory and the actions he took as a manager. The objective is to describe Fayol's actions and compare them with his doctrinal thought. We will see both his scientific method at work in the way his experiments helped build his theory, and examples that clearly illustrate the main aspects of his management doctrine.

It is useful to recall some key characteristics of industry at the time. The first chapter describes the economic, industrial and legal context that French steel and mining companies operated in at the end of the nineteenth century, far from today's globalized economy. These industries were expanding rapidly. Coal was still the main source of energy, and iron was indispensable for all constructions and in particular for building railways, which were the main means of land transport and communication. Henri Fayol's business was of a modest size, and

included several mines and steel foundries spread through France's Massif Central region. Surrounded by agricultural lands, this region had been industrialized since the start of the nineteenth century, but was less well placed in the following century compared to the mines and the factories located in the north and the east of France with their rich deposits of iron ore and coal. The company remained profitable, while other similar companies had disappeared well before 1900.

After describing the historical industrial context, the book explores the five 'elements of management' identified by Fayol (plan, organize, coordinate, command and verify) and the six functions of the company (accounting, commercial, financial, technical, security and administration). They are developed in the following chapters: the financial function, planning, the organization of managers, the organization of workers, command, coordination, verification and the accounting function, the sales function, the technical function and the security function. These ten major aspects of Fayol's theory structure this work and are briefly outlined below.

The financial function was the responsibility of shareholders and the Board of Directors of the Commentry-Fourchambault company. The board named Henri Fayol in 1888 after a long selection process during which he benefited from internal disagreements. He strengthened his authority by perceiving the unspoken wishes of the majority and gained their trust by generating unexpected profits. He prudently reinvested funds to ensure growth and then argued for capital increases to finance larger and more ambitious projects.

Planning and forecasting were widely practised at Commentry-Fourchambault et Decazeville. Several ten-year plans were presented to the board of directors that were used to evaluate investment plans. Each year, site managers submitted their forecasts for the coming year. Such anticipation characterized all levels of management at Commentry-Fourchambault et Decazeville.

Organizing involved structuring the company through organizational charts and job descriptions. A study of the facts allows us to answer questions that the theory ignored: are real organizational charts the same as the examples given in *Industrial and General Management (IGM)*? Was the theory of 'span of control' really followed? How did organizational charts evolve in practice? How were people promoted? What influence did the personal desires of employees have on the drawing of charts? Did people leave when their wishes were not met? Organizing concerned the management of engineers, recruitment, career management and the retirement of incompetent individuals.

The workers in the factories and in the mines made up the majority of the workforce and determined production levels in these labour-intensive industries. The setting of wages was Fayol's seventh 'principle of management' and the eleventh principle advanced the notion of equity that directly applies to workers who Fayol argues should never feel they are victims of discrimination. In practice, Fayol

used wages to recruit, retain and manage workers. He also paid careful attention to strikes that were costly if they lasted too long and described two very different strikes in the third part of *IGM*. We compare his account as managing director to other sources including press reports and the recollections of unionists.

Coordinating, commanding and verifying are examined in a chapter that also studies the role of the accounting function. We have grouped these elements together as the management tools used to practice them are often the same. Meetings of department heads for example were often used to command by transmitting orders, to coordinate by informing everyone present of each other's tasks and to verify through oral reporting in advance of written reports.

The commercial function is vital for any company. Henri Fayol had understood its essential character and he directly negotiated with his biggest customers. He also built a sales network to limit their influence and sell at the most favourable price. Fayol believed, however, that agreements between producers were more effective than competition. His company was vertically integrated as the mines sold coal to the steel foundries, although these internal sales only represented a small share of sales.

The technical function was essential for his company. Henri Fayol was a skilled mining engineer and he surrounded himself with specialists for steel metallurgy. He simultaneously invested in new technologies to lower operating costs and to develop special steels in the company's Imphy factory that were adapted for new demands.

The security function is the last function identified by Henri Fayol in *IGM* and it was similar to today's 'risk management'. Managers must deal with accidents, breakdowns, theft and other incidents in the everyday running of a company, and the security function involves leveraging this experience to reduce the occurrence of these events.

Henri Fayol had already confronted his practice with theory in the third part of *IGM*. When he published his work in 1916, he announced four parts but only ever published two of them. He provided titles for the other two parts: 'Personal observations and experiments'[7] and 'Lessons of the war', and said 'I shall have occasion to cite some examples in the third part of these studies ... I shall show how I have amassed, in the course of a long industrial career, the material for this work'.[8] Henri Fayol even sketched out the ideas that would be found in this third chapter in 1908.[9] In 1995 Wren demonstrated that Henri Fayol's theory came from his industrial experience.[10] The text of the third chapter was archived at the Fondation des Sciences Politiques in Paris.[11] It has already been consulted by other scholars, including Donald Reid[12] but was not previously identified as a part of *IGM*. It is translated and included here as an appendix.

The third part of *IGM* is a professional autobiography that follows the course of Henri Fayol's career, first as an engineer and then as director of the Commentry collieries. He developed what he would later call 'management tools', such

as weekly meetings with colleagues, plans, monthly and annual reports, recruitment and training of personnel. He believed that his nomination to managing director and the deployment of management tools were experiments equivalent to scientific experiments in a laboratory. As the company recovered after changing only its management, he concluded that management was central to industrial success. He argued his case in much the same way a clinician would present the case of a patient who recovered by following a new treatment.

Henri Fayol collected data from a selection of events he encountered during his professional experience. The way he chose and interpreted them helps us better understand his intellectual approach. For example, he mentions strikes and explains that a good manager should know how to avoid them. He describes two strikes, one long and one short, in two different sets of circumstances, but where in both cases he took an inflexible position and did not waver. At the same time he chose not to describe other strikes, including one that cost the company dearly. The third part of *IGM* is incomplete with a number of sections left empty. We do not know if he lacked the time or the words to describe what may have been more complex or less flattering cases.

The second text reproduced in the annex is Henri Fayol's last publication that was published in a social Christian publication. It is an interview published in 1925 just before his death, in which the old master dialogues openly with Louis Marie du Crouzet, who was in reality Louis de Mijolla, a young disciple he had recruited as an engineer and who would succeed him at the head of the company seventeen years later. He talks at length of 'management tools' before giving his opinion about the 'social question', that of worker poverty, that so revolted the social Christians that Louis de Mijolla belonged to, and about governance and shareholder-control of a director's actions. The interview then moves on to more familiar themes including his work at reforming public bodies such as the postal service and the tobacco monopoly. The interview concludes with a discussion of the League of Nations, whose role, according to Fayol, was to help nations improve their industry or administration by promoting organizational studies. It is interesting to note that such studies were undertaken in the 1920s in French mines, after 1945 in industries across Europe and in the 1980s in the civil service under the aegis of the Organization for Economic Co-operation and Development.

Studying Henri Fayol's professional activities shows just how concrete his theory really is. Far from being outmoded, his thought underlies much of today's management thinking and practice. The way he named a concept, or the translation difficulties Fayol's words have sometimes encountered in other languages, are no longer important when we can compare the facts and events to the solutions he used to manage them. The situations he found himself in still exist in business today. The temporal continuity we can see in organizations is what favours their scientific study, and still make Fayol's thinking of a century ago relevant today.

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1 THE INDUSTRIAL CONTEXT: THE COAL AND STEEL INDUSTRIES IN NINETEENTH-CENTURY FRANCE

Henri Fayol was the managing director of a mining and steel-making company from 1888 to 1918. The coal and steel industries were important motors of industrial development, and production increased over this period. It was a time of great technological advances, obliging industrialists to reinvest regularly. On a global scale, France was a modestly ranked producer.

The situation in France was characterized by a number of laws governing mining, and a strict state oversight of industrial activities both to levy taxes and ensure that security measures were taken to avoid disasters. Wages were freely set but remained low, although they doubled during the nineteenth century. As wages were higher in industry than in agriculture, labour was attracted to factories and mines and this was the main driving force behind peasant migration.

To better understand Henri Fayol's actions, we present his company in 1898 after he had been managing director for ten years. It was a large company employing some 10,000 workers, but it remained of a modest size compared to others in the same industry. Schneider et Cie, for example, employed 10,000 workers on one site in the town of Le Creusot, and just as many at its other sites. It made comfortable profits in its four coal mines and four steel factories.

The Coal and Steel Industries in the Nineteenth Century

Man has known how to make iron for more than 3,000 years with iron ore deposits and mines spread throughout the world. Production increased significantly with the invention of the charcoal-fuelled blast furnace to produce pig iron that was used by the Chinese for around 2,500 years before it was introduced across Europe in the sixteenth century.

The English invented the modern steel-making process when they began heating blast furnaces with charcoal in the eighteenth century. The pig iron extracted from the blast furnace was transformed into iron by slow carbon oxidation which involved stirring the molten iron in a reverberatory furnace. This

puddling technique was invented in 1784 by the Englishmen Peter Onions and Henry Cort, and was significantly improved by Joseph Hall in 1839.

In the early nineteenth century, the English industry was ahead of its time. French factories began using the English charcoal-based process in 1820, and they replaced charcoal with coke in 1840.

Two inventions then allowed steel to be produced in high volumes. In 1856 Henry Bessemer (1813–98) invented the Bessemer process that could rapidly process large quantities of metal. The process was adapted for phosphoric iron in 1877 by Sydney Gilchrist-Thomas (1850–85) and his cousin Percy Carlyle Gilchrist (1851–1935) using a basic refractory lining (Thomas-Gilchrist process). This allowed impure iron ores to be used, notably those from the Lorraine region in France.

Five years later, Carl Wilhelm Siemens (1823–83), a German-born British engineer, patented the regenerative furnace in 1861. The waste heat in the fumes from the furnace was fed back through a chamber containing bricks, heating it to a high temperature and then using the same path to introduce air into the furnace – the preheated air significantly increased the flame temperature.

In 1863 this preheating system was used by the Frenchman Pierre Emile Martin (1824–1915) in a furnace that slowly transformed iron into steel using iron ore and scrap iron. This open hearth process (known as the Siemens-Martin process) became widely used for special steels of precise composition. In 1867 Carl Wilhelm Siemens built a similar furnace, and in 1879 an engineer working with Henri Fayol by the name of Alexandre Pourcel adapted the furnace for phosphoric irons.

Pig iron: Molten iron between 2.1% and 6.67% carbon, melting point between 1135°c and 1350°c.

Wrought iron: Less than 0.05% carbon, melting point at 1538°c.

Steel: Between 0.05% and 2.1% carbon, melting point between 1400°c and 1500°c.

Figure 1.1: Technical definitions for pig iron, wrought iron and steel.

These successive inventions allowed for the production of greater quantities of iron and steel at lower prices. The steel industry became the main market for coal producers, followed by heating and gas lighting. Coal was the main source of energy prior to the use of petrol. By the end of the nineteenth century steel had essentially replaced iron, and iron works had to constantly invest to increase their capacity and modernize their tooling.

Growth over the period was dampened by several economic downturns. For example, during the Long Depression from 1873 to 1896 growth slowed and production dropped. Iron production in 1886 was 25 per cent lower than in 1883. The production cycles for the coal and steel industries were not,

however, synchronized with the rest of the French economy. Economic fluctuations led mining and steel companies to accumulate large cash reserves, distribute dividends prudently and favour self-funded projects rather than opening their capital to new shareholders.

In 1830 30 million tons of coal was mined in Great Britain, representing 80 per cent of global production. The United States of America overtook the United Kingdom as the world's main coal producer in 1900, and accounted for 500 out of the 1,216 million tons mined globally in 1913. Over this eighty-three-year period world production grew by 4.3 per cent per year, with 3 per cent growth in the UK and 8 per cent in the USA.[1]

The growth in iron production was similar to that of coal. In 1913 the USA produced approximately 30 million tons, which was three times that produced in the UK. With an annual average growth rate of 6.5 per cent, by 1890 the USA were producing more iron than the UK, where growth was only 3.5 per cent.

Steel was produced in large quantities starting in 1870. Production grew annually at a rate of 8 per cent in the UK and 15 per cent in the USA. By 1913 the USA was producing 30 million tons of steel, compared with 8 million tons in the UK. In 1900 the USA was the main producer of coal, iron and steel.

Germany also experienced a strong 6 per cent annual growth in coal and iron production from 1830 onwards, and a 12 per cent growth in steel from 1870. By 1913 German coal production was two thirds that of the UK, but the country produced 60 per cent more iron and twice as much steel. It was the world's second producer of iron and steel.

France remained the fourth global producer of coal and iron. It accounted for 5 per cent of global coal production in 1830, and only 3 per cent in 1913, despite average annual growth of nearly 4 per cent. It was in a similar position for its iron and steel production which, despite increasing by 10 per cent from 1870 levels, was surpassed by Russia whose steel industry grew at the same 15 per cent per year rate as that of the USA.

The French coal, iron and steel industries were relatively small on a global scale. Activity around the Massif Central area (in central France) during the 1850s accounted for 57 per cent of total national production. The discovery of coalfields in the Nord and the Pas de Calais departments towards the end of the nineteenth century shifted the industry to the north-west of France, where it would later be exposed to World War I. By the 1890s, the Centre region only accounted for 32 per cent of national production.

The number of workers in the collieries grew as production levels increased. In 1888 105,000 workers were employed by the mines, of which two thirds worked underground. The numbers rose to 150,000 in 1898, and 200,000 in 1913.

Productivity in the French minefields was low due to difficulties in mining the relatively thin coal deposits. By comparison, in 1913 the 450,000-strong

German mining workforce extracted 190 million tons, representing an output of 422 tons per worker per year, while in the same year 200,000 French workers only mined 41 million tons, representing an output of 205 tons per worker per year, at half of German productivity levels.

French production remained relatively low and always beneath its own needs. Coal was imported to meet 30 per cent of national consumption. Steel and iron products slightly exceeded local demand allowing some produce to be exported. France was a main importer of UK coal, accounting for 17 per cent of the United Kingdom's coal exports between 1870 and 1904. Shipping costs were relatively low, in particular between Cardiff and Bordeaux, making up 40 per cent of sales price. Import duties increased prices by a further 5 per cent. British coal that arrived into the ports of Normandy, Brittany, the Atlantic and Channel coasts and even Marseilles was still 40 per cent cheaper than French coal, and also of superior quality. The British mines made healthy profits on their coal exports to France.[2]

French Mining Legislation

During the nineteenth century all industrializing countries adhered to the doctrine of economic liberalism. While companies could freely invest and sell their produce, laws and regulations differed between countries. France had mining laws that provided for oversight by a controlling body, the state Mines Service,[3] which regularly visited each mine. Towards the end of the century, French mining legislation was used as a model for legislation in other industries.

Mining in France was governed by the Law of 21 April 1810 that distinguishes the ownership of the land on the surface by private owners from resources lying underground that belong to the state. Operating a mine involved obtaining the authorization of the state in the form of a concession and then paying annual royalties, which were calculated based on the surface area of the mine plus 5 per cent of profits. Mining companies had to negotiate with private owners either to acquire the land on the surface, or to pay for any damages to the land caused by mining activities.

This law was completed by a decree on 3 January 1813 that required the reporting of accidents, the monitoring of arriving and departing miners and the interdiction for children under ten years of age to work underground. These measures reflect the growing social preoccupations and pressures at the time. Mining laws were also progressively updated to limit the working day of young and female workers. When Henri Fayol became managing director, the law stated that women and children less than 12 years old could not work underground,[4] the minimum working age was 8 years and the maximum working day was eight hours for children below 12, and twelve hours for those below the age of 16.[5]

The Law of 25 May 1864 authorized strikes, but still allowed employers to dismiss workers, in particular the ringleaders. The required notice for a strike was usually fifteen days. After the Law of 21 March 1884 authorized the formation of unions, their influence progressively increased. Mining unions adhered to the Confédération Générale du Travail (CGT) founded in 1895. It had 130,000 members in 1902, 200,000 in 1906, 300,000 in 1908, 400,000 in 1910 and 600,000 in 1914.

The Mines Service, made up of graduates from the Ecole des Mines de Paris, monitored French mines and quarries for the state. It made a regular visit to all mines once a year and whenever there was an accident or a fire. It audited the accounts of each mine and calculated the annual royalties. Exhaustive statistics were published on the mining industry in the journal *Statistiques de l'Industrie Minérale* based on the detailed accounting information collected from each mine. The Mines Service processed requests for mining concessions and generally tried to avoid attributing an entire field to one operator which meant that ownership of mines in France was quite fragmented. Whenever a mine owner wanted to sell a concession, he was required to obtain authorization from the state who took advice from the Mines Service. State intervention in the mining sector was exceptionally pronounced in France.

Wages in Nineteenth-Century France

In the nineteenth century salaries were very low in France but grew at an average annual rate of 1 per cent, doubling from 1840 to 1900. Over the same period prices remained relatively stable, notably for wheat, which was the main staple food at the time with bread representing 33 per cent of a worker's food budget.[6] Wage growth can be attributed to productivity improvements in agriculture, where the majority of the work force worked at the time.

Wages in nineteenth-century France depended on one's trade, qualification, gender, age, region and the season and were generally higher in the cities. For example, in 1892 a farm worker earned 2.04 francs per day[7] in winter and 2.94F/day in summer. Women earned 1.35F/day in winter and 1.78F/day in summer.[8] Wages in winter were two thirds of those in summer as farmers offered higher wages to attract labour for the July-August harvest. As Donald Reid notes, 'many of Decazeville's miners retained strong ties to the land. Cabrol referred to the harvest season as "the annual tribute which we are obliged to pay to agriculture"'.[9] It was common throughout France at the time for workers from the cities and the factories to leave work to help with the harvest.

Workers laboured six days a week without holidays, working a theoretical total of 312 days a year, although in practice only 288 days were worked on average during the year.[10]Absence for festivals, sickness and seasonal farm work accounted for the twenty-four available days that were not worked.

Industrial companies offered higher wages to attract labour. For example, in 1895 collieries paid double the farm wage at an average of 4.10F/day.[11] Wages grew strongly at the start of the twentieth century, averaging an annual rate of 2 per cent per year over the ten years preceding the World War I, but also fell during economic downturns.

Wage levels varied according to the worker's trade and were generally calculated based on a worker's output.

> In the coal mines, extraction workers work on tasks in teams. Work conditions, difficulties supervising impose this mode of wage calculation ... Task rates are agreed upon at the work site itself for a period of fifteen days, a month or even several months, depending on the regularity of the deposit.[12]

A rate was fixed for each cart of coal or each meter of excavated gallery. In addition, timbering and backfill were also remunerated.

> On pay day, accounts are settled, labourers, if there are any, are paid their days work, and the surplus is shared amongst the other workers following agreed upon percentages.[13]
>
> For the miners, vein miners or rock miners, piece work wages are set in a quite particular fashion. These workers work in small groups (of three, four or five), 'teams' or 'work sites' (each of these groups is made up of several miners and one or two aids, young workers or labourers); on pay day each team receives and shares on pay day a sum that is proportional to the number of carts or trolleys (around half a ton) of coal that it mined, or the number of meters gained in the gallery at the coal face; but the unit rate per ton extracted or per meter gained strongly varies within the same mine.[14]

Wages were formally calculated based on the team's output and shared amongst its members. It was a means of motivating workers to maximize their work efforts. However this system was entirely dependent on the way rates were set. Engineers and foremen set rates based on the technical conditions of each site as well as an individual target wage. 'It is the daily earnings, much more than the earnings by unit of work, that serves as the basis of wage determination'.[15]

> In all concessions, writes the reporter of a parliamentary enquiry (in 1896), a general remark is to be made: piecework tends to be increasingly transformed into a uniform and regular wage. What is particular in this tendency towards a fixed wage is that it appears to be the work of both the labourer and the company. For the company ... the preoccupation [of engineers] is to assure the worker a fixed average wage: the rate per piece is calculated with this objective. The wage has a fixed base: the day rate, according to a consulting engineer from a large mine in 1884; if a worker in one mine who produces 3000 kilogram per day earns 4.50F, another worker in another mine who only produces 1800 kilogram earns the same rate. Likewise, on several occasions, in their answers to the latest parliamentary enquiry, companies indicate that labour rates are fixed in such a way as to ensure the worker average daily earnings. Workers have the same idea ... : 'Most often workers do not always earn their day', says a mining union delegate; 'tariffs are almost always set in such a manner that the worker does

> not earn his day', says another. The expression 'earn (or not earn) his day' clearly shows for those who use it, that the idea of daily earnings is the norm for workers earnings, it is the notion that estimations refer to and that are used as a basis ... The notion of daily wage has a recognized strength. In reality the desire by workers to fix wages to a set unit of effort does not seek for the daily wage to cease being the norm for workers earnings, but rather that the strength of this notion not be used to obtain a greater effort for the same wage; it does not look to change the basis for calculating earnings, but to fix, aside the basis of earnings, the relationship between gain and effort ... The daily wage is the essential notion concerning workers earnings.[16]

Economists have known for some time that a daily remuneration was targeted when fixing the piece rate, 'Experience quite quickly informs the entrepreneur of the quantity of work that a worker can execute in a day, he knows what daily salary each of his workers can earn with piecework; and it is as to the amount of this day that master and worker debate over the rate'.[17] Daily wages were familiar to both workers and employers, and were not the result of counting daily outputs as might have been expected.

Employers however did not wish to pay daily wages so as to maintain the pressure on production and also discretely manipulate remunerations. 'Remuneration for piecework has the main advantage of facilitating the incessant compression of labour costs'.[18] Claims for a minimum daily wage were rejected by employers. 'The attitudes of workers and employers with regard to the minimum wage are both exactly based on their own interests. A minimum wage is desired by workers, and it is energetically rejected by employers'.[19]

Henri Fayol wrote at length about this central subject of wage setting in *IGM*. We examine his own practices as a manager in chapter 5.

Commentry-Fourchambault et Decazeville

Henri Fayol managed a company that occupied a modest place in French industry. In 1913 it was ranked sixteenth by the number of miners employed and accounted for only 2.5 per cent of national coal production and 1.2 per cent of France's iron and steel output.[20] The history of the Commentry-Fourchambault et Decazeville Company is told by Henri Fayol in the third part of *IGM*.[21] We now complete this description with a presentation of the situation of the company after ten years under Henri Fayol's management from 1888 to 1898.

The financial year began on 1 September and finished on 31 August. The 1897–8 year was profitable. Sales were 24.8 million francs[22] for an annual production of 1 million tons[23] of coal and 57,000 tons of iron and steel products.[24] Gross profit was 4MF. All sites were profitable with the exception of Brassac (see table 1), and the Commentry mine was still the company's 'cash cow' accounting for the majority of profits due to the quality of its coal and its low production costs. The Decazeville mine employed twice as many workers but produced only

30 per cent more coal of a mediocre quality. It was decided at the annual general meeting (AGM) on 25 March 1899 to include the Decazeville site in the company's name alongside the two historical establishments of Commentry and Fourchambault.

Table 1.1: The sites of Commentry-Fourchambault et Decazeville during the 1897–8 financial year.[25]

Site	Profit ('000 F)	Production	Quantity produced ('000 tonnes)	Number of workers	Managers and employees	Investment ('000 F)
Commentry	2223	Coal	353	1443	150	0
Montvicq	367	Coal	187	911		0
Brassac	-15	Coal	97	764	Unknown	255
Decazeville mine	377	Coal	444	2873	166	1600
Decazeville factory	408	Iron and steel	21	854		260
Imphy	414	Steel	7	769	49	421
Fourchambault	121	Steel	15	454	28	23
Montluçon	51	Pig iron	17.7	454	20	115
Headquarters			0	0	50	
Total	3946			8522	147	2674

Mines and factories were partially integrated: the Commentry and Montvicq mines sold coal to the Montluçon and Fourchambault factories; the Decazeville mine supplied the neighbouring factory; the Montluçon factory sent pig iron to Fourchambault and to Imphy. All of these products could also be sold to third parties at market conditions.

The company's factories and mines were located around the Massif Central. This mountainous zone had been covered by tropical forests some 300 million years ago. Cyclones had blown wood into lakes that accumulated there, and would later be transformed into coal. Numerous collieries were spread throughout the area.

The Commentry mine was a historic site for the company. Its deposit of quality coal had been mined there since 1820, first on the surface and later using underground mining techniques. The mine was very profitable but by 1898 the fields were almost exhausted and it was planned for the mine to cease activity in 1904, although it still continued to produce significant quantities of coal up until 1911. In 1898 a small share of the mine's production (15 per cent) was consumed by the factories.

The neighbouring Montvicq mine was less profitable, producing a lower quality coal at a higher cost. A quarter of its production was reserved for the

company's factories. The coalfields were also close to exhaustion and expected to close in 1907, but the mine remained operational up until 1914.

The Fourchambault forge was the other historic corporate site. It used pig iron from Montluçon and coal from Commentry to produce wires, rails and sheet metal. The forge enjoyed easy access to the Paris market for iron and steel products via the Loire River and the Briare canal. Investments were regularly made to save the sporadically profitable forge from closure.

The Imphy forge was close to Fourchambault and its Martin-Siemens furnaces used pig iron from Montluçon. Henri Fayol specialized the forge in the production of nickel steels and it made comfortable profits that nonetheless fluctuated depending on the specific orders that were mainly received from the military.

The Montluçon factory used a blast furnace, fuelled by iron ore from Berry and coke made in the Commentry coal mine, to make cast iron parts, pipes and moulded objects and sell its pig iron to the Fourchambault and Imphy factories.

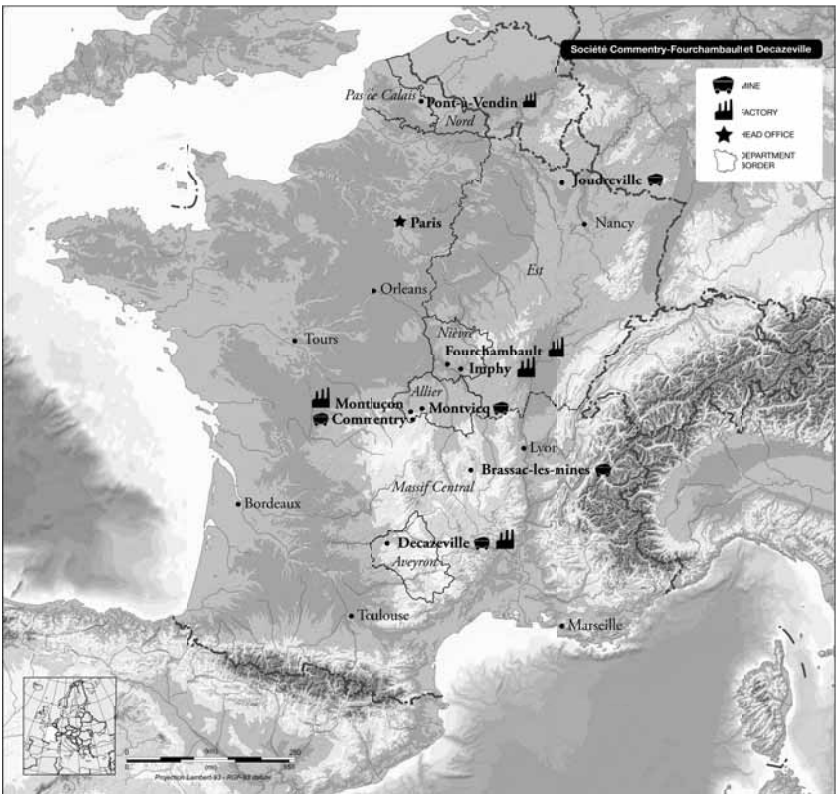

Figure 1.2: The sites of the Commentry-Fourchambault et Decazeville Company between 1888 and 1914