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**TAYLORISM IN FRANCE, 1904-1920: THE IMPACT OF SCIENTIFIC
MANAGEMENT ON FACTORY RELATIONS AND SOCIETY**

The University of Oklahoma

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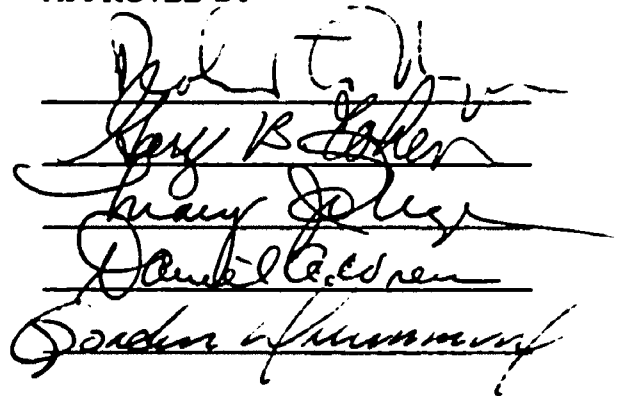
**TAYLORISM IN FRANCE, 1904-1920: THE IMPACT OF SCIENTIFIC
MANAGEMENT ON FACTORY RELATIONS AND SOCIETY**

**A DISSERTATION
SUBMITTED TO THE GRADUATE FACULTY
in partial fulfillment of the requirements for the
degree of
DOCTOR OF PHILOSOPHY**

**BY
GEORGE G. HUMPHREYS
Norman, Oklahoma
1984**

**TAYLORISM IN FRANCE, 1904-1920: THE IMPACT OF SCIENTIFIC
MANAGEMENT ON FACTORY RELATIONS AND SOCIETY**

APPROVED BY



DISSERTATION COMMITTEE

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CHAPTER I

INTRODUCTION

"Scientific management is not any efficiency device It is not a new system of figuring costs; . . . it is not holding a stop watch on a man and writing things down about it; it is not time study; it is not motion study in essence, scientific management involves a complete revolution on the part of the working man . . . and it involves the equally complete mental revolution on the part of those on the management's side." [Frederick Winslow Taylor to the U.S. House of Representatives Special Committee, quoted in Frank B. Copley, Frederick Winslow Taylor, 2 vols. (New York: Harper & Brothers 1923), I: 10.]

The disciples of Frederick Winslow Taylor, founder of the Taylor system of scientific management, have attempted to demonstrate the prophetic and messianic role that Taylor assumed in the evolution of industrial society. Henry Le Chatelier, who introduced Taylorism to France before the First World War and was the leading spokesman for scientific management until his death in 1936, viewed the Taylorist movement as religious in nature.¹ Indeed, the historical treatment of scientific management has exaggerated the importance of Frederick Winslow Taylor. That is not surprising since his disciples continued to labor in his cause for years after his death in 1914. Nevertheless, Taylorism and scientific management played a very important role in early twentieth-century factory relations and social development on the American and European continents. It was not Taylor nor Le Chatelier, however, who was responsible for the impact of Taylorism on the social, political and intellectual history of France during the

first two decades of the twentieth century. To believe so would attribute too great an emphasis on the individual's role in history. It is not the intent here, on the other hand, to deny the significance of Taylor or his disciples or to debate the "revolutionary" character of Taylor's ideas on class relationships. Rather, the task is to place Taylorism in its historical context, to identify those social, political, economic and intellectual factors which affected its historical evolution in France and to assess the contribution that scientific management made in French society between 1904 and 1920.

Frederick Winslow Taylor and his system of scientific management were, at the turn of the century, the center of an efficiency craze which spread to the European continent before the First World War. While Taylor's heavy reliance on time and motion studies and bonus systems for workers' wages to stimulate production in retrospect might appear rather unsophisticated and primitive, the social, political, economic and intellectual aspects of Taylorism were central issues in factory and social reform debates in the industrializing nations of the West. Indeed, Taylorism provided a conceptual and ideological basis for the emerging disciplines of business administration and industrial engineering which have enabled twentieth-century factory owners to extract greater productivity from employees, exert greater control over factory operations and reduce tensions between capital and labor. Taylor, in fact, was identified as the key figure in the emergence of a new industrial society that was marked by a much higher degree of self-consciousness about its internal and external operations. In contrast to the empirical or "rule-of-thumb" techniques of nineteenth-century factories and workshops, Taylor's system required that all work activities be studied scientifically in order to eliminate wasted time and motion. As Gerhard Masur has explained:

Industry had grown by leaps and bounds during the nineteenth century. The number of wage-earners, the gain in capital, the expansion of manufacturing, all pointed to the second phase of the Industrial Revolution: large-scale production which would lead eventually to mass production. From 1780 to 1880, however, industry had proceeded by trial and error; management had been geared by experience only. The Industrial Revolution--the result of scientific knowledge applied to manufacturing--had moved forward in a very unscientific manner. Taylor recast it by the introduction of scientific methodology; one could almost say that through the medium of Taylor's mind industry took a good look at itself and found itself wanting, wanting not only in the methods it used, but also in the general philosophy by which it had been guided.²

Daniel Bell, moreover, attributes to Taylor the twentieth-century fetishes for efficiency and the maximum utilization of time and human energy in the workplace.³ To Bell,

The significance of Taylorism lies in its attempt to enact a social physics. Once work was scientifically plotted, Taylor felt, there could be no disputes about how hard one should work or the pay one should receive for labor. "As reasonably might we insist on bargaining about the time and place of the rising and setting sun," he once said. For a managerial class which at the turn of the century had witnessed the erosion of its old justificatory mystique of "natural rights," the science of administration *per se* provided a new foundation for its moral authority.⁴

This dissertation will examine the impact of Taylorism, or scientific management, on French factory relations and general political and social theory during the period 1904 to 1920. Although the impact of scientific management on factory production will be examined closely, the purpose will not be to demonstrate how effective Henry Le Chatelier and the other French and American Taylorites were in implementing scientific management in French factories because, on the whole, applications of the system in French industry were limited. On the other hand, Taylorism did have a significant impact on French society

because scientific management posed a powerful critique of French work patterns, social class relationships and national development.

The adaptation of scientific management to French society was, in many ways, very different from that of the United States, due to the distinctive national cultures of the two nations. Simple imitation of the American experience was not possible, it will be argued, because of the greater influence of the artisanal tradition in France which, in turn, acted as a formidable obstacle to the subdivision of labor and the elimination of job autonomy that Taylorism demanded. Moreover, Taylorism became a political issue in France during and after the First World War, at a time when American labor and Taylorite engineers were making their peace. In contrast to American entrepreneurs, the French patronat was much less willing to make the salary concessions to factory workers or to revise its fundamental attitudes regarding production methods. Moreover, French employers recognized that the factory reforms supported by organized labor clearly challenged the fundamental relationships between labor and management. In France, Taylorism posited the future development of a society and economy radically different from that which had preceded it. At issue was the participation of the French working class and its representatives in an industrial democracy and the ability of the individual worker to retain a degree of autonomy in his profession. Finally, scientific management in France was intrinsically linked to the continued involvement of the state in the economy after the war. For, unlike in America, it was state initiative, particularly with Albert Thomas as Minister of Armaments and War Production and Étienne Clémentel as Minister of Commerce, which had pushed those industries producing for the war effort to adopt scientific management techniques. The continuation of those reforms, therefore, was closely linked to the role that French political leaders believed the state should

play in economic matters that had previously been the primary concern of employers alone.

There are two central concerns in this dissertation. The first is historiographical in that most discussions of the origins of scientific management in France provide insufficient information on the indigenous factors which contributed to the evolution of Taylorism during the early twentieth century. Thus this dissertation will establish the causal links between Taylorism and traditional conflicts between labor and management over labor discipline and autonomy in the nineteenth-century French factory environment. Secondly, historians have not explored in sufficient detail the unique history of Taylorism in France. There is no question among historians that its diffusion and applications in France was slower than in the United States. The most widely accepted explanation for that is to blame the French patronat and its conservative attitude towards entrepreneurial behavior. That explanation today seems less than adequate and too one-dimensional. In fact, support for Taylorism among French employers and engineers was more widespread by the end of the First World War than is often depicted. However, the application of Taylorism was closely linked to other larger issues of the day, such as the evolution of French factory relations, the economic role of the French state and the economic and social risks involved in adopting such American methods. In the final analysis, these relationships would play critical roles in the further applications of scientific management in French factories.

There is little research on the historical development of Taylorism in France that places it in the context of factory relations during the nineteenth-century. Until recently, there have been few significant historical treatments of Taylorism in France. The most important works were of a literary, philosophical

or sociological nature.⁵ After the initial failure of scientific management, French intellectuals sought to warn their readers of the mixed blessings of Taylorism and Fordism which, they believed, were largely to blame for the economic collapse of the world economy due to overproduction of consumer goods. In reviewing the works of Georges Duhamel, André Philip, Régis Michaud and Hyacinthe Dubreuil, Paul Gagnon notes that French observers generally believed that America was a sick and morally decadent society.

The "cancer" with which America was affected, and which Europe must avoid at all cost, was psychological and spiritual, a loss of contact with natural life, brought by a "technician's civilization" where the mind was only a tool and rationalization meant death for the individual.⁶

In the past fifteen years, considerable interest has been focused on the organization of work—a subject which had previously taken a backseat to the historical study of the French labor movement. Ironically, the first major historical work on European Taylorism, other than the uncritical pieces by Taylor's disciples, was by an American. Charles S. Maier's "Between Taylorism and Technocracy" (1970) placed Taylorism and Fordism within a "productivist" ideological tradition in French political history that had originated in Saint-Simonianism.⁷ Maier also pointed out that the "ideology of engineers" was compatible with virtually any regime which held power in Paris whether communist or fascist.⁸

Maier's work is characteristic of most of the work on French modern economic history in that it fails to exploit the nineteenth-century antecedents of twentieth-century modernization. Instead, Maier's article touches on another very important debate in French economic history—the underdevelopment and stagnation of twentieth-century France. David Landes, Michel Crozier and Stanley Hoffmann have led the way in depicting the French economy before the Second

World War as lacking in dynamism and "stalled" by industries controlled by families unwilling to take risks.⁹ The point of comparison, whether conscious or not, has been with the American businessman who is, according to Schumpeter's model of entrepreneurship, willing to take considerable risks and to act innovatively within the framework of modern industrial capitalism.

Aimée Moutet's recent research on Taylorism in France is critical of the patronat's unwillingness to apply scientific management in more than a superficial manner during the first two decades of the twentieth century. According to Moutet, French employers were more interested in purchasing machinery than in applying a system which they knew only vaguely. To the French patronat, the idea of a "system" was utopian and therefore "more or less socialist."¹⁰ Moutet's work places blame on the mentality of the patronat for failing to apply American methods of factory organization.¹¹

The "failure of entrepreneurship thesis," as one might expect, has sparked considerable controversy, but it has lost ground in recent years to those historians who contend that the performance of French businessmen has not been as weak as Landes and Hoffmann have portrayed it. While Maier concludes that French industry "seemed little moved by American technological messianism" during the First World War, he recognizes the momentum gained on behalf of industrial planning and "corporatist" cooperation under the influence of Taylorism.¹²

In fact, the historical research on the origins of technocratic planning has led historians to look closely at the part Taylorism played as a crucible for the idea of national planning. Richard Kuisel, in contrast to the work of Landes, Hoffmann and Crozier, sees in the experience of French business leaders and government officials during the First World War the birth of "dynamic France." Taylorism, of course, had an important part to play in this genesis. To Kuisel:

The First World War was an interruption in the prevailing style of private-public relations that anticipated the future. It is well-known that state intervention in economic life grew enormously between 1914 and 1918, with the institution of rationing, price and monetary controls, and even direct management of enterprises essential to the war effort. A less well-known aspect of the state's mobilization program is the long-range effect of the precedents it set upon the relationship of the public to the private sector of the economy, upon the course of industrial modernization, and upon the careers of future technocrats. The state's eagerness to raise the output of war manufactures led it to introduce technological innovation and to standardize production methods and products. It encouraged the study and adoption of F.W. Taylor's system of "scientific management."¹³

It is the search for historical precedents of national planning and technocratic modes of behavior which interests Kuisel. This conclusion is reaffirmed by the cursory treatment of Taylorism in his major work which traces the historical roots of dynamic France to the war experience. But Kuisel argues that the efforts of the "modernizers" had little impact in the postwar period. French employers "emerged from the war less inclined toward forming close ties with the administration" and were generally hostile to the interference and inefficiencies of the state in directing economic affairs. Those governmental leaders, particularly Thomas and Clémentel, who had supported scientific management and an économie concertée were out of step with the mood of the patronat after the war.¹⁴

Kuisel's analysis signals a shift in the historiography of French industrial modernization away from a search for the precise point at which "dynamic France" overcame "static France" to the process by which modernization occurred over time.¹⁵ The examples of innovators in the patronat now seems compelling. Business leadership in the French automobile industry was in advance of other industrial nations up to 1905, when the French gradually gave way to the

Americans as the leading producers on the world market.¹⁶ Maurice Lévy-Leboyer's argument that French employers were, in general, innovative within the geographical and demographical limitations of the French market has replaced the "failure of entrepreneurship thesis."¹⁷ According to Lévy-Leboyer, and in sharp contrast to Moutet's argument, "if scientific management had depended solely on employers' initiative, it would have become a reality much earlier."¹⁸

While the attitudes of employers will remain a key concern in the historiography of French modernization, it is appropriate to include other equally important factors which have not received adequate attention. In particular, this dissertation intends to establish the relationship between scientific management in France and: 1) industrial discipline in the factories and 2) the maximum utilization of all resources to enhance the power of the nation-state.¹⁹ Moreover, by placing Taylorism clearly in the context of the class struggle within the Third Republic, one may judge more clearly the importance of the efforts of skilled and semi-skilled workers to defend traditional job autonomy and the employers' attempts to eliminate it.²⁰ Indeed, the issue of new forms of discipline and control in the factories and the response of the working classes will be a major theme of this dissertation. As Perrot has written of Taylorism, "this type of discipline completed the process of dispossessing the skilled worker of his expertise and consequently of his power."²¹ In this regard, Taylorism offers the historian an important "window" through which can be observed the transition to twentieth-century patterns of factory relations.

David Montgomery and Daniel Nelson document the conflict between skilled workers and their employers in the United States at the turn of the century. Michelle Perrot, Michael Hanagan, Maier, Peter Stearns and Patrick Fridenson have directed, in broad terms, research to a similar process in French

factories at the end of the nineteenth century. To labor historians, Perrot suggests: "'Discipline' is now the order of the day."²² Fridenson writes simply that "between 1880 and 1920, the French factory was the scene of a conflict between two wills over the control of the work process, that of the skilled workers and that of the employers."²³ Stearns also underlines the battle between traditional work methods and modern disciplinary techniques on the European continent:

The time and motion studies set forward in all the industrial countries in the years right before World War I, of which the Taylor system was most famous, brought the pressure to a climax. Workers were held to systems planned by outsiders, their craft pride hurt, their goals forced them from quality to quantity.²⁴

Michael Hanagan agrees with the others in adding that:

In shops and factories throughout the country a tremendous struggle raged over the control of the production process. Everywhere employers strove to seize control on the shop floor and acquire a monopoly of expertise over the manufacturing process; everywhere skilled workers resisted those attempts. The growing power of the machine gave the employers an inestimable advantage in the conflict, but they faced a determined and resolute opponent.²⁵

The impetus for implementation of Taylorism in French factories, however, was not limited to the aspirations of factory employers and engineers to secure their control over the labor force. Outside the factory, the enhanced power of corporate capitalism offered the promise of a regenerated French state. Robert Nye has recently described how the concept of degeneracy in late nineteenth century France influenced general social and economic theory.²⁶ General social and economic theory also borrowed from the medical professions the notion of "fatigue" which was applied liberally to individuals, the social classes and the French nation. Anson Rabinbach, in fact, has termed late nineteenth century in France as "the age of exhaustion."²⁷

Borrowing heavily from the available medical models, factory reformers and politicians sought both to explain the ills that had beset France since the Paris Commune and to prescribe cures. In any case, it was widely believed that French society, and a large number of Frenchmen, were in a state of physical and moral decay.²⁸ As Nye explains:

For the political class, which was discovering a new resonance in the formulas of national revival and patriotism, the medical model was of great utility. It allowed them to identify crucial problems whose seriousness had already been acknowledged in some cases for generations. It provided republicans of all stripes a ready-made demonstration of the need for class solidarity and social equilibrium.²⁹

It is, in fact, the connection between other general intellectual themes of the period and Taylorism which has been so poorly understood by historians. While, based on the above discussion, it is clear that scientific management had a distinct organizational imperative rooted in the efforts of French employers to exert control over their employees, Taylorism also benefited from a number of other important ideas in French intellectual life. Specifically, Taylorism drew heavily on solidarism, elite theory, corporatism, thermodynamics, fatigue and national revival. The bourgeois fear of social crisis and national degeneration acted as a conceptual bridge between Taylorism and other intellectual and social ideals.³⁰ It was by this bridge that several political leaders supported scientific management.

The scientific study of factory organization, after all, was much like other emerging disciplines, including anthropology, alcohol studies, individual and crowd psychology, criminology, eugenics and physiology, which focused heavily on French social problems at the turn of the century.³¹ Taylorism, or scientific management, offered the managers of French society a persuasive explanation for

the comparatively low productivity of the workers and the acute nature of the class conflict from which France suffered. Taylorism also provided a corrective system which required the imposition of greater disciplinary and organizational efforts by the employers and the managerial cadres which had developed in modern factories. The primary problem, employers were told, was the "soldiering" of workers who refused to work to their maximum capabilities and who, therefore, really controlled operations on the shop floor. The solution offered by Taylor was the subdivision of this factory labor force and enhanced managerial control--a solution which fit very nicely, as noted earlier, with the nineteenth-century efforts to reduce worker autonomy.

Scientific management offered much more to its supporters than a simple reform of the factory work process. Taylor's strong emphasis on vastly stepped-up productivity promised to increase employer profits and raise individual worker wages which would result in a "'mental revolution' and would set the employer and worker pulling together rather than apart."³² Taylor's social ideas did have a significant appeal to social reformers on both the left and the right who sought solutions to the class conflicts which wracked the Third Republic before the First World War. Taylorism, indeed, became an integral part of the social ideas incorporated loosely in the Union sacrée and in the Minimum Program of the Confédération générale du travail in 1918--even if the emphases were altered to suit the respective political aspirations of the groups involved.³³

Politicians found scientific management, with its promises of greater efficiency, higher productivity, higher wages, reduced class conflict and the maximum utilization of available material and human resources politically beneficial in addressing the question of national reconstruction. The French economic performance before the war had been significantly inferior to that of the United

States and Germany. The devastation of the war only exacerbated the problem and threatened in the postwar period to inflict on the nation the defeat which the Germans had been unable to accomplish during the war. With a vastly reduced national labor supply, Taylorism promised the maximum production from the national labor force with a minimum of fatigue.

"Fatigue," like degeneracy theory, is another link between scientific management and general economic, social and intellectual views of the early twentieth century. Anson Rabinbach has recently demonstrated the importance of thermodynamic theory and fatigue to social theorists in late nineteenth-century Europe. The second law of thermodynamics, according to Rabinbach, "revealed that the transformation of energy from one form to another involved a 'dissipation' or entropy."³⁴ What did this mean in terms of the international struggle for survival of the fittest? To Rabinbach, the recognition by contemporaries that energy, chemical or physical, is transformed:

created the fear that inefficiency and waste would result in gradual loss of energy that could be converted into productivity. Not only physiologists, but political economists attempted to translate these ideas into socially practical and applicable principles. The social interests of medical and economic research were increasingly directed toward determination of the precise economies of labor power.³⁵

Indeed, the overcoming of fatigue became a prime concern of factory reformers and, of course, physiologists. "Fatigue, it appears, replaced idleness as the moral infirmity of the will to work."³⁶ The relationship between scientific management and fatigue was, in fact, very intimate in France. French physiological studies foreshadowed much of Taylor's and Frank Gilbreth's work on time and motion studies. French labor's opposition was spurred by their perception that Taylorism depended on work rhythms which would ultimately exhaust average

workers and rob the body of its energy. Furthermore, Taylorism would not permit workers to recover from the extensive buildup of fatigue due to unreasonable physical demands required in order to meet the quotas established by speed bosses. On the other hand, Taylor's supporters argued that his techniques, properly applied, offered reformers a system by which the French nation could draw the maximum benefit from its limited labor resources without undue fatigue and accompanying genetic damage to the race.

It is important to keep the historiographical framework provided above in mind throughout the dissertation since one of its major purposes is to supplant the simplistic notions that American management techniques applied in French factories are significant largely as precursors of later attempts to rationalize the French economy and that scientific management was simply an American import introduced in a vacuum. Indeed, the history of Taylorism in France to 1920 was intertwined deeply with the main currents of French labor history and with the social, economic, political and intellectual issues which France confronted during the first two decades of the twentieth century.

In addition to the introductory and concluding chapters, the dissertation is organized into four chronological chapters. The first chapter covers the period 1904 to 1907, the years during which Henry Le Chatelier introduced Taylor's ideas on factory organization to French employers and engineers. This chapter will also sketch the social situation of turn-of-the-century France in order to delineate the social, political, economic and intellectual framework into which Taylorism was introduced. This period itself, however, saw no widespread interest in Taylor's system or any significant applications of Taylor's ideas in French workshops.

The next chapter, covering the period from 1908 to the First World War, will discuss the intense efforts in the automobile industry to apply aspects of Taylor's system and the attitudes of engineers and labor leaders toward it. Apart from the flurry of activity in French auto factories in 1912 and 1913, the public debates in Paris newspapers during the strike at Renault against motion and time studies, and the sharp interest in Taylorism by the professional engineering societies and their journals, the system's impact on French factories and society was somewhat disappointing from Taylor's and Le Chatelier's perspective.

The fourth and fifth chapters examine the role that Taylorism played during the First World War and the postwar industrial recovery which immediately followed. Chapter four will examine the importance of scientific management during economic mobilization and in the development of a state bureaucracy capable of assuming a more active leadership role in the nation's economy. In reality, plans for industrial reconstruction were related closely to the efforts to incorporate American production techniques in French factories and fears that the failure to capitalize on the opportunities offered by the war to modernize the French economy and its social values would make France vulnerable to German economic aggression. There emerged after 1916 an impressive variety of groups which hoped to utilize scientific management as an integral element in the modernization of the French economy and society after the war.

However, chapter five concludes with the crushing defeat of French labor during the railroad strikes by the combined efforts of the determined bourgeoisie and French state which clearly sought to eliminate any expectations of the labor movement for the revolutionary overthrow of the republic or for significant social and economic reform. In the renewal of class tensions by the summer of 1920 and the onset of economic insecurities in Europe, it was clear that the oppor-

tunity to realize major reforms such as those outlined by Taylorist enthusiasts would not be imminent. The chapter, however, will point out the important, if limited, reforms to which Taylorism contributed—particularly the passage of the eight-hour day law—and the alternative proposals presented by reformers on the French right and the left for reconstruction which included some portions of Taylor's ideas.³⁷

NOTES

¹Henry Le Chatelier, Le Système Taylor; science expérimentale et psychologie ouvrière (Paris: Imprimerie Paul Dupont, 1914), pp. 39-40.

²Gerhard Masur, Prophets of Yesterday; Studies in European Culture, 1890-1914 (New York: Harper & Row, 1966), pp. 382-3.

³Daniel Bell, The End of Ideology; On the Exhaustion of Political Ideas in the Fifties (Glencoe: The Free Press, 1960), p. 226.

⁴*Ibid.*, p. 228.

⁵The French sociologists of labor, under the intellectual framework established by Georges Friedmann, have generally exhibited a great deal of ambivalence to Taylorism. For example, Friedmann's classic study, La Crise du progrès, stiffly criticized Taylor for his dogmatic refusal to take into consideration the concerns of American workers and their leaders, his consistent denial of the reality of class conflict and his mechanistic treatment of the physiological and psychological factors which were later incorporated by Munsterberg and Elton Mayo's work. Friedmann, on the other hand, recognized the importance of Taylor's efforts to develop a scientific organization of work, urging engineers and employers not to neglect the "human factor" in implementing factory reforms. See Friedmann, La Crise du progrès; esquisse d'histoire des idées, 5th ed. (Paris: Gallimard, 1936), pp. 81-2.

⁶Paul Gagnon, "French Views of the Second American Revolution," French Historical Studies 2 (Fall 1961), p. 447. This is the best review of a very important intellectual tradition regarding technological reform which views technology and rationalization as a threat to the integrity of the individual. Gagnon points out the importance of H.L. Mencken, Theodore Dreiser, John Dos Passos, Charlie Chaplin and Sinclair Lewis on the French intellectual establishment during the 1920's and 1930's. The American Babbitt character was a particular object of scorn by French writers.

⁷Charles S. Maier, "Between Taylorism and Technocracy: European Ideologies and the Vision of Industrial Productivity in the 1920's," Journal of Contemporary History 5, no. 2 (1970), pp. 38-9.

⁸*Ibid.*, pp. 40-5.

⁹The literature on this subject is extensive. See, for example, David S. Landes, "French Entrepreneurship and Industrial Growth in the XIXth Century," Journal of Economic History 9 (May 1949), pp. 49-61; Landes, "French Business and the Business Man: A Social and Cultural Analysis," in Modern France; Problems of the Third and Fourth Republics, E.M. Earle, (ed.) (Princeton: Princeton University Press, 1951), pp. 334-53; Stanley Hoffmann, "Paradoxes of the French Political Community," in In Search of Modern France; The Economy, Society and Political System in the Twentieth Century, Hoffmann et al (eds.) (New York: Harper & Row, 1963), pp. 1-158; and Michel Crozier, The Stalled Society, trans. by Rupert Sawyer (New York: Viking Press, 1973).

¹⁰Aimée Moutet, "Les Origines du système de Taylor en France. Le point de vue patronal (1907-1914)," Le Mouvement social, no. 93 (October-December 1975), p. 27.

¹¹Moutet recognizes that the patronat's attitude towards Taylorism improved somewhat during the First World War and that they temporarily accepted state intervention in the private sector; but, on the whole, employers remained traditional in their practices and attitudes regarding the role of the working classes in the workshop. See Moutet, "Patrons de progrès où patrons de combat? La politique de rationalisation de l'industrie française au lendemain de la première guerre mondiale," Recherches, no. 32/33 (September 1978), pp. 440-92.

¹²Maier, "Between Taylorism and Technocracy," pp. 45-54; and Recasting Bourgeois Europe: Stabilization in France, Germany, and Italy in the Decade after World War I (Princeton: Princeton University Press, 1975), pp. 70-9.

¹³Richard F. Kuisel, "Technocrats and Public Economic Policy: From the Third to the Fourth Republic," Journal of European Economic History 2 (1973), p. 59.

¹⁴Kuisel, Capitalism and the State in Modern France: Renovation and Economic Management in the Twentieth Century (Cambridge: Cambridge University Press, 1981), pp. 57-8.

¹⁵*Ibid.*, pp. 272-80. Stanley Hoffmann, Charles Kindleberger and Andrew Shonfeld have focused on post World War II renovation. Kuisel's thesis points to a "long-term shift in men's attitudes about their economy and in the institutions they devised to direct it." In short, the triumph of "dynamic France" was the product of a process which began in earnest during the First World War and finally overcame the opposition of "static France" through the shocks of two world wars and deep domestic concern about the nation's economic shortcomings demonstrated by her slow recovery from the Great Depression and quick military defeat in 1940.

¹⁶James M. Laux, In First Gear: The French Automobile Industry to 1914 (Liverpool: Liverpool University Press, 1976), pp.58-68.

¹⁷Maurice Lévy-Leboyer, "Innovation and Business Strategies in Nineteenth-Century France," pp. 87-135 in Enterprise and Entrepreneurs in Nineteenth- and Twentieth-Century France, Edward C. Carter et al (eds.) (Baltimore: Johns Hopkins University Press, 1976); and François Crouzet, "French Economic Growth in the Nineteenth Century Reconsidered," History 59 (June 1974), pp. 178-9.

¹⁸Lévy-Leboyer, p. 117.

¹⁹See John M. Merriman, "Introduction," in Consciousness and Class Experience in Nineteenth-Century Europe, Merriman, (ed.) (New York: Holmes & Meier, 1979), p. 3; Michelle Perrot, "The Three Ages of Industrial Discipline in Nineteenth-Century France," in Consciousness and Class Experience in

Nineteenth-Century Europe, p. 149; and Maier, "Taylorisme et technocratie," Recherches, no. 32/33 (September 1978), pp. 130-2.

²⁰Patrick Fridenson, "France-États-Unis: genèse de l'usine nouvelle," Recherches, no. 32/33 (September 1978), p. 387; Ronald Aminzade, "The Transformation of Social Solidarities in Nineteenth-Century Toulouse," in Consciousness and Class Experience in Nineteenth-Century Europe, p. 102; and Bernard H. Moss, The Origins of the French Labor Movement, 1880-1914: The Socialism of Skilled Workers (Berkeley: University of California Press, 1976), p. 13.

²¹Perrot, p. 164.

²²*Ibid.*, p. 150.

²³Fridenson, p. 387.

²⁴Peter N. Stearns, Lives of Labor: Work in a Maturing Industrial Society (New York: Holmes & Meier, 1975), p. 204

²⁵Michael P. Hanagan, The Logic of Solidarity: Artisans and Industrial Workers in Three French Towns, 1871-1914 (Urbana: University of Illinois Press, 1980), p. 3.

²⁶Robert A. Nye, "Degeneration and the Medical Model of Cultural Crisis in the French Belle Époque," in Political Symbolism in Modern Europe: Essays in Honor of George L. Mosse, Seymour Drescher et al. (eds.) (New Brunswick: Transaction Books, 1982), pp. 20-2. On the idea of decadence in French society, see also Koenraad W. Swart, The Idea of Decadence in Nineteenth-Century France (The Hague: Nijhoff, 1964); and A.E. Carter, The Idea of Decadence in French Literature, 1830-1900 (Toronto: University of Toronto Press, 1958).

²⁷Anson Rabinbach, "The Body without Fatigue: A Nineteenth-Century Utopia," in Political Symbolism in Modern Europe, pp. 42-3.

²⁸See Susanna Barrows, Distorting Mirrors: Visions of the Crowd in Late Nineteenth-Century France (New Haven: Yale University Press, 1981).

²⁹Nye, p. 36.

³⁰For the idea of degenerate theory as an important "connecting bridge" or "link" to general economic and social theory, see Nye, p. 20.

³¹Susanna Barrows, for example, argues that late nineteenth-century science, on the whole, served both "as a window upon social dislocation and as a shield against society." See Barrows, p. 2.

³²On this point, see Samuel Haber, Efficiency and Uplift: Scientific Management in the Progressive Era, 1890-1920 (Chicago: University of Chicago Press, 1964), pp. 26-7.

³³See Martin Fine, "Albert Thomas: A Reformer's Vision of Modernization, 1914-1932," Journal of Contemporary History 12 (July 1977), pp. 545-64; and "Toward Corporatism: The Movement for Capital-Labor Collaboration in France, 1914-1936" (Ph.D. dissertation: University of Wisconsin, 1971), pp. 1-55.

³⁴Rabinbach, p. 47

³⁵Ibid., pp. 47-8.

³⁶Ibid., p. 51.

³⁷The best treatment of this subject is in Fine, "Toward Corporatism: The Movement for Capital-Labor Collaboration in France, 1914-1936." See also Kuisel, Capitalism and the State in Modern France, pp. 59-92; and Maier, Recasting Bourgeois Europe, pp. 77-80.

CHAPTER II

FACTORY RELATIONS AND SOCIAL CONTROL IN BELLE ÉPOQUE

FRANCE: THE CONTEXT FOR TAYLORISM IN FRANCE

An industrial society implies order and rationality, at least a new kind of order, a new kind of rationality. Its emergence implies not only economic and technological changes but also the creation of new rules of the game, new forms of discipline. Industrial discipline represents only one form of discipline among others, and the factory belongs, with the school, military, penitentiary, and other systems, to a constellation of institutions which, each in its own way, contribute to the rule-making process. Michelle Perrot, "The Three Ages of Industrial Discipline in Nineteenth-Century France," in Consciousness and Class Experience in Nineteenth-Century Europe, John M. Merriman, (ed.) (New York: Holmes & Meier, 1979), p. 149.

Between 1904 and the First World War, a small number of French engineers sought to apply an American system of factory organization to the reform of French industry and society. Dissatisfied with the organization of labor in French factories and the "rule-of-thumb" approach utilized in most French workshops, an elite group of French engineers saw in the work of Frederick Winslow Taylor a system that would apply scientific methodology not only to material and technological problems, but also to every element of the production process, including the relationship between employers and the employees. To Henry Le Chatelier, Charles de Fréminville and Georges Ram, the leading proponents of Taylorism¹ in France before the war, Taylor's system offered, in its simplest form, a recipe that would reduce production costs, increase worker productivity,

employer profits and workers' wages and result in social class harmony and cooperation.

It is best to divide the discussion of Taylorist development in prewar France into two chapters. This chapter will focus on the period ending in 1907 when Taylor's ideas were introduced to French engineers. The period was notable for the translations for French journals of Taylor's early work on scientific management. While those efforts effectively introduced Taylor's system to the French engineering elite, this period was also marked by the fact that, with one notable exception, there were no attempts to apply Taylorism in French factories.

This chapter will delineate the necessary intellectual, social, political and economic conditions which helped shape the peculiar history of Taylorism in France. Once those historical conditions which affected the introduction of Taylorism in France are established, it will no longer appear that scientific management was simply a foreign import but that there was a unique historical context and tradition into which Taylor's ideas were introduced. The proper historical understanding of French Taylorism certainly requires a more thorough understanding of the efforts by nineteenth-century employers to reduce the job autonomy of French workers and to increase their control over the labor force.

Most historical treatments of Taylorism have failed to place Taylorism within the historical development of nineteenth-century French factory relations and within the economic and social development of the French nation. On the one extreme, Richard Kuisel views Taylorism only from the perspective of its contribution to future "technocratic" patterns of behavior that reached full fruition in the post-Second World War economic planning efforts of Jean Monnet.² Taylorism's importance, therefore, is based on its influence on technocratic pioneers

such as Étienne Clémentel, Louis Loucheur and Jean Monnet who played prominent roles in the modernization of the French economy.

Aimée Moutet's "Les Origines du système de Taylor en France" does point out that the introduction of Taylor's ideas to the French public was preceded by several decades of efforts by French engineers on behalf of industrial rationalization. For example, Henri Fayol's work at the Société Anonyme des Mines de Commentry-Fourchambault-Decazeville began in 1888. His ideas on administrative reform, later expressed in his L'Administration industrielle et générale, which was published in 1916, demonstrates that not all French engineers and industrial leaders were blind to the advantages that could be expected from more effective management.³ Moutet, however, fails to elaborate or develop any further on the historical context for Taylorism in France.

The historical context is essential to the understanding of the development of French Taylorism. Clearly, to judge from successful applications of Taylor's system in French factories, Taylorism had only a minimal impact on French industrial development during the first two decades of the twentieth century. Yet to a remarkable extent, the discussion of Taylor's work in France and the attempts to implement it brought into focus the efforts of the patronat to restrict the traditional job autonomy of the skilled artisan and the semi-skilled laborer and to assert more management discipline over the production system.⁴

In addition to describing the historical context of Taylorism in France, this chapter will briefly describe the work of Frederick Winslow Taylor and provide biographical and intellectual background information on Henry Le Chatelier, the distinguished French scientist and engineer who introduced Taylorism to the engineering and industrial elite of France. The effort to Taylorize French industry, it will be argued, was limited before 1908 to the publishing of Taylor's work in

French engineering journals, the unsuccessful attempts by Taylor and Le Chatelier to induce a few French engineers to study scientific management in American plants with Taylor and his team, and an obscure effort to apply time and motion techniques in several Renault workshops.

It is critical to the argument presented by this dissertation to clearly understand the nature of French production methods, the concerns of French employers regarding their workers and production methods and the nature of the changes in factory relations during the nineteenth century. Since the Second World War, historians have debated the nature of French entrepreneurial behavior and the subsequent pattern of factory relations during the Third Republic. Led by American historians, French employers have been criticized severely for their failure to adapt to the entrepreneurial methods of industrial capitalism and for their deep-seated social and political conservatism. According to the "failure of entrepreneurship thesis," French industrial performance during the Third Republic was characterized by stagnation and conservatism in comparison with the more dynamic industrial economies of Great Britain, Germany and the United States. By 1900, the entrepreneurial style of the French bourgeoisie had crystallized into a highly conservative respect for stability, caution and order which prohibited fundamental economic reform. David Landes, the most prominent spokesman for the "failure of entrepreneurship thesis," has argued that French businessmen's behavior was epitomized by the stereotypically conservative family firm:

It is evident in the widespread practice of running a family business (and an unusually large proportion of all French business is family business) not in terms of maximizing profits or growth, or the institutionalized objectives of rational capitalism, but in terms of preserving the status of a family through successive generations, of trying to make the business into a family annuity.⁵

While it is not now necessary to pass judgment on the validity of the "failure of entrepreneurship thesis," it is generally true that the French economic system at the turn of the century, in contrast to the tendency of industrial capitalism elsewhere to encourage industrial merger and monopoly, was dependent on small economic units. François Crouzet, who has been generally critical of the "failure of entrepreneurship thesis," admits that the French economy before 1914 was dominated by small-scale producers. Crouzet writes that:

it remains true that the average size of industrial undertakings was smaller in France than in other advanced countries; that machinery was generally less up to date, productivity lower, costs higher. The domestic system and handicraft production long persisted, while big modern factories were for long exceptional.⁶

What can we conclude about the entrepreneurship of French employers from their propensity towards small family firms? It would be easy to argue that small firms were responsible for economic stagnation, hostility to innovation and a conservative traditional management style in the workshops.

However, the evidence does not necessarily support such conclusions. The "failure of entrepreneurship thesis," in fact, has been attacked recently by French economic historians, and a new interpretation of French economic performance and entrepreneurship has gained recently favor among historians. Instead of stagnation and business conservatism, historians are finding now a relatively satisfactory growth in individual production and a greater willingness to undertake economic risks than depicted by earlier studies. Historians now look at other factors than size as criteria to determine economic efficiency.⁷ According to the current thesis, there were two economic orders in France at the turn of the century. There was the "static sector" which could be characterized as Malthusian in performance and outlook, while the "dynamic sector" tended to be much more

innovative and willing to adapt to changes in technology and market opportunities.⁸ Indeed, to overlook the pioneer role that French entrepreneurs played in the automobile and aviation industries would provide one with a one-dimensional picture of French business during the Belle époque.⁹

While the French economy was sluggish between 1882 and 1896, so was the international economy, which was in a period of depression. On the other hand, from 1896 to the First World War, the French economy experienced a period of rapid growth. During that time, the mean annual growth in French industrial output increased 2.4 percent, the gross national product grew 1.8 percent annually and worker productivity jumped 1.9 percent per year.¹⁰ These figures on per capita increases are very creditable compared to other industrial nations. However, French performance, as a nation, was significantly weaker largely due to its stagnating population compared to England, Germany and the United States where population growth far exceeded that of France. As Crouzet points out, while French performance was "creditable" compared to other developed nations, it was not, on the other hand, "brilliant."

On the whole, the qualitative lag between the British and French economy, which prevailed in the early nineteenth century, persisted during the whole period under consideration, and later on a similar lag developed between France and some other countries—Belgium, Germany and the United States. France did not succeed in catching up with Britain, but was overtaken by several of her rivals.¹¹

The point that must be made at this juncture is that French employers were not nearly as inept as they have been characterized by their critics.¹² In fact, recent research on the performance of nineteenth-century French employers clearly demonstrates a keen concern for improvement in management techniques among employers. Peter Stearns, for example, argues that from 1820 to 1848, the

French patronat included in its ranks a very "dynamic, innovative minority." It was this dynamic group of employers which, in Stearn's view, "accounts for a disproportionate amount of the industrial growth" that France experienced during that period.¹³ He contends that, French employers experimented with rationalization techniques earlier than did American and British businessmen in order to cope with a short supply of labor, high wages and high employee turnover.

Nonetheless, the major force behind managerial experimentation was the desire of employers to exercise more discipline over the French working classes. French employers experimented with a variety of techniques to accomplish that goal--piece-rates, fines, stricter rules, increased supervision and new benefits in their efforts to create a more stable and disciplined labor force. Stearns writes that:

Their vigor in this area may seem surprising, but only to the extent that historians have belittled the rationalizing, expansionist element among French manufacturers. Faced with some special labor problems, French factory owners introduced major innovations rather quickly. Their reduction of the responsibilities of skilled workers, substituting rules and foremen was attempted earlier than in England or the United States in terms of the stage of industrialization involved.¹⁴

His conclusions on the relationship between management innovations and industrial discipline have been more sharply drawn by recent historical treatments of French factory relations. As Michelle Perrot has so cryptically noted in her essay on French industrial discipline, among historians of the French working classes, "'Discipline' is now the order of the day."¹⁵ In fact, an understanding of French employers' efforts to impose greater discipline over the working classes in the factory and reduce their traditional job autonomy provides the necessary historical context that has been overlooked in most discussions of Taylorism in France. It is essential then to establish the historical precedents for Taylorism in the nineteenth-century factory workshop.

The key to understanding the French factory system and the relationship between employers and their workers during the nineteenth century is the nature of the nineteenth-century French work force. The conventional view of this work force is that it was dominated by an aristocratic and highly skilled artisanry strongly opposed to mechanization and rationalization. Jealous of their traditional prerogatives in the production process and over the training and selection of their comrades, this artisan work force was supposedly more successful than workers in other nations in delaying industrialization. This assumption is supported by contemporary observers of French working life. For example, the English sociologist Henry Steele wrote in 1904 about the internal structure of French labor:

In the workshop there is much more freedom than, I believe, exists in English factories. Discipline is by no means of a cast iron character. If Maurice or Jules have (sic) a sudden idea which they (sic) wish to communicate to Henri at the other end of the shop, they go at once, without looking around to see where the foreman is, or pretending to go on business. A good quarter of an hour is lost each morning in shaking hands and passing salutations with comrades in all parts of the factory. To omit the handshakes or the 'salut comrades' is a serious breach of manners. In most workshops in France smoking is allowed . . . in a few of the larger and more modern plants only, smoking is forbidden . . . provided there is no deliberate wasting of time or shirking of work, the workman has the utmost freedom in the workshop, and any attempt to limit that freedom is resented as deeply as any attack on the economic position of wages and hours.¹⁶

Steele's comments do not capture the intensity of the struggles in the workshops between French employers and workers over the control of the productive process. Michael Hanagan has concluded recently that an "industrial war" was waged between the patronat and workers between 1890 and 1914.¹⁷ In factories throughout France, skilled workers were forced to defend their prerogatives against their employers who wished to exercise more control over the production process.¹⁷

To a remarkable extent, in fact, skilled and semi-skilled workers were able to sustain traditional measures of job autonomy in the nineteenth-century French workshop.¹⁸ A recent collection of essays edited by John M. Merriman argues that historians have not understood sufficiently the process of proletarianization in nineteenth-century European factories. Influenced by Marxist descriptions of industrialization's affects on the European worker, historians have exaggerated the degree to which the European labor force was converted to a factory proletarian class. As Merriman notes, "Unfortunately, the historiography on social change in the period has sometimes tended to emphasize uprooting and upheaval at the expense of an understanding of the evolution and continuities of changing historical experience."¹⁹

Historical evidence demonstrates the success of the working class's defense of its traditional job autonomy against the employers' efforts to mechanize their factories and impose greater managerial discipline over their workers. Of the two challenges, it was the organizational reforms designed to instill greater control by the employers, not the introduction of new machinery, which represented the greatest threat to the workers.²⁰ According to Ronald Aminzade's study of proletarianization in Toulouse, workers were exposed to organizational reforms which forced them to perform more repetitive and routinized tasks. This, in turn, caused them to lose control over their work rhythms and replaced the compagnonnage tradition which allowed workers to control the selection and training of apprentices to trade organizations. The combined effects of these changes were profound. Aminzade explains that:

Employers' increased control over the production process and labor market meant that the important decisions and functions once carried out collectively by workers through organizations like the compagnonnage, including the recruitment of skilled labor, the enforcement of standards

regarding finished products, and labor discipline, were gradually becoming the exclusive prerogatives of the employer The job security and collective control over conditions of work that members of the *compagnonnage* once enjoyed was increasingly challenged by the rise of industrial capitalism and the corresponding decline of handicraft industry. As artisans faced a growing threat to their control over access to their trades and over the pace and process of their work, they no longer found their self-identities in the status and privileges of their occupational group and its ritualized exclusivism.²¹

The social and political consequences of the struggle between management and labor in the workshops were reflected by the increasing frictions of the French labor movement with the patronat and the state after the Paris Commune. Indeed, the tone of labor politics and the response to labor by French authorities changed dramatically during the first three decades of the Third Republic.

To a certain extent, employer paternalism took the edge off class conflict before the Revolution of 1848. In contrast to the more brutal and callous treatment of workers by English factory owners, French employers continued "to feel a genuine sense of paternal responsibility toward their labor force."²² Paternalism, argues Stearns, was an effective system in securing a more stable labor force when coupled with other disciplinary methods. The range of benefit programs such as retirement plans, company housing and medical services established for workers by their patrons gave workers a greater stake or investment in a company and precluded French employers from completely turning their backs on the welfare of their workers.

More importantly, paternalism sustained the patronat's view of the worker as a dependent who needed the benevolent guidance and supervision of his social betters:

paternalism paints the ambiguous picture of calculated generosity on the part of innovative manufacturers, who wanted to think themselves decent men, along with a new stage in the groping toward the most efficient handling of labor and organization of the economy. The talk was of generosity, and some of the effects brought genuine benefits to workers, but paternalistic policies essentially extended the system of industrial discipline that the big firms had quietly developed.²³

In short, Stearns concludes that "in a period of undeniable change, paternalism seemed valid both because it promised to save money and because it might keep the workers under proper control."²⁴ In time, however, the "docility" of the French working class changed to a more militant attitude as the labor organizations gradually developed.

The militancy of the French working class after the Paris Commune was based on several major factors. First, the process of proletarianization between 1870 and the First World War had reached a crisis point for the skilled and semi-skilled workers who had assumed leadership roles in the syndicalization of French labor. Second, the working class reacted against: 1) a more hostile political environment after the Paris Commune, which tended to offer little more than lip service to the political and social aspirations of the working class; and 2) the determination of a more aggressive patronat to exert more control and discipline over the working class.

The impetus for industrial rationalization steadily increased after economic prosperity returned in 1896. Rationalization threatened the status of the skilled and semi-skilled worker even though it did not necessarily differ in quality from the process of proletarianization during the first half of the nineteenth century, but which had become more intense and menacing by the turn of the century. In fact, Bernard Moss concludes that the skilled worker was

confronted by a "structural crisis" at the turn of the century which threatened the survival of his traditional prerogatives in the workshop. According to Moss:

The structural crisis was defined in terms of two opposite features, the proletarianization of skilled workers and the survival of skill. Industrialization in the nineteenth century had advanced far enough to threaten the security, income, and integrity of most crafts, but not enough in terms of total mechanization to destroy the craft and its organized resistance. The security, income, and integrity of the crafts were threatened by the influx of cheaper labor; standardized production; cyclical unemployment; the introduction of power tools; and increases in the division of labor. Yet, while undergoing a relative proletarianization, most activist workers still retained their craft status with the apprenticeship requirement, measure of job control, and trade solidarity. Despite the political transformation of their crafts, they still possessed the professional and organizational capacity to resist exploitation and offer a transformative ideological response to capitalism.²⁵

In contrast to labor protest in the first half of the nineteenth century, skilled workers were now joined by unskilled workers protesting against low wages and poor working conditions. By 1900, the influence of unskilled workers in the syndicalist movement, particularly in the construction and metals industries, was responsible for the sharp increase in strike activity before the First World War even though strikes involving unskilled workers were shorter and less successful in terms of workers obtaining strike objectives.²⁶

It appears that the change in the work process itself reached such proportion during this period that French workers were willing increasingly to strike against their employers and working conditions. A mere listing of the factors leading to the deterioration of working conditions such as increased production requirements, more repetition in work assignments and unrealistic rules or piece rates is not sufficient to explain why French workers now reacted against the changes in the work process. In fact, as Stearns recently explains, the overall nature of work in modern factories underwent a fundamental change from 1890 to

1914. "What we are talking about is the creation of the modern work system and, to an important extent, the modern worker himself."²⁷ Workers were forced now to submit more and more to the organizational pressures imposed upon them by their employers. Tighter supervision from foremen, more complex factory operations and attention to time management prepared the way for Taylorism. Stearns concludes that:

For workers generally this, more than the first phase of industrialization, was the period when intensity and regularity came to dominate the work experience. Factory workers had been whistled to their jobs from the early days, of course. But now they, and also many craftsmen and laborers, were not only called to work at a certain hour but regulated minutely while on the job. Devices to measure speed and effort replaced the factory whistles as the symbols of industrial labor.²⁸

Threatened with the loss of social status and job control and hostile to the deterioration of factory working conditions, French workers also were confronted by a dramatic change in the political and social policies of the Third Republic. In fact, the political alliances which had developed between the republican bourgeoisie and the working class during the July Monarchy and the Second Empire were strained and eventually severed. Working class leaders who had derived political and social advantages through cooperation with republican leaders against conservatives gradually learned that this strategy would no longer suffice as bourgeois republicans lost their taste for substantial social and economic reform once gaining control of the government in 1876. Moss believes that the October 1876 national labor congress in Paris was the turning point in working class cooperation with bourgeois republicans. Henceforth, labor leaders recognized the folly of depending on the benevolent assistance of the new ruling class in aiding workers. The congress's final report concluded that:

From the moment that the republican form of government was assured, it was indispensable for the working class, which had marched until then together with the republican bourgeoisie, to affirm its own interests and to seek the means by which it could transform its own condition.²⁹

However, the French labor movement was deeply divided prior to 1905. French socialists proved incapable of either establishing a unified socialist party or organizing a strong trade union movement. Quarrels between Guesdists, Allemanists and Possibilists prohibited a socialist union during the nineteenth century, and Jules Guesde's attempt during the 1880's to establish a socialist-sponsored trade union failed.³⁰ All attempts to form a unified national syndicalist organization were thwarted by the political disputes within the socialist movement.³¹ Then during the 1890's, the Allemanists and Blanquists managed to form a somewhat tenuous trade union organization independent of the socialist parties.³² Established in 1894, the Confédération générale du travail (CGT) united the trade union federations, but it suffered from the opposition of Fernand Pelloutier, the popular leader of the Fédération nationale des bourses du travail, who was opposed to the CGT's moderate stance on social class reform. Without his support and that of the local bourses du travail which followed Pelloutier, the CGT remained weak until 1902 when it was finally united with Pelloutier's Fédération nationale des bourses du travail.³³

By 1905, socialist and syndicalist opposition to the bourgeois political and economic leadership had intensified. In that year, Jean Jaurès succeeded in hammering out a compromise with Guesde to unite the French socialists in the Section française de l'internationale ouvrière (SFIO). Successful unification of the socialist and syndicalist movements at the turn of the century, despite their strongly divergent and independent stances, caused great concern among bourgeois leaders concerned by the revolutionary statements of the labor movement and the enhanced effectiveness of the CGT in guiding strike activities.

In fact, CGT membership increased sharply during the four years after its unification with the Fédération nationale des bourses du travail, although the overall percentage of eligible workers who joined the CGT remained small in comparison with other modern industrial nations before the First World War. Georges Lefranc estimates that CGT membership increased from 100,000 at the 1902 Montpellier congress to 122,000 in 1904 and 300,000 by the 1906 Amiens congress.³⁴

The CGT and the legacy of revolutionary syndicalism during the "heroic period" of 1902 to 1909 have been the subject of sharp historical debate. One view, espoused by Peter Stearns, points out the limitations of those historical studies which have focused on the central structure and the ideas of the CGT. According to this view, the CGT and its revolutionary syndicalism was not representative generally of the working class's interests, and historians have credited the CGT influence over the working class that distorts reality. According to Stearns:

French syndicalism was a movement aimed at working-class control of the economy and society; but many of the workers were satisfied with things as they were, others worked for gains within the system, while others did indeed want more voice. Perhaps, in this peak period of worker agitation, there was no working class, at all, but rather a motley collection of traditionalists, would-be bourgeois, and genuine proletarian radicals.³⁵

Stearns argues that the revolutionary rhetoric of CGT doctrine conflicted with the moderate outlook and actions of grass roots syndicalist leaders who frequently directed strikes toward quick resolutions and legal settlements of issues involving wages and working conditions. Pointing out the small membership of the CGT, its lack of funds and organizational weaknesses, and the pragmatic actions of syndicalist leaders during strikes, Stearns refutes those who believe

revolutionary syndicalism was a serious threat to the status quo of the Third Republic before the First World War.

For neither the government nor the employers took syndicalism too seriously. Syndicalism created a much milder sense of crisis than occurred in Britain after 1910, under the impact of the huge strike wave. The outlook and behavior of French workers did not interfere with or threaten the functioning of the Third Republic, and its leaders knew this Syndicalism failed, then, thoroughly to épater les bourgeois.³⁶

While Stearns might be correct to argue in retrospect that the rank-and-file workers did not share the revolutionary expectations of their leaders, he understates the concerns in the bourgeois community created by revolutionary syndicalism and the strike movement at the turn of the century. Other studies have concluded that the labor movement threat was real before 1914. Despite the lack of large numerical support for the CGT and its policies, several historians have argued that revolutionary syndicalism was perceived by Republican leaders as an internal threat. A. Fryar Calhoun, for example, writes:

It was clear enough around the turn of the century that the revolutionary syndicalists were far from representing the bulk of French workers. Nevertheless, the movement's leaders did claim a mass base, and who could rule out the possibility that their ranks might swell significantly with each further step in the country's industrialization, notably in times of labor unrest? Moreover, the syndicalist theory of the general strike held that the country could be paralyzed and the road to revolution laid open without a mass uprising, provided that enough workers in one or a few key industries were determined to act. Such a potential challenge could not be ignored by the ruling groups of the Third Republic, particularly when it was aimed at the rail system.³⁷

Statistics accumulated by the government gave a sense of reality to the bourgeoisie's fear. Those statistics reflected a sharp increase in both the number of strikes and the numbers of workers affected over the period 1870-1906. During the five-year period 1870 to 1874, there was an average of 84

strikes with a total of 27,200 strikers a year. For the five-year period 1900 through 1904, the number of strikes increased nearly nine hundred percent to an annual average of 746 strikes affecting 185,800 French workers.³⁸ This dramatic increase in strike activities would have been difficult for the French patronat and other groups in the bourgeoisie to have ignored.

Furthermore, revolutionary syndicalism encouraged workers in their opposition to bourgeois society. In contrast to the political tactics of the SFIO which often accommodated an opportunistic relationship with bourgeois parties, revolutionary syndicalism supported an arsenal of direct action tactics including boycotts, sabotage and strikes.³⁹ Stearns correctly argues that revolutionary syndicalism was the program of a relatively small group of Blanquists and anarchists which controlled the CGT's policy from 1902 through 1909. The outstanding advocates of revolutionary syndicalism and the general strike in the CGT leadership were Victor Griffuelhes, Georges Yvetot, Émile Pouget and Paul Delesalle.⁴⁰ One historian has recognized in the doctrine of revolutionary syndicalism the program of an alienated and isolated segment of the French population. To a large extent, revolutionary syndicalism was the manifestation of an alienated and politically immature working class which was outside the political mainstream of the Third Republic.⁴¹ French society was dominated by a bourgeoisie and peasantry whose values "formed a solid phalanx in parliament against which labor would beat in vain." According to Gordon Wright:

If France had a forgotten man in the pre-war era, it was surely the urban worker. The expansion of the working class since 1870 had brought rising unrest and violence but not very much in the way of social gains. In 1884 trade unions had at last been formally legalized; in 1906 Sunday rest was made obligatory; in 1910 an optional social insurance plan was established. This was not a very impressive record of reform; almost no other industrial state in those years granted so little to its labor force.⁴²

Not only were the working classes outside the political mainstream, the state also demonstrated that it was willing to use force against the working class to defend the interests of the patronat. The Clemenceau ministry used violence against the strikers at Draveil and Villeneuve-Saint-Georges in 1908 which resulted in the deaths of some six strikers and scores more wounded. Clemenceau followed those actions with the threat to dissolve the CGT for its "anarchist and unpatriotic" influence on the working classes.⁴³

Stearns' argument that the government and employers were not seriously concerned about the revolutionary threat of labor is not borne out by the reaction of the patronat to strikes before the war. French employers refused in an authoritarian manner to make concessions to any organized worker demands. Even Stearns admits that:

From a comparative standpoint, despite many individual and industrial variations, French employers stand out in the years around 1900 as being at once unusually harsh and unusually ineffective in their relations with workers French manufacturers were extremely jealous of their power and often feared bargaining as an abdication of all authority . . . of all responsibility.⁴⁴

Edward Shorter and Charles Tilly identify the same tendency in the French patronat at the turn of the century:

The one objective the employer attempted at all costs to reach in labor relations was the protection of his patronal authority. Indeed, keeping his position as master of his own house from encroachment by organized labor or by the state appears even to have triumphed over the profit motive.⁴⁵

Indeed, employers frequently organized to defend themselves against the CGT and strike activities. In many cases, groups of employers cooperated to defeat strikes with worker lockouts, refusals to hire strike leaders and blacklisting militant workers.⁴⁶

In the main, the employers were concerned about the "social problem" which they believed threatened to erode their control over their shops. In spite of the CGT's structural and ideological weaknesses, employers believed it was capable of providing sufficient leadership and direction to the already alarmed working class to channel discontent against working conditions into strike activities. The turnout for the May Day strike in 1906 for the eight-hour day was certainly a remarkable feat for the CGT. While the number of strikers and the results of the strike may have been disappointing to some of the strike's leaders, it caught the attention of the public. The strike's success raised expectations in the working class and strike activities during 1906 increased nearly five hundred percent over the previous year.⁴⁷

In contrast to Stearns' thesis that revolutionary syndicalism represented no threat to the Third Republic, François Goguel argues that France in 1906 faced a "situation, if not revolutionary, then at least prerevolutionary."⁴⁸ Georges Lefranc calls the May Day strike of 1906 "the last great blaze of revolutionary syndicalism."⁴⁹ The bourgeoisie, which feared further revolutionary upheaval, was alarmed seriously because the CGT organized and channelled worker frustration against the institutions of the Third Republic. Charles Tilly and Edward Shorter rightly argue that:

The CGT was much more like someone standing on a table shouting exhortations during a bar-room brawl than a general directing his armies across the field of battle. But even this anarchic arrangement would suffice to coordinate strike movements at times when locals were prepared to be coordinated, which is to say, when unionists across France sensed that a political crisis was brewing at the center.⁵⁰

The political environment of the Third Republic before the First World War encouraged the working class to develop their own institutions and goals

separately from those of groups included in the republican coalition. In retrospect, historians have sought to explain the alienation of the working class by the failure of the Third Republic to develop a viable social and economic policy that would have been attractive to the working class and, at the same time, acceptable to the bourgeoisie. This failure was evident from the earliest years of the Republic.

The bourgeoisie's experiences with the French crowd during the Paris Commune and the Boulanger Affair and the working class during the strike waves that swept France during the last two decades of the nineteenth century had profound effects on general social and economic theory in the Third Republic. The fears and anxieties of the French bourgeoisie regarding the working class were exemplified in the work of Hippolyte Taine, French crowd psychologists and Émile Zola. Susanna Barrows writes in her excellent study of French visions of the crowd that middle class fears of the working class were deeply rooted. She concludes that:

their vision of the crowd was awesome, almost invariably terrifying. As they described the crowd's savage, instinctual behavior, these crowd psychologists encapsulated many of the fears of their well-to-do contemporaries—fears deeply rooted in the social fabric of the time. Their crowds loomed as violent, bestial, insane, capricious beings whose comportment resembled that of the mentally ill, women, alcoholics, or savages.⁵¹

Indeed, Theodore Zeldin concludes of the nineteenth century in his study of contemporary France that "the age of fear is as good a label for this century as the age of progress."⁵² According to Zeldin, the general level of anxiety increased in French society at the same time that industrial progress appeared to offer greater individual prosperity. There is, in fact, little question that the fears and anxieties of the French bourgeoisie escalated during the first

half century of the Third Republic. Military defeat in the Franco-Prussian War and the terrifying experiences of civil and class warfare during the Paris Commune were traumatic for the bourgeoisie. The shock waves from those events raised doubts about the health and well-being of the French nation. Declining birth rates, increasing alcoholism and stagnating economic output led to a public discussion about national degeneration and decadence.⁵³ The issue of intellectual decline and lost national prestige was a great concern to the academic community.⁵⁴

The most prominent spokesman on the issue of national decline after the Paris Commune was Taine, whom Barrows terms the "physician to modern France" during the 1870's and 1880's. Taine's Les Origines de la France contemporaine was inspired by the memory of the Paris Commune in which the crowds provided him with his images of hordes led by thieves, criminals, lunatics and alcoholics.⁵⁵ Barrows explains that "by playing upon the sense of despair, national humiliation, and cultural decline, Taine, 'the pathologist of French society', offered an explanation for how and why France had lost its primacy among nations."⁵⁶ Taine's analysis of the causes of French decline was elitist and was based on the assumption that the average man tended to revert to an "instinctual state once a crowd is formed."⁵⁷ His elitist prescription was as influential as his nosography. He called upon the altruistic and civic leadership of the privileged classes as a counterweight to the leveling influences of democratic society.

French society continued to suffer political and social crises before the First World War. Strikes, the Boulanger and Dreyfus affairs, the Panama Canal scandal, anarchism, the assassination of President Sadi Carnot, the continued growth of the socialist parties, the controversy over separation of Church and State, and the diplomatic situation before the First World War caused the

bourgeoisie to doubt the strength of the Third Republic. The political victories of the Radicals at the turn of the century and the changes in the university system diminished the control of the grande bourgeoisie over French society.⁵⁸ Even so, the Radicals failed to offer a dynamic alternative to the social and economic policies of previous regimes. The revolutionary tradition of 1789 which the Radicals inherited proved stale and inadequate to the challenge offered by industrialization. David Thomson writes:

That the French national tradition was one of revolutionary ideology whilst the constitution of the Third Republic was but a working compromise between Republican and anti-Republican forces, was a permanent underlying fact which determined its whole development. The system of parliamentary sovereignty which divided Frenchmen least was a neutral, negative thing which also satisfied them little. The Third Republic is an almost unique example of extremely positive political force, working through a negative instrument, which was in itself incapable of providing a government or an administration better or worse than the interplay of forces was able to provide.⁵⁹

Into this society troubled by social disharmony, national decline, political turmoil and lack of dynamic political leadership, Frederick Winslow Taylor's system of scientific management was introduced. Frederick Taylor was born in 1856 and died in 1914.⁶⁰ He was the product of a well-respected Philadelphia family. His parents were from prominent Pennsylvania Quaker families; his father was a lawyer by training but relied totally on his inheritance and investments which were sufficiently lucrative that, at the time of his death in 1910, he was nearly a millionaire. Taylor's parents demonstrated a genuine concern for the social issues of the day. Mr. Taylor was an active trustee for a school for the mentally retarded, while his wife supported the antislavery faction headed by William Lloyd Garrison. They were also very involved in the cultural and

intellectual life of Germantown, Pennsylvania, where the Taylors raised their family. When Frederick Taylor was a youth, the family spent three years in Europe trying to broaden the educational experience of their children. It appears, however, that the social and intellectual outlook of his parents had little influence on Taylor. According to Taylor's most recent biographer, Daniel Nelson:

It is a testimony to the precarious nature of parental expectations that Franklin's and Emily's preoccupations had relatively little effect on Frederick. He was, of course, the beneficiary of their wealth and connections, but . . . he had little interest in his parents' social or intellectual concerns. As an adult he made few charitable gifts and was active only in professional societies. To his parents' chagrin he soon adopted the racial and ethnic stereotypes common to industrialists of the late nineteenth century.⁶¹

Young Taylor was primarily interested in two pursuits: athletics and inventions. He was reported to have been fiercely competitive (he was in later life a championship-caliber tennis doubles player despite vision problems). His talents in mechanical matters surfaced early. As a youth, Taylor made a harness in which he slept to overcome chronic insomnia and frequent nightmares.⁶²

Taylor's parents sent him to Phillips Exeter Academy to prepare for Harvard University. However, Taylor and his parents became alarmed about a vision problem and headaches which they believed were caused by overstudy. Instead of entering Harvard, Taylor returned home where he took a job as an apprentice machinist in 1874 at a Philadelphia factory. Unlike other apprentices, Taylor had the advantages of his social status among the elite of Philadelphia. When he completed his apprenticeship in 1878, Taylor took a job as a laborer at the Midvale Steel Company, which was one of the most progressive industrial plants in Philadelphia at the time. He quickly rose to foreman at Midvale due to his extraordinary talents and social connections. While there, Taylor completed a

mechanical engineering degree in 1883 from Stevens Institute of Technology in Hoboken, New Jersey. By 1884, Taylor had been promoted to chief engineer--a quick ascent through the factory ranks which proved to him the results of hard work, self-discipline and the application of talent to one's chosen career.

The time Taylor spent at Midvale was crucial to his intellectual development. As foreman, he experienced great difficulties in his efforts to extract greater productivity from his workers. Out of frustration, Taylor called into question the effectiveness of contemporary management practice. While his work in this area ultimately led him to the breakthrough in management practice that bears his name, it was his meticulous work on metal cutting which brought Taylor his first international acclaim among engineers and industrialists. According to Daniel Nelson, Taylor's practical development of a rapid steel-cutting process "precipitated a revolution in machine shop practice."⁶³

Taylor's work in metal cutting quickly evolved into the reorganization of the Midvale workshops to take full benefit of the rapid-cutting steel techniques and then the reorganization of the Midvale factory. While the connections between these series of reforms are difficult to trace from Taylor's records, it is clear that he was convinced at the beginning of his work at Midvale that factory workers did not work to their maximum. He found that the greatest limiting factor in the full utilization of his technical advance was the organization of the production process in modern factories--particularly in regard to the work of factory laborers.

Taylor remained at Midvale until an 1889 management reorganization led to his resignation. However, before leaving Midvale he experimented with the management techniques which later became the basis of the management system now called Taylorism. By 1885, Taylor had hired additional clerks to assist

management in asserting greater control over the production process, experimented with motion and time study and implemented an incentive wage system based on the "differential piece rate." His major departure from traditional management practices had been the development of an elaborate system of production control using bulletin boards and instruction cards. Little was left to chance or the discretion of the Midvale factory workers. Tools were assigned and schedules were drawn for the overhaul and lubrication of machines. Taylor later claimed that his factory reforms at Midvale doubled or tripled production.

Daniel Nelson concludes that Taylor's reforms, while on the advanced edge of management reform, were not dramatically dissimilar to the work of several other American engineers. He was, however, more "single minded" in his drive to increase worker productivity.

Taylor's conclusions were derived wholly from his pragmatic effort to increase production rather than from anxiety over the "labor problem," the state of American society, the workers' welfare, or some combination of economic and social concerns. His single-minded emphasis on production became more apparent in the 1890's when he introduced the differential piece rate in other factories.⁶⁴

In fact, Taylor's preoccupation with increasing productivity restricted his management perspective and his system of management. He had little knowledge or appreciation of purchasing, accounting and marketing procedures. More importantly, his appreciation of personnel management was extremely limited. He assumed simply that men labor for money—a perspective which explains his fixation on the differential piece-rate system. Workers would accept much higher production schedules in return for higher wages. Personnel to Taylor were little different, in principle, from other technical production factors.

Beyond this he had nothing to offer; indeed, in most respects he was a reactionary. In later years he proclaimed the "scientific selection and progressive

development of the workmen" as one of his "principles" of scientific management, but these were largely meaningless phrases.⁶⁵

Taylor's first public presentation of his management work was to an annual meeting of the American Society of Mechanical Engineers in 1895. "A Piece Rate System" was a brief criticism of contemporary management procedures and a justification of his differential pay system that gained him favorable attention from his peers and brought him lucrative consulting work. However, his consulting work ended with a notable personal defeat after his three years at the Bethlehem Steel Company failed to increase substantially production. But with no financial need to continue consulting, Taylor turned to the popularization of the managerial ideas which he had developed over the two decades of factory experience.

It is important not to dwell too heavily on the technical qualities of Taylor's managerial ideas. Trained as a mechanical engineer with practical experience as a machinist and foreman, Taylor also had a firm understanding of the social organization in factory workshops. However, his social background clearly placed him within the privileged classes. While he understood workers and foremen, his management style was authoritarian. As an engineer, he sought to reduce the power of the foreman and to enhance that of the engineers by transferring to them duties over production control and planning.⁶⁶ In fact, the shift in power from the foreman and workers to the engineering or technical staff levels that Taylor sought to achieve had started long before he developed his system.

While the smaller firms of the nineteenth century did not require extensive staff diversification or complex managerial development, the administrative requirements of the twentieth-century factory demanded more elaborate mechanisms of control. Reinhard Bendix terms the process by which

entrepreneurs centralized much of the functions involving production and marketing the "bureaucratization of management":

At one time individual entrepreneurs performed a large variety of routine administrative tasks in addition to their "distinct economic function of undertaking new things," which Schumpeter has singled out for special emphasis. Seen historically, bureaucratization may be interpreted as the increasing subdivision of the functions which the owner-managers of the early enterprises had performed personally in the course of their daily routine. These functions may be divided into labor management, technical staff work, administrative management, and mercantile functions of purchasing, sales, and finance. As the work became more extensive and complex with the development of economic enterprises, it came to be delegated to subordinates both with regard to routine work and with regard to selected aspects of the entrepreneurial function proper.⁶⁷

While the bureaucratization of management was not uniform in the industrializing nations, the resulting new administrative and technical staff created by the process benefited from some of Taylor's concepts. However, gains in power and status by the technical and administrative staff were at the expense of other occupations in the industrial setting. Recent historical studies of Taylorism have studied closely the competition for status between foremen, technical staff and entrepreneurs sparked by Taylorism--particularly in the United States. All such studies have concluded that the technical and administrative staffs clearly had the most to gain from the application of scientific management.⁶⁸

Prior to 1880, most factories had changed little from the craftsman's shop of the eighteenth century in their administrative structures. With the possible exceptions of more visible supervision and stricter rules, the greatest changes in the workshops were technological in nature, mainly through a more extensive use of machinery and new power sources. According to Daniel Nelson:

in many industries internal management techniques, particularly those involving relations between the factory

managers and workers, were not fundamentally different from what they had been in the craftsman's shop. This was due to the relatively small size of the pre-1880 factory, the manufacturer's preoccupation with financial problems, and the failure to recognize supervision and personnel relations as distinct administrative functions. As a result the operation of the plant was generally left to the foreman and the skilled workers. In this respect the factory of 1880 remained a congeries of craftsmen's shops rather than an integrated plant.⁶⁹

Thus engineers and supporters of scientific management sought to reduce the responsibilities of the factory foremen, but the strategy to supplant the foremen was indirect. Engineers such as Taylor and his disciples believed that increasing production and reducing labor costs required that two major steps be taken. First, factories had to be equipped with the most modern and efficient machinery available. Second, the machines had to be used efficiently. Many engineers realized that by the turn of the century mechanization had surpassed the ability of existing managerial operations to make maximum use of current technology. They concluded that labor methods had to be reformed. For engineers such as Taylor, Frank Gilbreth and Henry Le Chatelier, the essential goal was to streamline the labor process through imposing greater management control. According to Nelson, "what was clearly implied but never stated was that the goal would be achieved at the expense of the foremen's--and ultimately the workers'--autonomy."⁷⁰

By 1900, Taylor's metallurgical work had caught the interest of the engineering community in America and Europe. While only a few intimate American associates of Taylor were fully aware of his managerial initiatives, European engineers were fascinated by his work on high-speed steel cutting tools which was one of the highlights of the 1900 Paris Exhibition. One of those interested in

Taylor's metallurgical breakthroughs was Henry Le Chatelier, who immediately recognized the importance of Taylor's innovation to the iron and steel industries.

Le Chatelier also recognized the importance of Taylor's research methods as a model for the application of science to industrial matters. Through their parallel interests in the role of scientific method in the factory, the eminent French engineer, professor and editor of the Revue de métallurgie, developed a professional relationship with Taylor. He soon undertook the task of introducing Taylor's system of management to the French and for the following three decades was the major French spokesman for scientific management. Aimée Moutet has written recently that Taylorism was fortunate to have had Henry Le Chatelier introduce scientific management in France.⁷¹ Well-educated and respected by the academic and business communities, Le Chatelier was able to communicate clearly Taylor's ideas about scientific management to leaders in the scientific, industrial and governmental fields.

Henry Le Chatelier was born in 1850.⁷² The Le Chatelier family, although not exceptionally wealthy, was respected by the professional and educated bourgeoisie. Le Chatelier's father was an engineer who worked for the state and for several French railroads. The elder Le Chatelier, despite the fact that he had not attended the École polytechnique, had many friends in French industrial and engineering circles, was an active and founding member of the Société des ingénieurs civils de France when it was formed in 1848 and was an active participant in the railroad ventures of the Perier brothers. The Le Chatelier family provided Henry Le Chatelier with the appropriate bourgeois education that would prepare him for state service and assure him a place among the French professional elite. His early academic training was at the Collège Rollin which prepared him for the baccalauréat and provided him with a sound background in the

sciences and mathematics. His years at the Collège Rollin were not, on the whole, happy. Le Chatelier later described himself as a melancholic and neurasthenic youth who often had problems relating to other students. Moreover, his academic progress during his early school career was not impressive. However, Le Chatelier overcame by force of will the melancholia and neurasthenia. When he finished his studies at the Collège Rollin, he was at the top of his class in mathematics and the sciences, though his record in French composition was not nearly as impressive.

In 1869, Le Chatelier entered the École polytechnique. While there, he was deeply influenced by the spirit of positivism. He saw in science promises of progress in the application of the scientific method to all fields of human endeavor. According to Le Chatelier, his professors did little to impress on the students the philosophical and social value of the scientific method, but he and a number of his comrades were converted to positivism through their independent reading. He later said to a group of École polytechnique students that:

My spirit was raised to the heavens during the course of reading completed in my spare time which was theoretically devoted to preparing for my classes. With several of my comrades, we were deeply influenced by Auguste Comte, Herbert Spencer, Taine and the philosophical novels of George Sand.⁷⁵

Le Chatelier finished second in his class at the École polytechnique and enrolled at the École des mines in Paris where he completed his formal academic training in 1874. He then served as a geologist on a French mission to North Africa where he planned the creation of an inland sea to transform eventually the desert into rich farm land. Shortly after his return from North Africa, Henry Le Chatelier was appointed full professor of applied chemistry at the École des mines in Paris. Of his new position, he later wryly recalled, "I owed my nomination to

the good-will of the director at the École, M. Daubrée, who was a friend of my father and the fact that no other engineer in the mining corps had better credentials than mine."⁷⁴ The new professor was deeply concerned that his scientific skills would prove inadequate for the post. He sought the advice of his father's old friend, Henri Saint-Claire Deville who was a member of the French Académie des sciences and one of the most respected members of the scientific community; Deville was amused by the problem Le Chatelier posed and told the younger engineer that there were so many fields open to research that Le Chatelier needed only to choose a field.⁷⁵

Nonetheless, Le Chatelier was convinced that his research skills were utterly inadequate. He joined many of his colleagues in criticizing the French educational system for placing insufficient emphasis on laboratory work. To improve his skills, Le Chatelier worked several years with Professor Mallard, professor of minerology at the École des mines, on his research on causes of mine explosions. With Mallard, Le Chatelier put into practice many of the concepts which he had learned as a student at the École polytechnique. He also gained a deeper appreciation and understanding of the scientific method and its applications to industrial problems.

His impressive record in the applied sciences during the 1880's and 1890's helped establish Le Chatelier's reputation among French and European factory owners. At the same time, he worked assiduously to improve his writing skills. Le Chatelier studied history and philosophy, although only superficially, to broaden his research interests and to prepare him for later work in political economy, educational reform and the philosophy of science.

As a young man, Le Chatelier's social conservatism deepened. Although he and his family remained committed to republicanism, he was deeply

disturbed by the crowds during the Paris Commune and had little faith in popular democracy. Like many bourgeois Frenchmen after the establishment of the Third Republic, Le Chatelier was convinced that no further changes in the social and political system were desirable and that if the Republic were to survive, it must be conservative and based on the principle of social discipline. The events of the Paris Commune demonstrated the excesses of unrestrained popular democracy. Like Hippolyte Taine whom Le Chatelier greatly admired, the Le Chatelier family believed it was the duty of the educated and privileged classes to provide the leadership and discipline to maintain social stability and to avoid further revolutionary upheaval that would result in the dissolution of the French nation.⁷⁶ Later, Le Chatelier became an anti-Dreyfusard—a position that eventually cost him a coveted chair at the École polytechnique because those who controlled such appointments before the First World War were Dreyfusards. Through the controversy that wracked the Third Republic, the Le Chatelier family remained firmly committed to the Catholic Church.

Although politics prevented his receiving a chair at the École polytechnique, Le Chatelier did receive a number of important academic awards for his work. In 1907, Le Chatelier was elected to the chemistry section of the French Academy of Sciences. He was also elected in 1904 the president of the Société d'encouragement pour l'industrie nationale. His other professional honors included membership in the Royal Society (1913), the Davy Medal from the Royal Society (1916), the Bessemer Medal from the Iron and Steel Institute and numerous honorary degrees from European universities and memberships in scientific societies. In 1887, he was made a chevalier of the French Legion of Honor in which he eventually became a grand-officier in 1927.⁷⁷ In addition to the position at the École des mines, by 1900 he was a faculty member at the Collège de France and

the Sorbonne. Holding the chemistry chair on the Sorbonne Science Faculty was a particularly remarkable achievement since it was extremely rare for someone who had not passed the agrégation to be appointed to the Science Faculty. In fact, Le Chatelier and Henri Poincaré were the only members of the Science Faculty who were not required to resign from their corps. Clearly, Le Chatelier had, by 1900, achieved the status and influence due a maître in the French educational system.

Le Chatelier's reputation was based as much on his efforts to establish industrial science as a recognized career for French students as on his scientific work. By the 1890's, he took an active role in the debate on the weaknesses of French science and the educational system. In 1898 he argued that the contribution of science to industry was the primary reason for the remarkable material progress of the nineteenth century:

The rapid development of industry during the 19th century will be viewed by future historians as the characteristic of our period. A phenomenon of such importance requires, in order for a proper explanation, the intervention of special factors not present in previous centuries. But mineral resources, manual skills and commercial aptitude have not changed certainly during the modern era. One factor alone is responsible: the rapid development of the experimental sciences, in particular that of chemistry during this century and that of electricity for the next century.⁷⁸

Le Chatelier supported industrial science against what he considered to be the overly theoretical nature of French science. In 1901, he attacked the preoccupation of French education with pure science:

My goal is to fight the sentiment, today general in France, that pure science must reject completely any concern for practical applications and that it must isolate itself from industry as with a compromising promiscuity.

All our scientific instruction is oriented in this unfortunate direction; all our scientific bodies are imbued with the same spirit There are no other countries where this antagonism between pure and applied science is as profound as it is in France; but it does not have to be thus always.⁷⁹

Le Chatelier, in fact, was one of the most vocal critics French education for not supplying industry with the technological and skilled technical expertise that it so desperately required to keep up with German and American competition.⁸⁰

In order to convince French engineers of the benefits of industrial science, Le Chatelier established a journal in 1903. The Revue de métallurgie became, under his direction, a major vehicle for communicating his ideas on the application of science to industry. Publication of the Revue de métallurgie also offered Le Chatelier the opportunity to extend his influence over engineers and patrons in the French iron and steel industries. Cooperation from the Comité des forges was important in establishing the Revue de métallurgie. The journal was also well supported by the Société d'encouragement pour l'industrie nationale. In fact, the five original members of the editorial board included three active officers in the Comité des forges and the Société de l'encouragement pour l'industrie nationale. Louis Baclé and Édouard Gruner later became presidents of the Société d'encouragement pour l'industrie nationale and the Société des ingénieurs civils de France.

Le Chatelier effectively used the Revue de métallurgie to communicate to the reader what he believed was the proper relationship between industry and science. For example, in 1904 he included several editorial articles on the significance of scientific methods for French industry. In one issue, Le Chatelier wrote:

The principal goal that I have wished to accomplish in creating this Revue was to contribute to the diffusion of scientific methods in our factories. I believe that this is a matter of vital importance for the development of our national industry. I do not intend to deviate from this position which is the only reason for spending the time and energy which I have devoted to this publication.⁸¹

Le Chatelier shared with many bourgeois conservatives an elitist and antidemocratic political philosophy and a belief in the possibility of restoring a preindustrial social cohesiveness. Le Chatelier, however, departed from most of his conservative comrades in that he proposed implementation of radical reforms in factory organization which he believed was the key to developing and preserving a competent, intellectual ruling class capable of leading the masses. Le Chatelier also proposed reforms in the educational system as the cornerstone to build the new ruling class:

Schools have been a potent factor in the development of an intellectual elite, the class responsible for the progress of civilization in any country The formation of an intellectually superior class should be the dominant preoccupation of any country that expects to cut a figure in the world.⁸²

To Le Chatelier, the quality of education and family background was what distinguished the social classes. Although men were created equal at birth, the education of the bourgeoisie prepared them for their positions of leadership in industry, education and government.

Good common sense is often a gift of nature, but the more delicate sense of subtle discrimination is principally a result of education. It is very rarely observed among the children of the lower classes; it is a product of classical education, and, above all, it springs from that which is taught in the home. The English declare that thirty-six years of education are necessary to make a gentleman, twelve for the grandfather, twelve for the father and twelve for the son.⁸³

In 1904, when he first learned of Frederick Winslow Taylor's work on scientific management, Le Chatelier was fifty-four years of age. He was by then regarded to be among the most prominent scientists and professors in France, but Le Chatelier was eager now to focus on the general reforms which he felt were

necessary to French industry. In choosing to use his academic standing and personal influence in support of scientific management, Le Chatelier made a major contribution to the international scientific management movement over the next three decades.

Le Chatelier had originally been attracted to Taylor's extraordinary work on high-speed steel cutting which had captured the imagination of engineers and entrepreneurs in the iron and steel industry during the Paris Exposition of 1900. Le Chatelier immediately recognized the importance of this technological advance. He published an article in the 1904 first volume of the Revue de métallurgie concerning Taylor's remarkable work on steel-cutting tools.⁸⁴

Le Chatelier started to correspond with Taylor in 1906. A November letter to Taylor complemented him on his fine research in "On the Art of Cutting Metals." Le Chatelier was impressed by the caliber of Taylor's scientific research that led to the discovery of the high-speed steel-cutting process. He wrote to Taylor that "the scientific method with which these studies were conducted has interested me immensely,"⁸⁵ and that a translation of "On the Art of Cutting Metals" would be published in the Revue de métallurgie.

Taylor responded enthusiastically to Le Chatelier's letter. Taylor's letter generally referred to his system of management which Le Chatelier was invited to observe if he would visit the United States:

and I would esteem it a great honor to show you our system of management in operation in some of our larger establishments. It was part of this system of management that our experiments in the "Art of Cutting Metals" were originally undertaken, and they were prosecuted to their end for the purpose of supplying the information necessary to successfully manage a machine shop by our method.⁸⁶

Le Chatelier did not pursue, at the time, the subject further and did not indicate an interest in visiting the United States. Indeed, Le Chatelier never visited the

United States even though he was impressed deeply by American methods and frequently encouraged and assisted others to make the pilgrimage.

Le Chatelier frequently included articles in the Revue de métallurgie about industrial methods in other countries. French industrialists or engineers who visited German, English or American factories often published their findings on their return in the Revue. One French observer, for example, wrote in 1906 that he believed American industrial methods could be implemented in French factories. The article typified several impressions of the American factory system believed to be true by the French. Compared to French factories, American plants were unusual in the careful planning of the interior organization and in the cooperation of the American workers in factory production. Implicit in the account was a stereotype which contrasted the industrious American with the temperamental French workers:

The individual productivity of the American worker has a character of greater intensity than that of the European worker; the American laborer is, in general, more robust and sober. He is incomparably better paid, and enjoys a comfort, domestic tranquility and social situation superior to our laborers. He employs more initiative in the factories and derives greater production from his machines and tools.⁸⁷

Although the article makes no mention of the Taylor system, it concludes that the basis of the American factory system is "the ingenious and practical employment of machinery operated with precision by a cooperative and intelligent labor force which produces to its maximum and receives good wages based on individual production."⁸⁸

Le Chatelier published in the January 1907 edition of the Revue de métallurgie a translation of Taylor's "On the Art of Cutting Metals" which presented in broad terms the philosophical and social bases for his system of

management. Taylor originally delivered this piece as his presidential address to the American Society of Mechanical Engineers at its December 1906 meeting. The title obscured the important contents of the address which briefly outlined the basic principles of his system of scientific management. He explained that the fundamental basis of the system was to assign each worker his daily work with times in which to accomplish the appointed tasks and to compensate workers who exceed their quotas with wages considerably higher than those who do not.⁸⁹ Taylor argued that workers produced less than fifty percent of their potential and that greater productivity required the hiring of additional administrative staff to handle responsibilities which the foreman was not capable of fulfilling. The hiring of additional administrative staff would provide employers with the means to assure increased productivity and thus reduce labor in costs in production.

Taylor's proposal called for a system in which responsibility and decisions would be centralized in the plant's administrative functions. He believed contemporary production practices permitted the workers and foremen to make too many decisions regarding production. Taylor's reforms, he frankly admitted, were so radical and revolutionary that they would require a complete revolution in the mentality of both the administration and labor.⁹⁰ Taylor emphasized the major social and economic effects of his economic reforms on social organization:

To conclude, I should like to say that we are presently at the beginning of the new era of a true collaboration. The time has virtually passed when the efforts of one individual, without the assistance of those around him, are sufficient; and the period is approaching when all great works will be the result of the collaboration of large numbers of men, each accomplishing his task for which he is best suited, each conserving his individuality and superiority in his unique function while not losing at the same time any of his originality and initiative. Each, however, will submit to the direction of other men and work in perfect harmony with them.⁹¹

If Taylor's conclusion appears now somewhat utopian in its prediction of harmonious labor relations, "On the Art of Cutting Metals" nonetheless appealed to numbers of readers because of its organizational implications. Le Chatelier wrote Taylor in February 1907:

Your latest article is raising a great deal of interest, not because of its remarkable scientific method which escapes a large number of industrialists, but because coming after the success of the rapid cutting steel, they have confidence in your new findings . . . on the scientific methods of labor.⁹²

On the other hand, Le Chatelier admitted that many were reluctant to believe American methods were superior to those of the French. He explained that many engineers who had visited the United States denied that American methods were different from those being used in the most modern French factories. Others argued that American methods were not transferable to France due to the character of the French worker, who was not likely to accept the strict controls placed on American workers under the Taylor system or its demands to increase greatly their production.

Initial French responses to Taylorism were far from spectacular. Despite Henry Le Chatelier's encouraging letter to Taylor, there is, with the exception of Georges Ram's work at the Renault plant which will be discussed in the next chapter, no evidence that French firms introduced administrative reforms inspired by Taylor before 1908. However, Le Chatelier remained committed to Taylor and scientific management. In July 1907, Taylor's "Shop Management" was translated by Léon Descroix and published in the Revue de métallurgie. "Direction des ateliers" was the first extensive presentation of Taylor's system of management and of the philosophical context of his ideas.⁹³

"Direction des ateliers" opens with a critical assessment of contemporary managerial practices which points out the disadvantages resulting from a lack of uniformity and centralized control over production. Managerial activity, by custom, was severely limited in the daily operations of factories, where foremen and workers were allowed to operate independently of direct managerial supervision. The result, according to Taylor, was gross inefficiency in the production of goods and lost profits to the employers.⁹⁴

Not only did poor managerial procedures and organization affect factory profits, they also contributed to social conflicts between workers and employers. Taylor reduced his description of the class struggle to the conflict caused by workers demanding higher wages and employers seeking cheaper labor costs. But for Taylor, higher wages and cheaper labor costs did not necessarily conflict, since both goals could be achieved through the establishment of an efficient organization of production.

To this point, Taylor's arguments offered little that was new or startling. Engineers and employers had experimented for several decades with techniques to increase productivity, primarily by employing incentive programs for workers. Indeed, the piece-rate system, which has often been confused with Taylorism, was used widely in Europe and the United States in the nineteenth century. The piece-rate system, according to Taylor, failed to offer substantial improvements over the traditional daily or hourly-wage systems due to management's failure to establish an objective basis for piece rates and the opposition that piece rates fomented among factory workers. Moreover, workers opposed other piece-rate systems because management consistently reduced piece rates so that workers were unable to increase their wages. Piece-rate schemes in America and Europe frequently failed in their mission to improve factory productivity

because foremen often manipulated the rates against their workers and management failed to compensate workers for production failures which were the fault of management. Workers often identified piece rates with speedups. According to one recent history of factory production and management ideology:

Workers, knowing that under the speed-up they could not expect to take home a living wage for anything less than superhuman effort, did in fact arrange to limit their productivity. By combining informally without the knowledge of management, they set production rates judged suitable for a "fair" wage, and threatened potential rate breakers with severe sanctions.⁹⁵

In "Direction des ateliers," Taylor discussed at length how workers reduced their output by soldiering, or slowdowns, to control production schedules and to prevent speedups under the piece-rate system. "In the first place," wrote Taylor, "there is a natural instinct and tendency of workers to take their time which one can call natural soldiering; in the second place, there are beliefs and reasons more or less obscure derived from their relationships with other workers which one can call systematic soldiering."⁹⁶ Indeed, Taylor believed that the production pace and work rhythms of late nineteenth-century factories were dictated by labor rather than management. Thus the elimination of the soldiering process was a major theme in Taylor's management system. According to Taylor, workers normally would pace their production by the slowest in the group, but the most pernicious form of worker slowdown was a form of "systematic soldiering" which he reported to be "almost universal in all ordinary systems of organization." The purpose of "systematic soldiering" was to hide deliberately from employers the potential speed with which workers could perform their tasks.⁹⁷

Taylor contended that "systematic soldiering" was endemic to the piece-rate system. Workers did not trust their employers, and they feared that speeding up production would only result in the reduction of the piece rate. Since

employers were unable to determine accurately production standards, workers vigilantly defended themselves against management attempts to control individual production through implementing the piece-rate system. Taylor concluded that the piece-rate system resulted in the deterioration of factory labor relations.

Scientific management, ironically, has often been linked with the piece-rate system, since its wage system was based on individual production. Nonetheless, Taylor carefully separated his system from piece-rate systems with respect to production standards. Taylor argued that all previous managerial systems ultimately failed to provide meaningful standards of time required for the accomplishment of a given unit of production. It was fundamental to Taylor's system that management provide standardized determinations by systematic and scientific examination of the precise time required to perform given tasks and "to know exactly what quantity of a given task can be done each day by a worker."⁹⁷ Under this system, Taylor confidently claimed that the properly managed and placed worker would increase his output as much as four hundred percent and that management would be able to determine accurately a fair day's wages.⁹⁸

The scientific management system described in "Direction des ateliers" outlined a radically different and more active administrative function which would transfer authority and responsibility to the planning department required by Taylor's system. Taylor sharply criticized the organizational structure of most factories for relying too heavily on the plant manager. Nineteenth-century factories were deficient because they were organized according to the military model in which responsibility theoretically resided at the plant-manager level. As discussed earlier, however, the military model still enabled many decisions to be made at the foreman and worker levels. To Taylor, the growth of large, modern factories was rendering the military model unwieldy, obsolescent and unprofitable. The

military model, Taylor believed, placed an inordinate weight on "universal men" who he described as well educated, intelligent, physically and technically gifted, tactful, energetic, firm, honest and wise. Too few men possessed such marvelous traits, and the complexity of industrial society demanded organizational reforms based on human psychological realities.

While Taylor was not alone in attempting to reform factory organization at the end of the nineteenth century, his "work was more comprehensive and complex than that of most systemizers and writers on industrial betterment."⁹⁹

According to Samuel Haber:

The Taylor System placed restrictions upon the entrepreneur and the manager in the factory as well as the worker. Taylor attacked the cult of personality in management. Methods were primary, not particular men. The discovery of a science of work meant a transfer of skill from the worker to management and with it some transfer of power. Yet this power was fixed not directly at the top but in the new center at the factory, the planning department The planning department was to be the repository of the science of production and therefore to possess a new kind of authority which stemmed from the unveiling of scientific law rather than the expression of arbitrary will

The "military system" of factory organization, with ranks built of the successive levels of worker, foreman, assistant manager, and a chain of command which allowed for much undirected choice at all levels, was no longer adequate.¹⁰⁰

Indeed the planning department acted as the central nervous system of the Taylorized organization. "To the greatest possible extent, workers and foremen should be relieved completely of organizational work as well as all written work. All intellectual labor must be excluded from the workshop and centralized in the planning department."¹⁰¹ The foreman's administrative functions would be distributed, thereby, to a cadre of specialists responsible for carrying out the administrative duties of the factory. Selected according to their individual

administrative skills, specialized positions would be created with the responsibility of assigning work, establishing production schedules, overseeing quality control and maintaining the tools and equipment.

The issue of Taylor's social philosophy has been debated in Europe and the United States since the system's initial introduction. Taylor's leftist critics have accused him of misrepresenting himself as sympathetic to the worker. Indeed, as noted earlier about Taylor's personnel management, there was little in "Direction des ateliers" to support the view that Taylor was well disposed to the worker.

To the left, Taylor's social philosophy deceived the reader into believing that the best interests of the working class would be served by its cooperation with management. It was predictable that Taylor's critics in France linked the elitist philosophy of Le Chatelier to Taylor and scientific management. Taylor believed that the interests of employers and workers could be united in a society organized according to the principles of scientific management. First, however, he believed a complete mental revolution among employers and workers was necessary so that they henceforth would see each other as allies in a corporate society. Class cooperation would be achieved by the workers accepting the direction of management in return for better wages and by management upgrading its competency in order to take a more active role in internal factory operations while receiving greater profits through reduced labor costs.

What specifically, then, did Taylor promise workers in return for their cooperation and their vastly increased productivity? Taylor argued in "Direction des ateliers" that under his system wages would increase from thirty to one hundred percent while workers' production would increase as much as four hundred

percent. He justified his belief that management deserved a disproportionate share of the profits expected from the implementation of his system on the basis that 1) management would be required to take a more active role in increasing production and 2) that wages much larger than he envisioned would have a deleterious moral effect upon workers. In contrast to his generally scientific approach to industrial production, Taylor's justification for limiting workers' salary increases was paternalistic rather than scientific. For most workers, Taylor believed much more than a living wage invited moral disaster. Workers would be tempted to spend their wages on drink and other immoral activities, which would eventually reduce their production on the job. In contrast to his work on labor productivity which Taylor contended was based on the rigorous standards of the scientific method, he did not indicate that this conclusion had been reached scientifically--a fact that was exploited later by French syndicalist opponents during the Renault strikes against Taylorism.

In 1907, Taylor took a more aggressive role in his efforts to influence French factory administration. Converts to Taylorism had to be made in French factories. In January 1907, Taylor encouraged Le Chatelier to convince French engineers to come to the United States for scientific management training. By that time, Taylor had retired from industrial management to devote all his energies to the training of disciples and to preaching the gospel of scientific management. Thus, Taylor wrote Le Chatelier that:

it would be my particular pleasure to instruct and help any French engineer who intends thoroughly learning the whole art. To completely learn, however, how to introduce our system of management, would take a man from two to three years in this country.¹⁰²

Le Chatelier approved of Taylor's proposal. In a February 1907 letter to Taylor, Le Chatelier discussed sending his own son, an engineer who worked at a steel factory managed by Le Chatelier's brother. Le Chatelier explained that his son would be an ideal candidate for training in scientific management since he was acquainted already with Taylor's ideas (he had implemented Taylor's high-speed steel-cutting methods at the Cail factory where he was employed), was proficient in English and had visited the United States twice before. In contrast to Taylor's proposal, Le Chatelier suggested that his son would need to remain in the United States only one to two months to become thoroughly proficient in Taylor's methodology.¹⁰³

Le Chatelier's plans to send his son to the United States ultimately failed because he was promoted to a position that prevented him from leaving his job, but the correspondence between Taylor and Le Chatelier on that issue illustrates several of the obstacles to the early implementation of Taylorism in France. Aimée Moutet also suggests that the letters reveal several of the problems in both Taylor's methods and in the attitudes of the French patronat which would continue to retard the growth of scientific management in France.

When Le Chatelier wrote that his son would remain in the United States only one to two months, Taylor's reply was very reserved. While he did not reject Le Chatelier's plans, Taylor warned that such a short apprenticeship would reduce the likelihood that Le Chatelier's son could implement successfully scientific management in a French factory. Taylor explained:

It is . . . only right that I should tell you that, while your son could in one or two months become thoroughly familiar with the details of our system and study in many ways its applications; still it is highly improbable that, in so short a time he would be able to learn how to successfully introduce our system into one of your works in France. My opinion is that, in order to introduce the system without

dangers of strikes, it will require the engineer to actually work under the system for a considerable length of time, or, better still, to have actual experience in working under some of my former assistants, say Mr. Gantt, Mr. Barth, or Mr. Hathaway, in actually introducing the system into a new shop where it is not already running.¹⁰⁴

Taylor's requirement that French engineers remain in the United States for several years went much further than the stated purpose of preventing strikes during the implementation of the system. As Moutet writes, for Taylor:

it was a question largely of realizing in France what he had already accomplished in the United States. That is, he wished to form a team of consultant engineers, trained by his disciples, and under his control.¹⁰⁵

The issue was not a minor one in the scientific management movement—particularly since it became common for orthodox Taylorites to deny the work and methods of other efficiency experts such as Harrington Emerson who were less thorough and more flexible in their approach to management reform. Taylor and his disciples, in agreeing to undertake the reform of a business concern, insisted that the consulting engineers assigned to the project be given absolute authority and a free hand over the existing staff. The consulting engineers, often picked by Taylor, had to be thoroughly trained in Taylor's methods. In contrast to Harrington Emerson and the many other efficiency experts who attempted to take advantage of the efficiency craze sparked by Taylor's work, the Taylorites insisted on using outside consulting engineers rather than training existing personnel, who Taylor believed would be hostile initially to his system. If few American factory owners were likely to delegate their authority so completely to outside engineers, the possibility of a French patron agreeing to hand over his power was even less likely.

If the above were not enough reason to inhibit the introduction of Taylorism, then the resistance of the French patronat would present an additional

obstacle to engineers interested in applying the system in French factories. In contrast to Le Chatelier's early encouraging letters after publishing "On the Art of Cutting Metals," he wrote Taylor in May 1907 that French engineers were unlikely to invest time and money on a long training program when the patronat was not enthusiastic about applying Taylorism in their factories. According to Le Chatelier, his son:

made this decision, only partially not to lose the position which was offered him, but above all because he believes that French factories are only slightly interested in your system of labor organization and that he would not find, on returning to France, the occasion to apply what he would have learned with you.¹⁰⁶

With no demand for Taylorist reforms from French employers, French engineers were unable to expect financial and professional rewards from the training program outlined by Taylor. The lack of interest or understanding in Taylorism by management, as will be learned in the next chapter, was a major obstacle in the early history of French Taylorism.¹⁰⁷

NOTES

¹For stylistic purposes and because Taylor did not have any serious rivals in the scientific management during the period 1904 through 1920, we will use Taylorism, Taylor's system and scientific management interchangeably. By calling Taylor's system "scientific management," we do not mean that the system of management established by Taylor and his disciples were founded on well-tested laws.

²Richard F. Kuisel, "Technocrats and Public Economic Policy: From the Third to the Fourth Republic," Journal of European Economic History 2 (1973), p. 59.

³Aimée Moutet, "Les Origines du système de Taylor en France. Le point de vue patronal (1907-1914)," Le Mouvement social, no. 93 (October-November, 1975), pp. 15-6.

⁴See Michelle Perrot, "The Three Ages of Industrial Discipline in Nineteenth-Century France," in Consciousness and Class Experience in Nineteenth-Century Europe, John M. Merriman (ed.) (New York: Holmes & Meier, 1979), pp. 149-68, for the best short treatment of the struggle between French employers and their workers to determine the limits of worker freedom in the factories.

⁵David S. Landes, "French Business and the Businessman: A Social and Cultural Analysis," in Modern France: Problems of the Third and Fourth Republics, Edward M. Earle (ed.) (Princeton: Princeton University Press, 1951), p. 338.

⁶François Crouzet, "French Economic Growth in the Nineteenth Century Reconsidered," History 59 (June 1974), p. 172.

⁷Maurice Lévy-Leboyer, "Innovation and Business Strategies in Nineteenth- and Twentieth-Century France," in Enterprise and Entrepreneurs in Nineteenth- and Twentieth Century France, Edward C. Carter et al. (eds.) (Baltimore: Johns Hopkins Press, 1976), p. 91.

⁸*Ibid.*, pp. 87-131.

⁹For a fine study of France's premier role in the world automobile industry, see James M. Laux, In First Gear: The French Automobile Industry to 1914 (Liverpool: Liverpool University Press, 1976). Laux, in fact, argues that French entrepreneurs displayed a capacity for innovation unmatched by their competitors before the First World War.

¹⁰Crouzet, p. 171.

¹¹*Ibid.*, pp. 169-70.

¹²Lévy-Leboyer, pp. 129-31.

¹³Peter N. Stearns, Paths to Authority: The Middle Class and the Industrial Labor Force in France, 1820-1848 (Urbana: University of Illinois Press, 1978), p. 29.

¹⁴*Ibid.*, p. 87.

¹⁵Perrot, p. 150.

¹⁶Henry Steele, The Working Classes in France. A Social Study (London: Twentieth Century Press, 1904), pp. 16-7.

¹⁷Michael P. Hanagan, The Logic of Solidarity: Artisans and Industrial Workers in Three French Towns, 1871-1914 (Urbana: University of Illinois Press, 1980), p. 3.

¹⁸*Ibid.*, p. 4.

¹⁹John M. Merriman, "Introduction," in Consciousness and Class Experience in Nineteenth-Century Europe, p. 5.

²⁰Workers could resist and often delay the harshest effects of technological reform, but organizational reform struck decisively at the very foundations of the handicraft system of job autonomy and the control over training of new workers. For more on this subject, see Ronald Aminzade, "The Transformation of Social Solidarities in Nineteenth-Century Toulouse," in Consciousness and Class Experience in Nineteenth-Century Europe, pp. 85-105.

²¹*Ibid.*, p. 102.

²²Stearns, p. 101.

²³*Ibid.*, pp. 87-8.

²⁴*Ibid.*, p. 179.

²⁵Bernard H. Moss, The Origins of the French Labor Movement, 1880-1914: The Socialism of Skilled Workers (Berkeley: University of California Press, 1976), p. 159. There was, however, no uniformity in the proletarianization process. Machine-builders seemed to have been affected heavily by mechanization and rationalization compared to most other crafts.

²⁶Stearns, "The European Labor Movement and the Working Classes, 1890-1914," in Workers & Protest: The European Labor Movement, the Working Classes and the Origins of Social Democracy, 1890-1914, Harvey Mitchell and Stearns (eds.) (Ithaca: F.E. Peacock Publishers, 1971), p. 141.

²⁷Stearns, Lives of Labor: Work in a Maturing Industrial Society (New York: Holmes & Meier, 1975), p. 5.

²⁸*Ibid.*, p. 193.

²⁹Séances du congrès ouvrier de France, session de 1876, quoted in Moss, p. 66.

³⁰For an excellent analysis of the ideological and organizational conflicts within the French socialist movement and their effects on the French syndicalist movement, see Moss, pp. 103-60.

³¹Moss, pp. 136-40.

³²*Ibid.*, p. 141.

³³*Ibid.*, p. 143.

³⁴Georges Lefranc, Le Mouvement syndical sous la Troisième République (Paris: Payot, 1967), p. 105.

³⁵Stearns, Revolutionary Syndicalism and French Labor: A Cause without Rebels (New Brunswick: Rutgers University Press, 1971), p. 7.

³⁶*Ibid.*, p. 104.

³⁷A. Fryar Calhoun, "The Politics of Internal Order: French Government and Revolutionary Labor, 1898-1914," 2 vols. (Ph.D. dissertation: Princeton University, 1973), 1: 9-10.

³⁸Susanna Barrows, Distorting Mirrors; Visions of the Crowd in Late Nineteenth-Century France (New Haven: Yale University Press, 1981), pp. 22-32.

³⁹Georges Lefranc includes in his analysis of the syndicalist movement an excellent and brief chapter on revolutionary syndicalism, pp. 85-108.

⁴⁰Victor Griffuelhes was the secretary-general of the CGT from 1902 through 1909; Émile Pouget was recognized as the earliest advocate of the general strike and, as a journalist, edited the Almanach du Père Peinard and later the Voix du peuple which were major vehicles for the spread of revolutionary syndicalist ideas; Georges Yvetot followed Fernand Pelloutier as leader of the Fédération nationale des bourses du travail; Paul Delesalle was an anarchist who was both a secretary of the Fédération nationale des bourses du travail and the CGT.

⁴¹Michael S. De Lucia, "The Remaking of French Syndicalism, 1911-1918: The Growth of the Reformist Philosophy" (Ph.D. dissertation: Brown University, 1972), p. 56.

⁴²Gordon Wright, France in Modern Times: From the Enlightenment to the Present, 2nd ed. (Chicago: Rand McNally, 1974), p. 284.

⁴³Georges Bonnefous, Histoire politique de la Troisième République, vol. I: L'Avant guerre, 1906-1914 (Paris: Presses universitaires de France, 1956), pp. 106-8.

⁴⁴Stearns, Revolutionary Syndicalism and French Labor, p. 7.

⁴⁵Edward Shorter and Charles Tilly, Strikes in France, 1830-1968 (Cambridge: Harvard University Press, 1974), p. 34.

⁴⁶Local employers would often cooperate against strikers, and formal employer associations were formed to defend their interests against the working classes. De Lucia, for example, argues that Alphonse Merrheim's organizational efforts on behalf of the metal workers were in response to the effective work of Robert Pinot and the Comité des forges to restrict the strike activities of their workers. See De Lucia, pp. 80-1.

⁴⁷In 1905, there were 849 strikes affecting 175,900 workers; the strikes increased to 1,354 in 1906 impacting 437,800 workers. In fact, the number of strikes remained at or above 1,000 per year for the remainder of the prewar years according to Shorter and Tilly, pp. 361-2. The actual number of strikers during May 1906 was estimated by the government at 158,000. More than fifty percent were believed to be in Paris. The 1906 strike wave, however, actually began after the March 10, 1906, mine disaster at Courrières near Lens. Miners went on strike during March and April to protest the Courrières disaster throughout the Nord. For more on the 1906 general strike, see Shorter and Tilly, pp. 118-22 and Lefranc, pp. 125-46.

⁴⁸François Goguel-Nyegaard, La Politique des parties sous la IIIe République, 4th ed. (Paris: Editions du Seuil, 1958), pp. 181-2.

⁴⁹Lefranc, p. 146.

⁵⁰Shorter and Tilly, p. 170.

⁵¹Barrows, p. 5.

⁵²Theodore Zeldin, France, 1848-1945, vol. 1: Intellect, Taste and Anxiety (Oxford: Oxford University Press, 1977), p. 822.

⁵³For more on the subject of French national decline see Koenraad Swart, The Sense of Decadence in Nineteenth-Century France (The Hague: Nijhoff, 1964); A.E. Carter, The Idea of Decadence in French Literature, 1830-1900 (Toronto: University of Toronto Press, 1958); and Robert A. Nye, "Degeneration and the Medical Model of Cultural Crisis in the French Belle Époque," in Political Symbolism in Modern Europe: Essays in Honor of George L. Mosse, Seymour Drescher et al. (eds.) (New Brunswick: Transaction Books, 1982).

⁵⁴Harry W. Paul, The Sorcerer's Apprentice; The French Scientists's Image of German Science, 1840-1919 (Gainesville: University of Florida Press, 1972), p. 1.

⁵⁵Barrows, p. 82.

⁵⁶Ibid.

⁵⁷Ibid., p. 77.

⁵⁸Georges Dupeux, French Society, 1789-1970, trans. by Peter Wait (London: Methuen, 1976), pp. 170-5.

⁵⁹David Thomson, Democracy in France Since 1870, 5th ed. (London: Oxford University Press, 1969), pp. 170-1.

⁶⁰I have used for general biographical information on Taylor, Daniel Nelson, Frederick W. Taylor and the Rise of Scientific Management (Madison: University of Wisconsin Press, 1980). Frank Barkley Copley's Frederick Winslow Taylor, The Father of Scientific Management, 2 vols. (New York: Harper & Brothers, 1923), is a more flattering and less objective treatment of Taylor by the official biographer.

⁶¹Nelson, p. 23.

⁶²*Ibid.*, p. 24. Sudhir Kakar's Frederick Taylor: A Study in Personality and Innovation (Cambridge: MIT Press, 1970), makes Taylor's psychological difficulties a major factor in the development of scientific management.

⁶³Nelson, p. 37.

⁶⁴*Ibid.*, p. 44.

⁶⁵*Ibid.*, p. 45.

⁶⁶*Ibid.*, p. 40.

⁶⁷Reinhard Bendix, Work and Authority in Industry: Ideologies of Management in the Course of Industrialization (New York: Wiley, 1956), pp. 211-2.

⁶⁸For studies which highlight the role that Taylorism played in the professionalization of industrial or mechanical engineering in the United States, see Daniel Nelson, Managers and Workers: Origins of the New Factory System in the United States, 1880-1920 (Madison: University of Wisconsin Press, 1975); Edwin T. Layton, Jr., The Revolt of the Engineers: Social Responsibility and the American Engineering Profession (Cleveland: Press of Case Western University, 1971); Robert H. Wiebe, The Search for Order, 1877-1920 (New York: Hill & Wang, 1967); Samuel Haber, Efficiency and Uplift: Scientific Management in the Progressive Era, 1890-1920 (Chicago: The University of Chicago Press, 1964); David F. Noble, America by Design: Science, Technology, and the Rise of Corporate Capitalism (New York: Alfred A. Knopf, 1977). The role of engineers in France has been discussed by Charles S. Maier, "Between Taylorism and Democracy; European Ideologies and the Vision of Industrial Productivity in the 1920s," Journal of Contemporary History 5, no. 2 (1970), pp. 27-61 and Aimée Moutet, "Les Origines du système de Taylor en France. Le point de vue patronal (1907-1914)," Le Mouvement social, no. 93 (October-December, 1975), pp. 15-49.

⁶⁹Nelson, Managers and Workers, p. 4.

⁷⁰*Ibid.*, p. 50.

⁷¹Moutet, pp. 45-6.

⁷²The biographical information on Henry Le Chatelier is taken from François Le Chatelier, Henry Le Chatelier, un grand savant d'hier, un précurseur, sa vie, son œuvre, son temps (Paris: Revue de métallurgie, 1968).

⁷³Henry Le Chatelier, Le Système Taylor; science expérimentale et psychologie ouvrière (Paris: Imprimerie Paul Dupont, 1914), p. 7.

⁷⁴François Le Chatelier, p. 40.

⁷⁵*Ibid.*, p. 51.

⁷⁶For an excellent study on bourgeois fears of revolution and French crowds, see Susanna Barrows, Distorting Mirrors; Visions of the Crowd in Late-Nineteenth Century France.

⁷⁷François Le Chatelier, p. 359. According to François Le Chatelier, his father was denied a position at the École polytechnique due to his obvious displeasure with the politicians of the Third Republic.

⁷⁸*Ibid.*, p. 53.

⁷⁹*Ibid.*, p. 148.

⁸⁰See Harry W. Paul, "Apollo Courts the Vulcans: The Applied Science Institutes in Nineteenth-Century French Science Faculties," in The Organization of Science and Technology in France, 1808-1914, Robert Fox and George Weisz (eds.) (Cambridge: Cambridge University Press, 1980), p. 175; and The Sorcerer's Apprentice, pp. 24-6. For more on engineering criticism of the education provided by the grandes écoles, see Terry Shinn, L'École polytechnique, 1794-1914 (Paris: Presses de la Fondation nationale des sciences politiques, 1980), pp. 101-39.

⁸¹François Le Chatelier, p. 236.

⁸²*Ibid.*, p. 238.

⁸³Henry Le Chatelier, "Formation of an Elite," trans. by Ralph E. Oesper, Scientific Monthly 27 (September 1928), p. 212.

⁸⁴Henry Le Chatelier, "Les Aciers rapides à outils," Revue de métallurgie 1 (1904), pp. 334-47.

⁸⁵Le Chatelier to Frederick W. Taylor, November 16, 1906, Taylor Archives, Stevens Institute of Technology, Hoboken, New Jersey. Hereafter cited as Taylor Papers.

⁸⁶Taylor to Le Chatelier, November 30, 1906, Taylor Papers.

⁸⁷F. Corvée, "Notes de voyages aux États-Unis: contribution à l'étude des appareils métallurgiques américains," Revue de métallurgie 2 (1906), p. 639.

⁸⁸*Ibid.*

⁸⁹Frederick W. Taylor, "La Taille des métaux," trans. L. Descroix, Revue de métallurgie 4 (January 1907).

⁹⁰*Ibid.*, p. 39.

⁹¹*Ibid.*, p. 64.

⁹²Le Chatelier to Taylor, February 2, 1907, Taylor Papers.

⁹³Taylor, "Direction des ateliers," trans. by L. Descroix, Revue de métallurgie 4 (July 1907), pp. 636-7.

⁹⁴*Ibid.*, pp. 638-9.

⁹⁵Judith A. Merkle, Management and Ideology: The Legacy of the International Scientific Management Movement (Berkeley: University of California Press, 1980), p. 26.

⁹⁶Taylor, "Direction des ateliers," p. 643.

⁹⁷*Ibid.*, p. 644.

⁹⁸*Ibid.*, p. 649.

⁹⁹Haber, pp. 21-2.

¹⁰⁰*Ibid.*, pp. 24-5.

¹⁰¹Taylor, "Direction des ateliers," p. 677.

¹⁰²Taylor to Le Chatelier, January 18, 1907, Taylor Papers.

¹⁰³Le Chatelier to Taylor, February 2, 1907, Taylor Papers.

¹⁰⁴Taylor to Le Chatelier, February 18, 1907, Taylor Papers.

¹⁰⁵Moutet, p. 21.

¹⁰⁶Le Chatelier to Taylor, May 5, 1907, Taylor Papers.

¹⁰⁷Aimée Moutet hints that a major obstacle in the initial spread of Taylorism was the defective professional preparation of French civil engineers. According to Moutet, the educational training of the French engineer, in contrast to American engineers, was too theoretical. In fact, French engineers were at the time debating whether or not to reform the engineering curricula at the grandes écoles and the écoles pratique et professionnelles to provide greater emphasis on the technical demands of modern industry. However, the problem was relevant most for graduates of the École polytechnique and the École des mines who were expected to follow careers in the state or the military. The problem was not nearly so serious for engineers from the Écoles des arts et métiers who did seek employment or ownership in the factory system.

CHAPTER III
THE DIFFUSION OF SCIENTIFIC MANAGEMENT
IN FRANCE, 1908-1914

Currently, the number of believers in the new doctrines are very few However, this situation will change over time, because those factories operating under the rules of Scientific Management will have a devastating competitive edge over their rival by selling their products at lower prices due to their lower production costs while at the same time attracting to their factories the best workers due to the higher salaries offered by their factories. Another force which will aid the triumph of Taylor's ideas is that Scientific Management has become, in the eyes of its supporters, a true religion, and, as we know, faith will move mountains. [Henry Le Chatelier, Le Système Taylor; science expérimentale et psychologie ouvrière (Paris: Imprimerie Paul Dupont, 1914), pp. 39-40.]

Before 1908, efforts to educate the French public about Taylor's system of scientific management had been limited to the translation of his "The Art of Cutting Metal" and "Shop Management" in the Revue de métallurgie. With the limited number of readers of such a technical journal, it is safe to conclude that Le Chatelier's efforts to spread Taylor's work in France had not had a significant impact to that point. There had not been, in fact, any French attempts to interpret, adapt or refute Taylorism based on the system's practical application in France. In short, the philosophical and social principles of Taylorism as well as its potential technical applications were still virtually unknown to the French general public.

However, by the First World War, Taylorism had become a topic of public debate. French and European interest in scientific management, in fact, paralleled events in the United States. Europeans were not able to overlook the popular interest in America that scientific management sparked following the Eastern Rate Case of 1910-11, during which Louis Brandeis declared that the implementation of scientific management in American railroads would save one million dollars per day. Taylor profited from the public discussion of this case by publishing The Principles of Scientific Management which was subsequently translated into numerous foreign languages including French in 1912, and generated international interest in Taylorism.

Nonetheless, one cannot explain French developments in scientific management before the First World War as a simple imitation of American industry. Edwin T. Layton has concluded recently that "Taylor's Scientific Management was not transferred to France or any other country as a unit."¹ While there is no question that the French borrowed extensively from the American experience, the history of French Taylorism was different due to the unique characteristics of the working class and of businessmen in France and the particular national concerns about the French economy and society in which scientific management was introduced.

The major purposes of this chapter will be to analyze and evaluate the reasons why Taylorist development in France continued to lag behind the United States and to assess the nature of the debate regarding the integration of Taylorism in France. It appears that the manner in which Taylorism was applied by French automakers precipitated strikes against scientific management in the automobile industry and led to a debate between the right and the left that, at least temporarily, polarized the opinions of employers and labor on Taylorism. As

a consequence, the patronat ended its limited experimentation with scientific management until the requirements of the First World War and postwar reconstruction forced French policymakers to examine once again a potential role for scientific management in French industry. Only at that time, did the goals and techniques of scientific management figure prominently in French discussions on the reform of economic and social institutions.

On the whole, the period 1907 through 1909 was rather uneventful in the history of scientific management in France.² With the exception of Georges de Ram's work at Renault, scientific management made little progress in France during this period. Not surprisingly, the correspondence between Taylor and Le Chatelier during that time was infrequent and contained little of interest regarding Taylorism.

Ram's application of Taylor's techniques was on a small scale. In a letter to Taylor on September 17, 1908, Ram indicated that he had applied certain aspects of scientific management in his shop at Renault—most notably the standardization of tools. Ram had learned of Taylorism through his reading of Taylor's articles on cutting metals and factory management which were published in French by the Revue de métallurgie.³ Taylor's reply was very warm and he asked Ram to visit the United States in order to learn more about scientific management. Taylor wrote:

It is to men like yourself that I have been in hopes a description of our system might be of interest. However, I have found it impossible to help people very much by merely the writing of the papers. A visit to one or two of the works in which our system is in operation gives far more information than any amount of reading of papers.⁴

Ram did not take advantage of Taylor's invitation at that time, but he subsequently wrote an article for the Revue de métallurgie regarding the application of scientific management at Renault that pleased Taylor. Ram was in charge of two Renault shops with a total of four hundred workers. He reduced Taylor's system to only four major points: 1) each worker must have his daily assignments carefully planned by the planning department; 2) the assignments must be written and include careful instructions on the manner by which the work was to be executed; 3) the tools utilized in the production process must be controlled and maintained by the planning department; and 4) the workers must be paid substantially higher salaries in accordance with the higher production quotas demanded. Ram's presentation of Taylor's system focused on the technical rather than the theoretical aspects of scientific management. The article's tone was factual and avoided the temptation to make dramatic promises of improved productivity and higher profits.

Even so, it was clear that Ram's production methods sharply contrasted with the traditional methods of skilled laborers which, as will be discussed in more detail, prevailed in the French automobile industry. Ram denied the workers in his shops the autonomy in and control over the production process previously noted as characteristic of nineteenth-century workshops. A summary of his experiences is worth highlighting, because he admitted that the workers initially opposed the changes in the production methods. During the first months of his implementation of Taylorism, a substantial number of workers left Renault in protest against the speedup of production. Their opposition to his new methods did not disturb Ram. To the contrary, he noted that his reforms successfully increased production in his shops one hundred percent after he applied the results of the motion and time studies he conducted and adjusted the pay system to allow bonuses for workers

who met their production quotas. Furthermore, he eliminated those workers whom he considered "average" and unsuited to meet the production schedules he hoped to attain.⁵

Taylor was impressed by what Ram had accomplished at Renault. On September 20, 1909, Taylor again urged Ram to arrange a visit to the United States to study further scientific management:

I am very sure that you would find it worth many times the cost of your trip and the time which you would lose in taking it, to see what has been, in this country, an evolution extending through some twenty-five years. You would see, in a short visit here, hundreds of matters, each one, perhaps in itself trifling, yet which combined make the introduction of our system of management vastly more simple and also more effective.⁶

Ram's response was telling in that it was reminiscent of Le Chatelier's explanation of why his son would not take advantage of Taylor's invitation to study scientific management in the United States. Ram admitted that his attempts to implement Taylor's system had been very limited but that there was no interest at Renault in sending him to America even for a short visit. "Unluckily," Ram noted, "I don't think I ever will attain here the results I am aiming at." He criticized the Renault administration for making him answer to a former worker "who has on the subject of shop management and piece work the ideas of some one hundred years ago." Ram's comments about Louis Renault were no less disparaging: "Mr. Renault, who is undoubtedly a very clever engineer, does not realize at all the needs of a workshop. He only sees one thing—the general expenses which must be kept down." Ram was so discouraged about his situation at Renault and the lack of understanding about his accomplishments that he believed his best course would be to search for another position that would provide him more flexibility and support for his efforts to implement scientific management.⁷

However, Taylor encouraged Ram to remain at Renault rather than change employers.

You have already gone far enough with your work there to have many friends among the workmen and to have broken down some of the prejudices which always accompany every new departure. I therefore believe that if you can only obtain more suitable conditions you will make more progress where you are than by changing.⁸

Ram, in fact, remained at Renault for several more years and eventually played a significant role, as will be examined later, in the implementation of scientific management at Renault.

By 1910 Taylorism had made considerable progress in overcoming public indifference in the United States and Europe following the dramatic statements about scientific management in the Eastern Rate Case and the publication of Taylor's The Principles of Scientific Management. Louis Brandeis's brilliant defense of eastern business associations in a railroad rate case before the United States Interstate Commerce Commission made Taylorism and efficiency among the most discussed topics in American reformist and business circles of the prewar period. Brandeis demonstrated by the testimony of engineers and businessmen who supported scientific management that no rate increase would be necessary for the railroads if they had used scientific management. In coining the term "scientific management" and promising that it would save the railroad industry a million dollars per day, Brandeis "lifted the Rate Case from inside the daily papers to the front page."⁹ One historian notes that Brandeis transformed the case into a morality play in which the evil railroad executives demanding a rate increase were opposed by the good and progressive management reformers protecting the consumer. It was thus that the terms "efficiency" and "scientific management" were

incorporated into the American progressive movement and became part of the popular craze for efficiency in government and business on the eve of the First World War.¹⁰

Taylor capitalized on the notoriety of scientific management that followed the Eastern Rate Case by writing The Principles of Scientific Management. Although it contained little new information on the application of scientific management to industry, The Principles of Scientific Management proved to be Taylor's most important publication. The Principles was prepared originally for publication by the American Society of Mechanical Engineers, but it rejected the manuscript in 1910 because its membership "was not interested in papers of this sort and that there was nothing new in it."¹¹ Taylor subsequently published The Principles of Scientific Management in the progressive The American Magazine; Harper and Brothers later published it in book form in 1911. It was such a popular success that a second edition was published the following year. The Principles was translated into Chinese, Dutch, French, German, Italian, Japanese, Russian, Swedish and Spanish before the First World War.

Taylor's purpose in writing The Principles of Scientific Management was to present a clear, concise and readable explanation of his system that would appeal to the professional businessman as well as the general reader.

The illustrations chosen are such as, it is believed, will especially appeal to engineers and to managers of industrial and manufacturing establishments, and also quite as much to all men who are working in these establishments. It is hoped, however, that it will be clear to other readers that the same principles can be applied with equal force to all social activities: to the management of our homes; the management of our farms; the management of the business of our tradesmen, large and small; of our churches, our philanthropic institutions, our universities, and our governmental departments.¹²

Unlike "Shop Management," which focused on the application of Taylorism to industry, Taylor now argued that his system was universal in its applications. His general management principles, although drawn from his experience in industry, were transferable to almost all human endeavors.

The Principles of Scientific Management was important to the history of scientific management, because, as Daniel Nelson explains, the work became both a reform tract and a progressive manifesto.¹³ Nelson argues that the publication of The Principles of Scientific Management and the subsequent connection between the scientific management reformers and the progressive movement was "the crucial ingredient in his Taylor's transformation, the link between his particularistic effort to deal with the challenges of late-nineteenth-century industry and the larger universalistic campaign against waste and inefficiency."¹⁴ Without the publication of The Principles of Scientific Management and his ultimate stature in the progressive movement, Taylor would have been remembered as merely one of several American engineers who made substantial technical contributions to management reform at the end of the nineteenth century. After The Principles of Scientific Management was published, Taylor's career took on an entirely new role as a progressive spokesman. As Nelson explains: "Without changing his interests, his promotional strategy, his management system, or even the illustrative stories he used in his papers and speeches, he became a spokesman for the redemptive possibilities of systematic organization and technical expertise in economic and political life."¹⁵

In The Principles of Scientific Management Taylor simplified and removed material from his earlier works on his management system that he felt might bore the general reader. More important was the emphasis he placed on the utility of his system as a universal cure for the "social problem." His solutions to

the social problem were quite simple. Scientific management would eliminate the "rule-of-thumb" methods in the workshops; management would insure more efficient factory operations based on the scientific method and more careful selection of workers; and the resulting improvements in productivity would remove the traditional class conflicts over the surplus by providing workers with higher wages and management with increased profits.¹⁶

The fault with this scheme was that Taylor promised more in the area of labor reform for his system than it could deliver. As argued earlier, Taylor's major concern was with increasing production and cutting costs, not meaningful labor reform. Indeed, Taylor's work has been judged "primitive" in regards to the selection and training of workers; scientific management did not take into account the pioneering work in personnel management reform. Daniel Nelson concludes on this point that Taylor and his disciples were not interested in personnel management reform.¹⁷

Nonetheless, if Taylor's inflated promises about labor reform resulted in substantial confusion in the Taylor movement, they also attracted progressive leaders to his work. Robert Wiebe emphasizes the significance that efficiency had in the progressive ideology. To the rank-and-file progressives, many of whom were doctors, lawyers and engineers, the "search for order" was critical in their decision to support the progressive movement. As Wiebe describes it, "the heart of progressivism was the ambition of the new middle class to fulfill its destiny through bureaucratic means."¹⁸ To the progressives, bureaucracy had positive connotations of merit and efficiency in accomplishing the tasks at hand. Therefore, a major plank of the progressive reform agenda was related closely to the message of scientific management: to "regulate society's movements to produce maximum returns for a minimum outlay of time and effort."¹⁹

Nonetheless, it is important not to confuse the progressive or scientific management reform with a thoroughgoing democratic program. In fact, Taylor was neither a progressive nor a democratic reformer. His disciples, with few exceptions, distrusted democracy in principle and held the elitist perspectives one might expect of a group of technical experts.²⁰ The progressive and Taylorist emphasis on the role of experts in the factory and society, in fact, limited the place that democracy had in their technocratic vision of a reconstructed society. Those progressives who did attempt to combine an enthusiasm for the efficient operations of economic and social institutions with a strong belief in the beneficial impact of direct democracy often found themselves in an intellectual quandary. Many progressives agreed with the conclusion of Professor William F. Willoughby who concluded that "the government best administered is best."²¹ Samuel Haber explains that:

those who were most eager to hasten the coming of the expert, though they sincerely welcomed government by the people, were troubled by the middle term of the classic Lincolnian triad, government by the people. This group of reformers usually led the campaign for governmental efficiency and found scientific management a corroborative and invigorating idea. Efficiency provided a standpoint from which progressives who had declared their allegiance to democracy could resist the leveling tendencies of the principle of equality. They could advance reform and at the same time provide a safeguard to the "college-bred."²²

What then did Taylor have to say about labor relations in The Principles of Scientific Management? Taylor made several basic assumptions about the role of factory labor which were crucial to his ideas on personnel management. He assumed that factory productivity was limited severely by the pervasive and pernicious level of "soldiering" or worker slowdowns and the domination of "rule-of-thumb" or empiricist methods which were the legacies of the handicraft tradi-

tion. The obvious result, Taylor believed, was that the output of the factory work force was far short of what might be expected based on a fair day's work according to his system.

Traditional production methods, argued Taylor, were patently deficient because they permitted workers to establish their own work rhythms and production methods. Taylor's system, on the other hand, represented "the gradual substitution of science for rule of thumb" and the introduction of a system based on the "one best way":²³

To explain briefly: owing to the fact that the workmen in all our trades have been taught the details of their work by observation of those immediately around them, there are many different ways in common use for doing the same thing, perhaps forty, fifty, or a hundred ways of doing each act in each trade, and for the same reason there is a great variety in the implements used for each class of work. Now, among the various methods and implements used in each element of each trade there is always one method and one implement which is quicker and better than any of the rest. And this one best method and best implement can only be discovered or developed through a scientific study and analysis of all the methods and implements in use, together with accurate, minute motion and time study.²⁴

The obvious question which should be asked at this point is: how did Taylor distinguish his system from other efforts simply to accelerate production by workers? The Principles of Scientific Management promised the establishment of a thoroughly scientific system of labor organization, but once stripped of its rhetoric, Taylorism was a sophisticated method designed to speed up worker productivity and increase employer profits. In fact, scientific management's reforms had a closer resemblance to other attempts to drive factory workers than Taylor and his disciples admitted. Indeed, his system's major contributions to modern management were primarily technical in nature and were designed to provide the planning department with the necessary control mechanisms and

techniques to insure that the production process was executed in the manner it prescribed. The application of the motion and time study technique and the sophisticated nature of his flow charts represented major advances over contemporary management practices, but they did not constitute a radical departure in resolving the social problem.

If Taylor's ideas on personnel management were traditional and even reactionary, his system was limited further by the fact that his conclusions were derived from his work in a few American factories and his understanding of the American worker's psychology. With that limited background Taylor concluded that men act primarily on the basis of self-interest. While he also believed that workers would support scientific management's completely rational and orderly approach to the production process which would facilitate their work, Taylor was not open to the other values which workers had derived from their occupations in the past. Thus his basic approach to personnel management was that salary incentives should be used to reward productivity. Workers should be assigned carefully established tasks based on what management believed was a fair day's work and those who met their production quotas would be rewarded with higher wages.

But would the average worker realize such increases in salary without being forced to overwork himself? The question was a serious one to labor critics of Taylor in the United States and France who believed that he had designed motion and time study so that only the strongest and ablest workers would meet their quotas. His published work provided very little information to counter the criticism of his system by his labor opposition. While Taylor discussed the advantages of scientific selection and training of workers in The Principles of Scientific Management, he provided little specific information about how he believed his methods work in industry. Instead, Taylor included examples from his own industrial career which his critics effectively used to attack him.

The most famous case involving Taylor personally applying his methods to enhance worker productivity was that of the pig-iron handler Schmidt at the Bethlehem Steel Company in Pennsylvania. The significance of the Schmidt episode to the history of French Taylorism is that it was used against Taylorism on to demonstrate his insensitivity to workers and that his conclusions were drawn largely from his experiences with unskilled workers rather than with skilled workers. His critics quickly pointed out that skilled labor represented a much larger percentage of the work force in French factories than American plants. Taylor was hired as a consultant at Bethlehem Steel from 1898 to 1901 to reorganize its machine shops. In beginning his work, Taylor and his associates chose to reform the pig-handling operations in order "to show the workmen, as well as the owners and managers of the works, on a fairly large scale the advantages of task work over the old-fashioned day work and piece work, in doing a very elementary class of work."²⁵ Pig-iron handling at Bethlehem Steel was a completely menial task in which a gang of seventy-five men carried pigs of iron weighing ninety-two pounds each up an inclined plank to a railroad loading car. Taylor observed that the men were "good, average pig-iron handlers . . . under an excellent foreman who himself had been a pig-iron handler, and the work was done, on the whole, about as fast and as cheaply as it was anywhere else at that time."²⁶

Taylor found that the average pig-iron handler was handling 12-1/2 tons per man per day, but the motion and time studies of Taylor's team indicated that a "first-class" pig-iron handler could load 47 tons per man per day. Taylor's associates reached that conclusion by dividing the movements of the pig-iron handler, examining "scientifically" whether or not they could be eliminated or accomplished more efficiently and then synthesizing the results in a manner which was designed to yield the "one best way" for loading pig iron at Bethlehem Steel. Once that was determined, Taylor wrote:

It was . . . our duty to see that this work was done without bringing on a strike among the men, without any quarrel with the men, and to see that the men were happier and better contented when loading at the new rate of 47 tons than they were when loading at the old rate of 12-1/2 tons.²⁷

It was Taylor's descriptions of the pig-iron handlers more than his methodology which offended French labor critics of scientific management. He described pig-iron handling as "typical of perhaps the crudest and most elementary form of labor which is performed by man" and "so crude and elementary in its nature that the writer firmly believes that it would be possible to train an intelligent gorilla so as to become a more efficient pig-iron handler than any man can be."²⁸

From the seventy-five men in the gang, Taylor selected a Pennsylvania Dutchman, Schmidt, as the man to be taught to increase his productivity. Described as "mentally sluggish" and "so stupid and so phlegmatic that he more nearly resembles in his mental make-up the ox than any other type,"²⁹ Taylor promised Schmidt that he would receive an increase in his wages from \$1.15 per day to \$1.85 for meeting the forty-seven tons per day quota. In the bargain Schmidt agreed to do exactly as he was told. Taylor and his associates instructed Schmidt as to how he would lift the pigs, how fast to walk and when to rest. Nothing was left to chance or his discretion. In fact, he quickly achieved his higher quota on a daily basis and received his increase in pay. But in the final analysis, Schmidt had bartered away what little freedom he had over his working conditions for his salary increase.

The example of Schmidt illustrated that scientific management could provide management with greater productivity and that employees could receive higher wages for their increased output. Moreover, management certainly could

see the potential savings from the application of Taylorism, as the pig-iron handling changes implemented by Taylor at Bethlehem Steel increased productivity by 276 percent while wages were increased only 61 percent. However, Taylor made a tactical mistake in including so much detail about the Schmidt episode. According to Taylor, only one-eighth of the seventy-five men on the pig-iron gang were capable of meeting the higher quota. That exposed him to criticism from labor that his system used the superior worker as the standard and that few could expect to achieve bonuses. More importantly, labor charged that his system resulted in undue stress and fatigue for the workers and was tantamount to a system of salaried slavery in which workers were constantly overseen and driven by men with stopwatches whose job it was to insure that work would be transacted at a frenetic pace.³⁰ The beneficial results of scientific selection and training, at least from the worker's perspective, appeared minimal. Labor argued that Taylor relied more on the process of elimination than selection at Bethlehem where, by his own admission, he eliminated nearly three-fourths of the men involved in shoveling coal into railroad cars from its original size of 600 men.³¹

Thus, it was hardly surprising that Taylor was bitterly opposed by American labor before the First World War.³² Samuel Gompers, president of the American Federation of Labor, took exception to Taylor's characterization of labor as highly subject to soldiering. However, it was the International Association of Machinists which took the lead in the fight against Taylorism. The machinists charged that Taylor "would deprive the machinist of his exclusive skills and would overturn his union."³³ The machinists and organized labor waged a determined fight against scientific management. They struck against it at the Watertown Arsenal and they lobbied against it in Congress. Hugh Aitkens argues that the Watertown machinists struck against what they believed was a serious

threat to their social and professional status and prestige—a point which never seemed to concern Taylor. To Aitkens:

The introduction of the Taylor system of management at Watertown Arsenal was not merely a technical innovation. It was also a highly complex social change, upsetting established rules and familiar patterns of behavior, establishing new systems of authority and control, and creating new sources of insecurity, anxiety, and resentment. There in microcosm were all the stresses of an industrial society exposed to constant revolution in technology and innovation.³⁴

Taylor refused to respond to labor criticism that his system resulted in the diminished status and prestige of skilled workers. Instead he retreated, as a prophet scorned, to history. In fact, his devotion to his work which was by now fanatical blinded him to the perspectives of those who disagreed with him. To Taylor, his system clearly represented the means for great economic and material progress as well as the end of class struggle. He explained:

The general adoption of scientific management would readily in the future double productivity of the average man engaged in industrial work. Think of what that means to the whole country. Think of the increase, both in the necessities and luxuries of life, which becomes available for the whole country, of the possibility of shortening the hours of labor when this is desirable, and of the increased opportunities for education, culture, and recreation which this implies.³⁵

Furthermore, scientific management offered more than material progress. Taylorism, he concluded, would end the seemingless endless struggle between labor and management over a limited amount of goods. Phrasing his conclusion in utopian terms, Taylor explained that:

Scientific management will mean, for the employers and the workmen . . . the elimination of almost all causes for dispute and disagreement between them The great increase in wages which accompanies this type of management will largely eliminate the wage question as a source of dispute. But more than all other causes, the close, intimate cooperation, the constant personal contact

between the two sides, will tend to diminish friction and discontent.³⁶

Buoyed by the interest in his work in America, Taylor quickly renewed his earlier efforts to spread the message to other countries. He wrote Henry Le Chatelier on May 5, 1911, to ask his assistance in a French translation of The Principles of Scientific Management. Taylor explained that his interest in a French translation was "not, as you understand, for the sake of making money out of it, but for the sake of forwarding the cause of scientific management."³⁷

Le Chatelier quickly arranged for the translation of Taylor's book for the Revue de métallurgie and to present its subscribers free copies.³⁸ Le Chatelier's son-in-law translated it, and the Principes d'organisation scientifique des usines was published in 1912. Its appearance stimulated new interest in scientific management before the First World War.³⁹ Before its publication, as noted in the last chapter, Taylor's work on scientific management was known to only a few people in the French engineering community. The translations of his essays which were published in the Revue de métallurgie had not attracted great attention but after 1910 there was a wider interest, as Aimée Moutet has documented, in France for Taylor's work.⁴⁰

How, then, can one explain the new interest in Taylorism? Moutet is partly correct to attribute it to the personal influence of Taylor. In the years immediately preceding his death in 1915, Taylor and his wife made several trips to Europe during which he met several key figures in the scientific management movement in France. In 1910, Georges de Ram visited Taylor in London, and he met Le Chatelier and Charles de Fréminville, who soon joined Le Chatelier as one of the leaders in the scientific management movement, on a trip to Paris in

1911. On a return trip to Paris in 1913, Taylor was the honored guest at a meeting on scientific management that included some of the most prominent French engineers and industrialists. In addition, Frank Gilbreth and Henry Gantt, two of Taylor's close associates, also visited Paris before the war.⁴¹ There is no question that Taylor's name lent credibility to his system with French entrepreneurs. His work in developing improvements in steel-cutting methods, his experience in factory reorganization, and his reputation as former president of the American Society of Mechanical Engineers shielded him against the criticism that scientific management was another utopian system designed by an intellectual with little practical industrial experience.

While it was correct that Taylor exercised a direct influence in the conversion of Le Chatelier and Fréminville, there were others who were attracted to Taylorism primarily on economic reasons. In fact, the following examples offer compelling evidence that support for Taylorism in the patronat before the war, which was centered in the automobile industry, developed because a number of entrepreneurs in that dynamic economic sector faced fierce economic competition from American manufacturers. Following are a number of examples to support this position.

Édouard Michelin, one of the owners of the Michelin Tire Company, was one of the most notable entrepreneurs from the industries engaged in producing products for the automobile industry who was attracted to Taylorism. He wrote Taylor on July 28, 1912, that "I have read with the greatest interest your books on shop management and the scientific organization of work" and that he intended to send his nephew, Marcel Michelin, to the United States to visit several Taylorized factories.⁴² During a short visit in the summer of 1912, Marcel Michelin was accompanied by Taylor's associate H.K. Hathaway on visits to several Taylorized

factories on the East Coast. Young Michelin was impressed by what he saw. He wrote Taylor that this:

new method of management interested me in the extreme. Now I understand a great deal better what is meant by "scientific management," and I realize what an enormous advantage can be obtained by working in accord with such a method. I am going back to France now, and am quite prepared to discuss, with my uncle, the way in which we will apply your method to our particular branch of industry.⁴³

Encouraged by that letter, Hathaway and Taylor made a proposal to Marcel Michelin for implementing Taylorism at the tire company. The plan called for the company to employ several of Taylor's disciples at its plant in Milltown, New Jersey to implement scientific management. Hathaway and Taylor also recommended that two French mechanical engineers be assigned to the Milltown plant under the direct supervision of the Taylor consultants so that after the French engineers received their training in scientific management, they could direct later implementation at the Michelin factory in Clermont-Ferrand. The plan called for the actual implementation of Taylor's system at the French plant to start between eighteen and thirty-six months after work would begin at Milltown.⁴⁴

However, Michelin did not accept the Taylor-Hathaway plan. Instead, Michelin hired a French engineer with no experience in Taylorism to supervise the application of scientific management at the Clermont-Ferrand plant and little progress was made in implementing scientific management at Michelin before the war. While both Taylor and Le Chatelier were disappointed that Michelin selected such an expedient approach to reduce costs and speed up implementation,⁴⁵ the Michelin episode illustrates several key factors about the attitude of the French patronat regarding the application of scientific management in France.

The Michelin brothers, André and Édouard, were among the most aggressive and innovative French entrepreneurs of their day. In the 1880's they assumed control of a family firm which had stagnated because the family could not decide what should be produced. While the factory had originally manufactured rubber products, it was sidetracked later into producing machinery for sugar refineries, distilleries and agriculture.⁴⁶ André and Édouard Michelin brought much more dynamic and decisive management to the company. André Michelin had graduated from the École centrale des arts et manufactures and had operated two Paris metalworking shops before taking an active role in the family business at Clermont-Ferrand in the mid-1880's. Édouard, on the other hand, was trained in the law and had studied painting at the Académie des beaux-arts in Paris. André refinanced and reorganized the firm, but it was Édouard who eventually took the most active role in running the factory on a daily basis. He decided that the future of the firm would be served best by focusing on rubber manufacturing and under his leadership, Michelin became, in the early 1890's, the largest world producer of pneumatic bicycle tires. The Michelins dominated the pneumatic tire field when they developed a pneumatic tire for automobiles, a technological innovation which sharply reduced road vibrations, allowed greater speed for the same amount of power and permitted cars to be built with considerably less weight.⁴⁷

Thus the Michelins were by no means conservative in their entrepreneurship. They had demonstrated a keen appreciation for technological improvement and an ability to take advantage of new developments in the market. In that sense, they recognized the significance of Taylor's work for its technical and organizational advantages. The Michelins, however, did not agree with Taylor and Hathaway that the implementation of motion and time study techniques,

standardization of tools, or establishment of a piece-rate system would require years of development under the direction of American consultants. Such refinements in management control over the production process, as was indicated in the last chapter, were consistent with sound business goals already recognized in French industry. Moreover, the assigning of the responsibility for implementing Taylor's techniques to a Michelin engineer avoided the problems that would have resulted from delegating the Michelins' authority to outside consultants. Thus, in the final analysis the Michelin episode demonstrates that French entrepreneurs differed with Taylor more on the costs and strategies of implementation than on the principles which he advocated.⁴⁸ The Michelins supported the objectives of scientific management in reducing production costs, increasing worker productivity and raising profits, but they were opposed to undertaking long and costly reorganization measures to achieve such objectives.

The impact of scientific management in the automobile factories is of even greater interest to this dissertation than events at Michelin. France was the leading automobile-producing nation in the world from 1890 to 1904 and in Europe until 1930.⁴⁹ By 1910, automobile manufacturing was a major part of the national economy. According to James Laux, the historian of the French automobile industry before the First World War, French carmakers employed approximately 33,000 workers in 1913, seventy percent of whom lived in the Paris region. Including those in subsidiary industries, the automobile industry provided nearly 100,000 jobs. Unquestionably, it was the largest single element in the French metals industry on the eve of the war and was the most dynamic industry in France.⁵⁰

In contrast to the dynamic entrepreneurial style of French automobile pioneers, their factories remained rather traditional in their production methods. Unlike American automobile factories, French car factories were labor intensive

and closely tied to the artisanal tradition. Production methods, particularly in contrast to the assembly line and mass production methods developed at the Ford Motor Company before the war, were more typical of the skilled labor shops of the nineteenth century. The first generation of automobile pioneers were aristocratic individuals concerned more with their racing pursuits and technological innovations than with the internal operations of their workshops. Moreover, they catered to buyers who could afford richly crafted and luxurious machines built for an exclusive clientele. Estimates on the composition of auto factory laborers indicate that two-thirds of them were skilled or semi-skilled workers. Skilled toolmakers, according to a contemporary observer, enjoyed considerable power and independence in French automobile factories.⁵¹ Patrick Fridenson argues that while production of automobiles increased significantly before the war, output per worker remained considerably less than in American firms which used more unskilled workers. For example, at Renault 1900 workers produced 3575 cars in 1912;⁵² in contrast, Ford produced nearly 250 percent more cars with fewer workers than Renault.⁵³ Moreover, the disparities between the two firms in productivity grew before the war after Ford introduced the assembly line in his factories.

Nonetheless, it is important to recognize the degree to which the production process in France at the turn of the century was changing. Foremen had implemented important changes in automobile factories in order to assert more control over their workers and to increase productivity. Throughout the automobile industry, manufacturers experimented with incentive systems to stimulate production. By 1906, it was accepted practice to be paid by the piece, although some observers believed that the piece-rate system resulted in shoddy workmanship. Nonetheless, management introduced complicated bonus systems to reward those who met their quotas.

The results of these bonus systems often failed to meet the expectations of employers. Pressures to increase productivity led to inferior craftsmanship and worker dissatisfaction; management frequently compounded problems by cutting piece rates.⁵⁴ In fact, labor unrest was widespread among the auto workers. The carmakers were often struck between 1899 and 1914. Factory discipline, reduced piece rates and grievances against foremen were frequently cited reasons for strikes.⁵⁵

The automobile industry itself was undergoing change after the turn of the century as a result of American competition. French cars were generally better designed and crafted but much more expensive than American cars. However, American factory owners seized the opportunity to create a new consumer market for those who could afford less expensive cars. The result was that French firms began losing on the international and the domestic markets. This situation caused great concern among French automakers. Aimée Moutet concludes that by 1907, American competition in the European market had created a crisis in the French automobile industry. Partly out of desperation French automobile manufacturers sought to implement Taylorism in order to increase productivity and reduce costs. French automakers no longer believed Taylorism was a "theory devoid of practical implications"; they now believed it prudent to use American production methods to offset American competition.⁵⁶

Thus in 1912 and 1913, French automobile manufacturers attempted to apply scientific management—which they mistakenly believed was primarily motion and time study. Among French auto companies, Renault, Panhard et Levassor, Berliet, Arbel, Lorraine-Dietrich and Brasier planned to utilize motion and time study in their operations. However, Moutet is correct in her conclusion that the same impulse led French automobile makers to attempt the introduction

of Taylor's system of management as had caused industrialists in the iron and steel industry to apply his techniques in high-speed steel cutting and industrial slide-rules. They sought to find a "recipe that they could apply immediately and at little cost to the enterprise, and then to obtain in the briefest delay a maximum increase in the production of goods."⁵⁷

Charles de Fréminville's experiences at Panhard et Levassor (P & L) in Paris illustrated the fact that French automakers had a limited understanding of Taylorism as a process whereby scientific methods of production replaced previous rule-of-thumb procedures. Fréminville, as noted earlier, was the most significant French convert to scientific management other than Henry Le Chatelier before the war. Fréminville, like Le Chatelier, was the product of a bourgeois professional family. Fréminville's father had taught at the École centrale des arts et manufactures in Paris. Fréminville was himself a centraux. After graduation, he worked as an engineer for the Compagnie des Chemins de Fer de Paris-Orléans, where he had had several opportunities to visit the United States in order to study American methods of organization.⁵⁸

In 1899, Fréminville was appointed technical director at P & L, which, along with Peugeot, at the time were the leading French automobile producers. Émile Levassor, the firm's pioneering founder, had been one of the most enthusiastic and successful of the early French car pioneers. Originally, P & L focused its energies on producing gasoline engines for the new cars. However, the French vision of the car market at that time was extremely limited. For example, Levassor established production goals of only three hundred cars per year in 1897, and actual production for that year was only 180. Like most other French car-makers, Levassor's primary concerns were technical. His major contributions to the early history of the automobile industry were his solutions to many of the

technical problems resulting from the adaptation of the petrol engine to the four-wheeled vehicles of his day. As an industrialist, he established only limited goals such as making a better car than his competition and winning races. He had little interest in developing a large industrial concern capable of producing hundreds of cars quickly.⁵⁹

After Levassor's death in 1897, P & L sales increased from 4.5 million francs in 1898 to 13.5 million in 1901. Car production passed the one thousand per year level in 1902.⁶⁰ However, the rapid growth at P & L leveled off after 1902 until 1906 when sales dropped. According to James Laux, P & L sales by its New York agency fell from over five million francs agency to three million francs, and overall sales declined nine percent during the company's 1907 fiscal year. During that same year, P & L's profits fell fifty percent.⁶¹ The general recession of 1908 to 1910 hit hard the auto industry in general and P & L in particular.⁶² By November 1907, P & L had laid off 700 out of a total work force of 1800; its share of the American market was greatly reduced; and it emerged after the recession as a second-level producer in the French market. In fact, P & L was, by the war, only the fifth or sixth largest auto manufacturer in France, and its profits never again matched those of 1905 and 1906. Clearly, P & L did not make the transition from pioneer to mature firm gracefully.⁶³

In 1898, P & L hired Fréminville to assist Major Arthur Constantine Krebs, the production manager who had replaced Levassor in 1899 and was largely responsible for the firm's spectacular growth during the next seven years. During Fréminville's employment at P & L, he succeeded in introducing many American machine tools in the workshops, and the shops were considered among the best organized in France.⁶⁴ Nevertheless, to what extent did Panhard et Levassor implement, under the direction of Fréminville, Taylor's system of management?

Edwin T. Layton has recently argued that P & L applied Taylor's methods in 1910.⁶⁵ Layton cites an October 7, 1910, letter from Henry Le Chatelier to Taylor as evidence that Fréminville was successful in his efforts to introduce scientific management principles in his shops. That letter, however, gives no evidence to support Layton's statement. Le Chatelier told Taylor that the "uses of your method of management in France are developing very rapidly," but he did not include specific examples where Taylorism was being applied other than at Renault. The only references to Fréminville in the letter were regarding his disappointment that he had not met Taylor on Taylor's recent trip to France and his hopes to send his son to study scientific management in the United States.⁶⁶

Aimée Moutet, Michele Flageolet-Lardenois and James Laux take a more conservative approach on this matter which seems justified by the historical record. There is no question that Fréminville was an enthusiastic supporter of Taylor's work, but the decision to apply it at P & L was long in coming. He wrote as late as May 1913, that the P & L board had discussed Taylor's system several times, but he explained that "I do not really know what the outcome will be as far as our firm is concerned."⁶⁷ Months later the board of directors expressed an interest in the application of Taylorism, but only on a very limited basis at its Reims plant and in the firm's sales department in order to increase sales.⁶⁸ Fréminville wrote Taylor in terms that support Moutet's thesis that the French wished to apply only those ingredients of Taylor's system that could be implemented quickly and with little cost:

I found that an idea existed among some of the directors to make time studies as soon as possible to show the men they were not afraid of them. That idea did not appeal to some others who would rather not trouble themselves about scientific management.⁶⁹

Fréminville insisted that the board, in applying scientific management, establish a planning department and organize the foremen functionally as required by Taylor. After several meetings on the issue, Fréminville wrote Taylor on June 13, 1913 that the board members "declared themselves enthusiastic about your system and ready to have a planning department."⁷⁰ However, Fréminville was distressed that implementation would be jeopardized because the board did not appoint someone with authority to carry out the mandated changes. Taylor agreed with Fréminville's fears:

It is unfortunate that your directors do not seem to appreciate the fact that in order to obtain the best results on making a change in the system of management, it must be absolutely under the control of one man, whose judgment and decisions covering all details are final. I am afraid that if several men attempt to inject their ideas into your improved methods, you will end by having serious problems.

Once again, as at Michelin, the application of Taylorism was inhibited by the patronat's fear of delegating its responsibilities and its partial understanding of Taylor's system. In any case, Fréminville's subsequent letters did not indicate that scientific management was applied at P & L before the war. Thus due to a lack of firm historical evidence, it is necessary to conclude with Laux that "how far he Fréminville succeeded in winning acceptance of Taylor's principles at P & L is not clear."⁷²

The most widely known and discussed application of scientific management in France before the war occurred at the Renault factory in the Paris suburb of Billaincourt. As discussed earlier, Georges de Ram experimented with Taylorism in several workshops under his direction as early as 1908, and Renault visited Taylor in 1911 to discuss scientific management during a tour of American

factories. When Renault returned from the United States, he decided to implement certain aspects of Taylor's system. This decision was motivated by two factors: 1) his desire to maintain his firm's position in the French and European markets; and 2) his wish to eliminate the workers' control over factory production in order to increase the firm's profits.

Louis Renault was unlike most of the early car manufacturers who were generally aristocratic and interested in the automobile racing that was such an integral part of the industry's early history. Though Renault was the product of a well-to-do family which earned a good income from the Paris textile shop and button and clothing factory that Renault's father owned, Louis Renault was regarded as a particularly unappealing and boorish young man.⁷³ As a youth, he was obsessed with mechanical matters. He originally planned to attend the École centrale des arts et manufactures, but he decided instead to work as a designer in 1896 for the boilermaker firm of Louis-Delaunay-Belleville. He returned from military service in 1898 just as Parisian excitement over the automobile industry was peaking.

Renault persuaded his two brothers to invest 30,000 francs each to start the production of automobiles; the first Renault car was completed by the end of 1898. Under Louis Renault's direction, Renault frères expanded rapidly; by 1901 it had become the world's eighth largest producer of cars. His success was built on the formula of a small, cheap and reliable car.⁷⁴

While Renault's technical innovations, particularly the development of the chain drive transmission, played a major role in the firm's expansion, his personality was a major factor in the history of the company. Laux argues that Renault's personality deficiencies led him to "build himself an industrial fortress where people would have to please him rather than he bow and scrape and play out

the petty hypocrisies of ordinary society to please them."⁷⁵ He devoted his energy to the internal operations of the firm, driven by his desire to be the total master over his house. Renault was obsessed totally by the business affairs at the Billaincourt factory where he had total control and complete independence. His reputation was that of an industrialist who insisted on getting his way and not respecting questions or opinions from his workers or staff.⁷⁶ It is important to keep Renault's personality in mind in exploring the events surrounding his efforts to introduce scientific management in his firm and the protracted strike against motion and time study in 1912 and 1913.

In 1907, Renault's car sales passed those of Panhard et Levassor, and remained the highest among French manufacturers until the war. Nonetheless, by 1910 the dynamism at Renault had diminished as he was unable to exploit his lead in the French market and to compete with Henry Ford for the control of the international and European market for small, inexpensive cars. Renault, contrary to the trend established by Henry Ford, continued to produce a variety of models at relatively expensive costs. While the market demand was heaviest for cars that sold for under 5,000 francs, Renault offered only one model which sold for a minimum of 5,000 francs. He had six 4-cylinder models which ranged from 7,400 to 19,000 francs for the chassis alone and two 6-cylinder models at 15,500 and 22,500 francs for the chassis.⁷⁷

Renault did recognize, however, the potential that Taylor's system had for reducing production costs at Billaincourt. He had seen the way that Ram's partial efforts to apply motion and time study and to standardize tools had cut the operational costs in his shops. Renault's visits to American factories which employed Taylorism also favorably impressed him. From the outset, his interest in Taylorism was narrow in focus. He showed no interest in the social elements of

the system with its claims that it would eliminate conflicts between management and labor. He ignored Taylor's warnings that the proper implementation of the system required careful and deliberate preparation to offset worker hostility. Renault's goal was to use motion and time studies to increase worker productivity and to reduce labor costs. In the view of Patrick Fridenson, the author of a two-volume study of the Renault firm, Renault reduced Taylorism to the simplest techniques which could quickly improve his profits with a minimal expenditure for retooling or reorganization. Fridenson's conclusions are supported by the fact that Renault had restricted Ram's efforts to reform other shops due to the additional costs involved in reorganization and he distrusted and lacked confidence in engineers.⁷⁸

Renault ordered in November 1912, the application of motion and time studies as the basis for establishing new piece rates in one-fourth of the firm's shops. The workers responded on December 1 with the demand that the motion studies stop and that wages be increased. Renault balked at this intrusion on his authority to establish working conditions, and one-fourth of the firm's four thousand workers struck on December 4 against the implementation of motion and time studies. The strike was settled quickly when labor accepted Renault's compromise that allowed the workers to elect two representatives to participate in the implementation of the new piece rates, agreed to adjust the findings of the motion and time studies to the favor of the workers by twenty percent and fired Ram, whom Renault held accountable for the strike.⁷⁹

The compromise did not end worker dissatisfaction with Taylorism at Renault. Complaints continued about the undue demands placed upon them by speedups resulting from the motion and time studies and the complicated way the piece rates were calculated which made it difficult for workers to receive

bonuses. They requested that Renault agree to the establishment of a Workers Labor Committee to protect workers against the unnecessary and unreasonable effects of Taylorism in the workshop.⁸⁰

On the surface, there was little that was particularly remarkable about the workers' demands. The piece-rate issue had been a general source of conflict throughout the auto industry. Most automobile factories had experienced strikes or complaints by workers that management arbitrarily reduced piece rates to offset potential increases in wages when workers took advantage of the incentive system. Skilled workers frequently found it useful to defend themselves against management efforts to speed up production by complaining that the changes in the production process would result in the reduced quality of the finished product. Thus the Renault workers fought Taylorism partially on the basis that increases in production were offset by increases in factory defects and inferior products that were expensive to Renault. They added that management should not penalize workers by deducting from their salaries the cost of defects that were the result of management speedups.

Once more, Renault offered a compromise. He agreed to recognize the Workers Labor Committee and to review the issue of whether or not workers should be docked for defective craftsmanship, but Renault refused to concede on the issue of motion and time studies. Negotiations then broke down, and the workers once again walked out on February 12, 1913. The second Renault strike against Taylorism did not end officially until March 22, 1913.

The strikes at Renault have drawn a great deal of interest among historians. To some extent, that interest has been generated by the significance that the Renault company and its workers have had in the French labor movement since the First World War as a barometer of changes in French labor relations.

Nonetheless, the strikes against Taylorism at Renault were critical in the fight between labor and management over job autonomy and management control in the workshops before the war. In retrospect, the strikes offered a clue to the trends in factory labor relations.

There were other French automobile factories which had attempted to apply Taylorist techniques, but they had failed due to successful strikes against the changes. In fact, the application of scientific management in other French automobile plants had been repulsed easily by labor. Marius Berliet had tried to apply Taylorism in his factory in Lyon during the spring of 1912, but his efforts failed because he did not prepare his workers properly for the changes. Thus when Berliet employed time-study experts from Paris, his workers protested against the recommendations of the experts to lower piece rates and went on strike.⁸¹ Pierre Arbel made a similar mistake when he tried to implement too quickly Taylor's motion and time studies and piece-rate system in his Douai factory. In contrast to Taylor's advice, these provincial businessmen displayed no interest in raising workers' wages in order to obtain their cooperation. However, these were minor skirmishes compared to the strikes at Renault in which the number of workers involved and the Parisian location gave that strike more importance than the strikes at Berliet and Arbel. What then were the major causes of the second strike against Renault? Obviously there remained some negative sentiment against Taylorism from the previous strike. However, Renault had attempted to reach some compromise with his workers by maintaining labor representation through worker delegates who had input into the application of Taylorism. He also agreed not to deduct wages for defective pieces. Thus the only grievance that he refused to concede was the call for an end to the motion and time studies. On that issue, Renault was determined to stand firm.

Another cause for the strike was the latent hostility that existed between management and labor. Patrick Fridenson has recently pointed out that the tension between the two sides existed throughout the French automobile industry during the decade before the First World War. He found in the Renault records proof that Louis Renault used factory spies and blacklisted employees as early as 1903. He also found a 1906 letter from Fernand Renault which indicates that he recognized that factory relations in the Renault plant were bad.⁸² Renault workers also shared labor's general concerns that management was doing nothing to reduce their hours of work, to increase wages in order to offset cost-of-living increases or to improve their working conditions.⁸³

Nonetheless, the workers' objections to Taylorism stemmed primarily from its obvious threat to the professional status and prestige of the skilled worker. In fact, the Renault strike was much like the one against Taylorism at the Watertown Arsenal in the United States in that they both raised the issue of the role of the worker in the factory system. These strikes, moreover, were linked to the desire of management to reduce the control and autonomy of the skilled worker over the production process. Peter Stearns believes this period witnessed a decisive change in the modern factory system in which labor came to be viewed as an "instrument" rather than as professional.⁸⁴ Traditional craft values of product quality, individual skill and professionalism were jeopardized by scientific management's emphasis on efficiency of production, standardization of the work process, mass production and the rational division of labor which directly threatened the hold of skilled labor over the production system. The rule-of-thumb methods of the craft tradition which allowed a great deal of individual variation in the production process conflicted with Taylor's concept of the "one best way" which required the subordination of the skilled worker to a standardized approach

determined by management.⁸⁵ In short, skilled workers, including the machinists at Renault, clearly recognized that Taylorism would have a devastating effect on their professional status. To the skilled machinists, Taylorism represented a decisive break from the artisan tradition and the final step in the derogation of their craft skill and professional status. The intrusion of time-study men threatened the power and independence of the machinists who had jealously guarded their ability to convince management of their indispensable role in the production process. Clearly, they feared that the rationalization of their craft "secrets" and skills would destroy their power.⁸⁶

To a large extent, the issues of professional status and job autonomy were difficult to articulate. Thus, the Renault workers' opposition to Taylorism focused on the issues of the long-term effects it would have on their health and their ability to withstand its deleterious impact on their job longevity. According to secret police reports, workers discussed their fears that the speedups caused by Taylorism would result in the discharge of many workers and that Renault would cut piece rates to maintain salaries at their previous levels.⁸⁷ Indeed, that had been the case, as noted earlier, in French factories where incentive systems had been installed to increase productivity; and Renault had made no efforts, as Taylor required, to insure workers that their compensation would increase as Taylor had prescribed. Fears that Taylorism would destroy the independence of machinists, reduce their professional status and other such underlying causes certainly help explain the causes of the Renault strike, but what caused the strike to occur when it did?

The strike was precipitated largely by the publication of several articles in early February 1913, by Charles Faroux in L'Auto, the Parisian daily automobile newspaper. Faroux was the most prominent French journalist covering the

French automobile industry, and many workers read his articles in L'Auto. His interest in automobile factory working conditions provoked him to write an article on Taylorism which incorporated material from a 1906 translation of John Foster Fraser's highly critical study of American working conditions at the turn of the century. While Fraser's work was superficial, it had enjoyed considerable popular success in France where it had already gone through several editions. Faroux mistakenly generalized about scientific management based on Fraser's work in a manner that had a profound influence on the history of Taylorism in France. In fact, Fraser had never visited a Taylorized plant, nor did his book discuss Taylorism. However, Faroux's articles left the mistaken impression that American factory life was dominated by Taylorism.

Despite his claims to impartiality, Fraser, an English journalist, described American life in disparaging terms. He told his readers that:

personally I would not want to live in America; first of all because life there is maddening and without any intellectual understanding; finally, because the social conversation between men, aside from some few pleasant exceptions, is constantly directed towards the question of money and because human life is reduced to the unique pursuit of fortune which destroys all that embellishes one's existence.⁸⁸

According to Fraser, American businessmen, like Sinclair Lewis' Babbitt, were single minded in their mania for larger profits by extracting more and more productivity from their workers. This exaggeration of materialism in American society was achieved at the expense of American labor, which was described as overworked and physically fatigued. This only reinforced French workers' impression that the patronat intended at the same stroke to increase their profits and to destroy the independence of the working class.

Faroux, who was not necessarily opposed to Taylorism, included an anecdote from Fraser's book that ultimately played a major symbolic role in the Renault strike. During a visit to the Baldwin factory in Pittsburg, he noted that there were no older workers on the floor. When he quizzed the owner about the situation, the owner said casually that the old workers could be found at the cemetery.⁸⁹ Though Fraser never indicated that Taylor's system was in operation at the Baldwin factory and Taylor later told Le Chatelier that the factory's production operations had no resemblance to scientific management, Fraser's description was accepted widely by Renault workers as an accurate depiction of the consequences of a system which they believed was designed to increase production with no regard to its effects on the workers.⁹⁰

Labor's protest that Taylorism and the accompanying speedups would deplete the strength of the worker drew from contemporary medical, physiological and thermodynamic theory. Nineteenth-century thermodynamic theory had a major impact on the way European society came to view the issue of "energy" in general. The first law of thermodynamics, developed by Helmholtz, stated that energy in nature could not be either created or destroyed. Scientists then demonstrated that energy, in its various forms as electricity, heat or work, could change but not be destroyed. Applied to general economic and social theory, the first law of thermodynamics provided "scientific support" for the social optimism of some mid-nineteenth-century political economists.

The second law of thermodynamics, however, related to the degradation of energy and was used by some of the more cautious and pessimistic theorists of the late nineteenth century. The idea, after all, that energy could dissipate caused a great deal of concern when applied to other subjects relating to the study of man and society.⁹¹ Indeed, one historian has recently demonstrated the

significant impact that the laws of thermodynamics had on late nineteenth-century political symbolism.⁹² The important point for this dissertation is that the concerns of political economists and scientists about maximizing available labor energies and minimizing waste in factories focused on the concept of "fatigue." Anson Rabinbach notes that Karl Marx and European factory reformers had already raised the issue as to whether or not the contemporary factory system exhausted the labor force.⁹³ By 1870, European researchers were actively engaged in the study of "fatigue":

Fatigue, it appears, replaced idleness as the moral infirmity of the will to work. By the second half of the nineteenth century the enforced regularity and introjected time-work discipline, which had to be acquired by the newly industrialized work force of the earlier part of the century, was already an "inner compulsion." By the 1870's, fatigue not only superseded idleness as the quintessential disorder of work, but was established as the disease of time-work discipline itself.⁹⁴

Physiological, anatomical and medical research as well as factory reformers in Europe sought to define the limits of human labor beyond which excessive fatigue impeded the body's ability to replenish its energy. In France, for example, Marey did considerable graphical work during the 1870's on the processes of work which anticipated the techniques later developed by Taylor's associates, Frank and Lillian Gilbreth. Jules Amar and Jules Lahy, contemporaries of Taylor and Le Chatelier, later conducted impressive physiological research which challenged Taylor's work on the basis of his inadequate attention to fatigue and the physiological basis of labor.⁹⁵

Thus it was not surprising that the Renault workers employed concepts drawn from current theories of fatigue in their fight against Taylorism. At a strike meeting on February 12, 1913, the secretary of the Syndicat des mécaniciens de la Seine argued that Taylorism would exhaust the "vital force of workers"

and would be a "detriment to their health and that of their children."⁹⁶ The syndicalist and socialist press supported the Renault workers' efforts in depicting Taylorism as a dehumanizing threat to French labor. Victor Roudine wrote in La Bataille syndicaliste on February 12, 1913, that even the strongest workers would be unable to endure the fatigue resulting from Taylorism and that its applications in Paris would require the enlargement of the Boulogne cemetery.⁹⁷ Émile Pouget described Taylor's system in La Guerre sociale as "the insane intensification of work to the point of slavery."⁹⁸ L'Humanité charged that Taylorism would result in the "annihilation of all humanity, the transformation of man into a thoughtless machine" and "the death of the working class."⁹⁹

Alphonse Merrheim, the secretary-general of the Fédération des métaux and one of the most astute students of the factory system in the French labor movement, vigorously attacked the applications of Taylorism by the French patronat. He pointed out that Taylor was strongly opposed to labor unions and that his system, despite its claims to scientific legitimacy, was dominated by his overriding desire to speed up production. To support that conclusion, Merrheim argued that Taylor's treatment of the pig-iron handler Schmidt proved that Taylor had no regard for the individual worker.

Merrheim argued that scientific management assumed labor was an instrument in the production process. He charged that Taylor's system was designed to destroy the initiative and independence of the worker and to make him become an automaton. Merrheim concluded that the French patronat, like Taylor, abused the technique of motion and time study to raise production at the expense of the physical and moral well-being of the worker and with no appreciable increase in salaries. Merrheim charged that the patronat was responsible, in its attitudes regarding the application of motion and time study, for the strikes in the automobile industry.¹⁰⁰

Syndicalist leaders provided considerable moral and financial support to the Renault strikers. High-ranking CGT officials, including Léon Jouhaux and Georges Dumoulin, spoke to the strikers and maintained a close watch on developments at Renault. In addition, the metallurgical union helped organize soup kitchens and solicited strike assistance funds from other syndicates. However, the strike ended in victory for Louis Renault on March 22. In retrospect, the turning point in the strike occurred ten days after it had started when nearly half the workers returned to work after Renault opened the doors. Nevertheless, the determination of the strikers had been remarkable. Early in the strike 3800 of the 4000 auto workers at Renault had walked off their jobs, and a daily average of 1659 workers had not reported to work over the duration of the strike. Renault, though, gained some measure of revenge by not allowing 436 of the strikers to return to their jobs because he considered them troublemakers.¹⁰¹

What impact did the Renault strike have on the spread of Taylorism in French industry before the war? It is generally agreed that scientific management suffered a temporary setback since Renault lost interest in the further development of the system and other employers decided not to implement Taylorism for fear of strikes. Taylor, Le Chatelier and Ram quickly attempted to minimize the effects of the strike on the system itself by placing blame for the strike on Renault. In a March 20, 1913, letter to Le Chatelier, Taylor wrote that based on his visit with Renault in 1911 and some conversations with Ram about the strike:

I was of the opinion when Mr. Renault was in Philadelphia that he would attempt to force our system of management too rapidly. I warned him against this several times, and tried to impress upon him the necessity of going slow in the introduction of the new methods, but I could see that what I said had very little weight with him. He evidently was of the opinion that he knew a great deal more about

such matters than I did. I do not think there was the slightest necessity for the strike in his works, and if he had only gone to work slowly, and had paid attention to my numerous warnings that he could not get his men to work at the proper fast rate of speed and accurately follow their instructions unless he paid them at least 30 percent higher wages than they were receiving, the strike would not have occurred.¹⁰²

Georges de Ram, like Taylor, refused to accept responsibility for the strike even though Renault had attempted to make a scapegoat of Ram after the first strike. Ram wrote Renault shortly after the second strike began to remind him that Renault himself was primarily responsible for the strike. Ram reminded Renault that he had been warned not to rush into applying scientific management and that wages should not be cut during implementation. Renault had refused to listen to Ram and, in fact, had fired Ram in January 1913, rather than heed his advice. Thus, it was no surprise to Ram that the workers struck against the way Taylorism was being applied at Renault. Ram wrote Renault:

On several occasions, over the course of this last year, I had verbally, as well as in various reports, warned you against the consequences of the irrational application of time and motion studies. You did not choose to follow my advice.¹⁰³

To Ram, Renault was responsible for the strike by too rapidly applying time and motion studies in workshops in which the necessary preparation of the workers and acquisition of equipment had not preceded implementation. Moreover, Renault had transgressed against one of Taylor's cardinal rules when he permitted factory foremen to reduce piece rates. Ram also charged that the management had not attempted to improve the deplorable state of repair of the factory's machinery which prevented workers from achieving their quotas. He concluded that Renault had failed to understand that "the Taylor method can operate normally only once you have obtained the confidence of the workers."¹⁰⁴

In reality, Taylor's French supporters were not discouraged totally by the effects of the Renault strikes since the negative publicity which resulted from the mistakes at Renault were offset by the public notoriety given the system by the press. There was an irony about the Renault strike in the fact that Taylorism had received publicity which all Le Chatelier's efforts had failed to provide. The publicity surrounding the strike and the discussion of the Taylor system finally brought it out of the pages of a few engineering journals and into the public spotlight. Newspapers and journals throughout France covered events at Renault, and explanations about the nature of Taylorism, many of them erroneous, appeared in the popular press. Thus, while Le Chatelier defended Taylorism against events at Renault, he privately admitted to Taylor on a more optimistic note that:

Many people are saying that the strike is going to be a great stumbling block to the introduction of your system in France. I do not believe anything of the kind. On the contrary, it has been a tremendous advertisement. All of our newspapers are full of it. I had entirely failed to introduce the public papers to your system in spite of the fact that I gave away two thousand copies of your volume to the most influential politicians, engineers, industrialists, journalists and political economists. Lately, the greatest publicity has been given to your work, and there is not a single Frenchman who does not know your name.¹⁰⁵

Although Taylorism had been applied, to some extent, in several French factories by 1913, it had not been revised to fit the particular needs of the French social, intellectual and economic milieu. The public interest generated by the Renault strike encouraged Henry Le Chatelier to present his ideas on the meaning of scientific management in France. Le Système Taylor: science expérimentale et psychologie ouvrière was originally presented by Le Chatelier as a lecture to the students at the École polytechnique, and was published in its entirety in 1914. Le Chatelier's presentation of Taylor's ideas was much more than a simple

summation; it was more scholarly, philosophical and analytical than The Principles of Scientific Management and Taylor's other publications on scientific management. As the title indicates, Le Chatelier's work emphasized the scientific methodology and the psychological aspects of Taylor's system that had been obscured in The Principles of Scientific Management. More importantly, Le Chatelier followed Taylor's example, as noted earlier, in exaggerating the extent of the labor reforms which scientific management promised.

According to Le Chatelier, the Taylor system "is the simple application of the scientific method to industrial problems."¹⁰⁶ Le Chatelier attempted to establish Taylorism firmly in the European tradition of scientific materialism. He wrote:

All natural phenomenon are linked by indisputable laws; they are meshed like the cogs of a clock. The goal of science is to determine those natural laws, and the understanding then permits us, by adjusting the proper cog, to act to a certain extent on natural phenomena, in order to modify them to our best interests, by making industry more profitable.¹⁰⁷

Taylor, argued Le Chatelier, believed the social sciences are also determined:

F. Taylor does not see any difference between the study of machines and that of men; both are subject to determinism, making them both the subjects of science. The human factor is more difficult to understand than the mechanical factor, but the methods of investigation remain the same.¹⁰⁸

With those basic assumptions, Le Chatelier dismissed the argument that Taylor's system could not be applied effectively in France. That criticism, charged Le Chatelier, was due to the intellectual and spiritual weaknesses of the French patronat and its lack of faith in science. Rather than seeking solutions to industrial problems, French employers accepted those problems as unavoidable. The basic fault of the patronat, according to Le Chatelier, was the "anti-scientific" educational training of the French elite.¹⁰⁹

To Le Chatelier, Taylor's system was much more than a technical advance; it represented the triumph of the experimental method over the rule-of-thumb approach to industrial production and aligned Taylorism with the dynamic sectors and innovative entrepreneurs. It was in this way that Le Chatelier also joined the Saint-Simonian tradition of French engineering with the work of Taylor. Taylor, like Saint-Simon and August Comte, stressed the importance of method in modern industrial society because it represented the triumph of order over chaos. Indeed, the purely technical nature of Taylor's work was given a less prominent role in Le Chatelier's work than in Taylor's.

Le Chatelier extended Taylor's discussion of the role of human psychology or the "human factor" in scientific management. According to Le Chatelier:

Among all the factors of industrial production, the most important, certainly, is the worker. In exercising a dominant influence on the costs of production, he encounters very often, besides, disastrous economic disturbances by syndicalist intervention, voluntary limitations in production and strikes. The capricious conduct of human beings appears to place this factor outside of all laws and to escape the control of science.¹¹⁰

However, Le Chatelier argued that human actions were subject to scientific study and manipulation and that the worker could be treated as an instrument in the labor process.¹¹¹ He argued that French management's grasp of the psychological and social dimensions of factory organization was primitive.

Le Chatelier was keenly aware that Taylor's work was subject to criticism and improvement on numerous matters. Thus he tried to avoid the obvious temptation to defend specific aspects of Taylorism on such issues. Indeed, Le Chatelier carefully attempted to separate his general argument on methodology regarding the human factor from any specific conclusions of Taylor—many of which had been stiffly attacked by the labor movement and physiologists. Taylor's

errors were those of a pioneer and, Le Chatelier argued, would be resolved by further scientific advances and did not discredit his fundamental methodology. After all, he wrote: "One does not discredit a procedure of chemical analysis based on the error of an unskilled chemist."¹¹²

In the final analysis, Le Chatelier's positions on the labor question were compatible with Taylor's. They both argued that workers were in essence psychologically identical to that of other men, but that it was nonetheless an experimental "fact" that intellectual and manual labor had to be separated in the modern factory. According to Le Chatelier, "it is impossible, by the fact of indisputable physiological necessities, to furnish simultaneously an intense intellectual labor and an energetic manual effort."¹¹³ The intellectual function, Le Chatelier explained to the École polytechnique students, was the responsibility of the technical staff.

In his discussion of the division of mental and manual labor, Le Chatelier attempted to attract support from two very important dynamic groups at the turn of the century in the development of the modern factory system. First, he sought support from those French engineers who desired a more prominent role in the modern factory. Second, Le Chatelier, through his extensive discussion of the duties and responsibilities of the planning department, sought support from businessmen in industries which, during the past century, had been undertaking organizational reforms designed to strengthen management's control over the production process and to eliminate the crafts' opposition to factory reforms.

The struggle for professional recognition within the French engineering community by the industrial engineers cannot be overlooked in the history of Taylorism.¹¹⁴ Traditionally, French engineering was dominated by the graduates

of the École polytechnique who were trained for jobs in the state hierarchy. During the Third Republic an increasing number of engineers entered the private sector and challenged the status of the state engineers. The conflict between the industrial and the state engineers reached the point that by 1900 some industrialists and industrial engineers applied political pressure to close the École polytechnique in order to prevent its further obstruction of French economic development. At stake were the social image and professional status of the mechanical or industrial engineers who felt they were not being recognized by the professional engineering societies controlled by the engineering corps. But, according to Terry Shinn:

By the 1890's, the industrial engineer, along with the capitalist, was frequently depicted as the key figure in industry and technical progress, owing to his capacity to manage successfully increasingly important problems linked to production. This professional ideology, disseminated in numerous speeches, articles, and pamphlets, stressed their operational effectiveness and the strategic place they occupied within the capitalist mode of production. Furthermore, the new generation of young industrial engineers was often portrayed as an arbiter in the conflict between workers and capitalists.¹¹⁵

Le Chatelier was deeply concerned about and actively involved in the contemporary debate regarding curriculum reform at the École polytechnique. It was his opinion that French educational methods, particularly in technical education, were too theoretical and mathematical. He believed that the École polytechnique was not contributing fully to French industrial progress due to its curriculum's emphasis on pure science; Le Chatelier urged that the curriculum be reformed to emphasize what had been traditionally referred to as science industrielle and applied research. His perspective was similar to those polytechniciens who wished to restore the École polytechnique to its social and technical preeminence in the education of engineers by proposing innovative reforms in its training

without damaging its social mission of producing the nation's social and industrial elite.¹¹⁶

Le Chatelier's ideas on educational reform were linked to his belief that the role of the École polytechnique was to supply French industrial and social elites necessary to restore French economic power in Europe and to provide stability to French society. His concerns accurately reflected the decline in the prestige of the École polytechnique's graduates in the eyes of the French patronat. Those concerns had reached the point that by 1900, according to Shinn, there was a crisis in the development of the engineering profession in France caused by the tensions between the traditional elitist image of the state engineers and the increasing pull of industry on the graduates of the top engineering schools. Indeed, it was a fact that the desire for careers in industry by polytechniciens had increased in the aftermath of the Dreyfus Affair, and fewer of the top graduates sought careers in the state as the prestige and compensation of state positions declined.¹¹⁷

It is critical at this point to distinguish between the mechanical engineers who were drawn to the Taylorist movement in America and the ingénieurs civils who had graduated from the École polytechnique and the École centrale des arts et manufactures if one is to understand the role that scientific management played in the development of the engineering professions in the two countries. While Taylorism found its earliest recruits in the engineering communities of both countries, its support among the French ingénieurs civils remained very shallow before the war. The engineers from the École polytechnique and the École centrale were different from the "self-made men" who carved out mechanical engineering careers in American and English industry; the engineers trained at the top Paris engineering institutions were cultivated and highly-educated individuals

destined to become the aristocracy of the French engineering profession and to hold prestigious positions in French society and the state hierarchy. In general, they were the children of the haute or moyenne bourgeoisie whose families believed that an education in one of those two schools would secure their children status among the social and intellectual elite of the Third Republic. The sense of special mission was strongest at the École polytechnique which, according to Terry Shinn, had consciously assumed as its mission in French society "the formation of dynamic men and men with character gifted with an acute sense of social responsibility."¹¹⁸

The elitism of the École polytechnique graduates, in fact, separated them from the graduates of the École centrale des arts et manufactures though both schools believed that their graduates were far superior to those from the écoles des arts et métiers, the Conservatoire des arts et métiers and écoles pratiques whose educational attainments and social prestige were considerably less than that of the polytechniciens and the centraux.¹¹⁹ These status distinctions are important in understanding Le Chatelier's intent to incorporate Taylorism into a science industrielle and to establish a technical elite at the head of French industry. Taylorism, as Le Chatelier fashioned it, was not designed so much to benefit the engineering graduates from the écoles des arts et métiers, most of whom originated from the petty bourgeoisie or the working class. To Le Chatelier, the ingénieurs des arts et métiers lacked the educational and social background required of an elite. Thus he focused his attention on the engineers from the two elite institutions. His efforts to reform French technical education were designed to insure the development of engineers and businessmen capable of becoming industrial leaders and of applying scientific management to French industry.¹²⁰ To that end, Le Chatelier believed that Taylorism's methodology was

perfectly designed to be incorporated into a science industrielle which would, in turn, restore the professional engineering elite to its proper role within modern capitalist society.

Le Chatelier's sense of order and hierarchy in the factory, his hopes to enhance the professional status of the industrial engineer and his plans to establish a more stable factory organization depended heavily on Taylor's concept of the planning department. It was also the planning department which would insure the patronat that Taylorism would result in the degree of control over the work force and the production system that employers desired. In this regard, Taylorism was to have been the solution to the nineteenth-century quest for organizational reform described in the last chapter. The planning department was the nerve center in Taylor's organizational framework. Critical to the operations of the department was the assumption that the factory's operations could be reduced to two-dimensional production and flow charts and individualized production cards. Once these were developed and the motion and time studies conducted, the planning department would assign and monitor work throughout the factory; it would then be the responsibility of the "functional foremen" to see that the directions of the planning department are executed and to determine that tools are maintained properly, workers trained, production quotas met and discipline established.

It was also assumed that the new factory, with its additional complement of technical staff in the planning department and more foremen on the floor, would be based on a total separation of mental and manual labor. Once that was accomplished, the power of the crafts would be broken since their influence was based largely upon their knowledge of the production process. Taylorism, as Le Chatelier understood it, would result in the shift of power from the skilled crafts to management through the latter's appropriation of the skilled craftsman's

knowledge of the production process which then would be refined and perfected by management. Le Chatelier provided additional justification for this position from contemporary physiological concepts of the relationship between mind and body. To him, the separation of mental and muscular functions in the modern factory should be so complete that it would require a parallel division between the staff in the planning department and the workers on the floor required to carry out the orders by the former. As he explained:

It is impossible, based on indisputable physiological facts, to provide simultaneously intense intellectual work and an energetic manual effort The Olympic champions of our schools are never brilliant students The worker must completely use his muscular force, one should not ask him at the same time to give an intellectual effort equal to his supervisors.¹²¹

Although Le Chatelier did not link Taylorism to the Saint-Simonian tradition in his analysis, scientific management's functional separation of the mental and muscular tasks in the factory promised to fulfill the Saint-Simonian's goal of "replacing the government of men with the administration of things." Indeed, scientific management's shift of power from the floor to the planning department satisfied the patronat's nineteenth-century goal of restricting the independence of skilled and semi-skilled workers and extending management's control over production in French factories. The fact that Taylor and Le Chatelier did not emphasize this transfer of power has three explanations. First, they shared the belief with conservatives in Europe and America that management needed to exercise greater control over their workers in order to put a stop to the unrest and rebellion of the organized labor movement. Second, scientific managers did not want to emphasize the extent to which their ideas transferred power to the technical staff and the planning department from the factory owners, the plant managers and factory foremen. Finally, it was not strategically

advantageous to inflame labor sentiment against Taylorism by explaining fully the significance of the system's appropriation of the mental processes of the factory system by management.

Instead, Taylor and Le Chatelier employed the "myth of rationality" to obscure the nature of power shifts which accompanied the application of Taylor's system in American and French factories.¹²² Le Chatelier deliberately couched his presentation of Taylorism in such manner as to emphasize its revolutionary effects on industrial society even though it was clear that he intended scientific management to reinvigorate the existing class system and industrial hierarchy. The resulting social arrangements in the factory then would be the basis for stabilizing the ruling class's social and political position in the Third Republic.

As discussed earlier, French workers vigorously opposed the Taylor system, particularly motion and time study and the reduction in piece rates which occurred in the automobile factories. Le Chatelier, however, generally dismissed the criticisms of Taylorism which originated during the Renault strike on the basis that the workers' understanding of the system had been distorted by Renault's inept efforts to implement his version of scientific management. Le Chatelier also correctly defended Taylorism against Fraser's myth that Taylorism was responsible for the early deaths of American factory workers. Le Chatelier's unsympathetic response to labor's objections about the derogation of skills that the system caused was symptomatic of the ideological bias of Taylor and Le Chatelier regarding personnel management and the entire reorganization of the factory system.¹²³

The question of the derogation of skill was the central issue in the conflict between Taylorism and labor before the First World War. Labor charged that Taylorism would reduce the factory worker's status to that of a robot. Le

Chatelier's response to this criticism was twofold. First, he argued that the specialization and division of labor required by Taylor was comparable to the specialization in the medical profession in that the skilled surgeon did not have less professional status than the general practitioner. Second, Le Chatelier depicted labor's criticisms of Taylorism as anachronistic in the modern industrial period. While it was regrettable that industrialization had eliminated the skilled artisan's role in the modern factory, it was nonetheless a fact that economic progress had provided a higher standard of living for the general population. To mourn the passing of the golden age of the skilled craft tradition made as much sense to Le Chatelier as wanting to return to the slave system of the pharaohs because the Egyptian system produced the pyramids. To Le Chatelier: "Progress . . . will consist in the application of more intensive production methods to reduce the hours of the workday soon to eight hours and later, perhaps, to six hours."¹²⁴

Of course, Le Chatelier's presentation of Taylorism met with strong opposition from labor leaders. Coupled with the manner in which the patronat had attempted to apply scientific management, labor leaders had little choice but to defend French workers against motion and time studies and the efforts to reduce piece rates and speed up production. However, it is important not to overstate labor's opposition to industrial modernization based on its efforts to oppose the application of scientific management in French factories before the First World War. The labor movement was undergoing significant internal reforms in these years that would ultimately result in a more conciliatory attitude towards scientific management during the First World War and post-war economic reconstruction. To ignore this evolutionary shift and ultimate break from the revolutionary syndicalist tradition in favor of reformism would place too much emphasis on the

impact of the First World War and the Union sacrée on French labor history and misinterpret the response of labor to Taylorism before the war.

Before the war, the position of the CGT regarding Taylor's system was summarized in Emile Pouget's L'Organisation du surmenage. Pouget was a talented journalist and popularizer of revolutionary syndicalism who had been attracted to working class politics through his involvement with the Communards during his youth. His journalistic efforts on behalf of revolutionary syndicalism made him a recognized leader in the labor movement. His articles in La Guerre sociale, La Bataille syndicaliste and La Voix du peuple were important in defining the position of the revolutionary syndicalists. He also wrote Le Père Peinard which presented those concerns in the vernacular of the working class. Although he never held office in the CGT, Pouget was one of the leading spokesmen for the revolutionary syndicalist and anarchist tendencies of the CGT and was among the first to support the doctrine of the general strike.¹²⁵

In L'Organisation du surmenage, Pouget synthesized all the attacks on Taylorism at the time of the Renault strike into a thorough and scathing denunciation of Taylor's system as little more than an organized system of slavery. Expounding on the thesis that scientific management would result in the exhaustion of the labor force, Pouget argued that it represented the destruction of the organized labor movement and the initiative and integrity of the skilled worker as well. Pouget strongly denied that Taylor's work experience as a young man in Philadelphia factories permitted him to claim any solidarity with or understanding of the working class. To Pouget, Taylor was unquestionably a spokesman of the arrogant class of American captains of industry of the sort that Fraser had described.¹²⁶

However, the major thrust of Pouget's work was to discredit Taylor's assertion that he was simply applying scientific principles to industry in order to increase production without any increase in fatigue. Pouget's position on this point sharply differed from that of Taylor and Le Chatelier. Pouget explained that:

I shall demonstrate, in effect, that the superior production which results from the application of Mr. Taylor's procedures is only obtained thanks to the increase in fatigue and overwork for the workers to which they are subjected; and also thanks to a cunning selection process that eliminates the average workers.¹²⁷

He pointed out that Taylor's methods were invalidated by his assumption that the laborer or moteur humain was analogous to the industrial machine. Unlike the machine, Pouget argued that the worker consumes energy while theoretically at rest. He supported his argument with the recent work of French physiologists which had demonstrated that the human body required a great deal of rest in order to replenish energy consumed while working. Taylor and his disciples, on the other hand, in their mad rush to extract more production from the labor force had ignored the scientific findings of the physiologists. In contrast to Taylor's lip service to reducing fatigue and obtaining higher production, Pouget charged that the system's raison d'être was to extract higher production without any regard to the additional physiological demands placed on the workers. In referring to French supporters of Taylor, Pouget caustically wrote:

if those eulogists had looked ever so slightly, they would have discovered that Taylor appreciates man only for his production . . . that he sees him only as a "robot" . . . and that he has only one goal: to make him work to his maximum.¹²⁸

On this point, Pouget's attack focused on the ultimate waste of human resources because scientific management eliminated the average worker and

would destroy in time the superior worker because Taylorism was driven by a bonus system that stimulated production to an extent that would physically and spiritually destroy a worker over the course of his career. Taylorism, argued Pouget, threatened to waste the human resources of France to a degree that far exceeded any current wastes caused by soldiering.¹²⁹

His argument captured the image of Taylorized factories employing dehumanized robots which dominated the syndicalist perspective on scientific management before the war. Nothing in the syndicalist experience with the awkward attempts to apply Taylorism in French factories conflicted with Pouget's criticism that the ultimate aim of the patronat was to drive its workers to the point of exhaustion in a factory system based on routine, unskilled production methods. Workers saw in the efforts to implement Taylorism at Renault, the intent to eliminate workers who could not withstand the pressures resulting from the speedup of production.

In addition, Pouget extended his criticism of Taylor's system to its derogation of the skilled and semi-skilled workers. The traditional authority and independence of French workers within the production process would be destroyed by the American system which created mindless and obedient robots conditioned to act in accordance with every direction from management.¹³⁰

Yes! Yes! It is very well "to encourage" . . . to promise "rewards and compensation" . . . when you have brutalized and made cretins of the worker, when you have reduced him to being nothing more than an extension of the machine which he must henceforth blindly and unconsciously operate.¹³¹

While Pouget's analysis was a very penetrating and accurate representation of the official syndicalist position regarding Taylorism before the war, L'Organisation du surmenage was couched in terms very clearly part of the

revolutionary syndicalist tradition of ouvrièreisme, which itself was undergoing attack from an important segment of the CGT leadership. Though Pouget denounced the French patronat in general for its few unsuccessful attempts to apply scientific management and thus concluded that "there are no other capitalists who have such a base mentality, who are so mean and so stupidly rapacious,"¹³² other CGT leaders were attempting to establish better relationships between the CGT and bourgeois society.

In fact, the French syndicalist movement entered a new period by 1910 which gradually led the CGT away from the ouvrièreisme of Pouget towards a reformist policy under the leadership of men like Alphonse Merrheim and Léon Jouhaux. One can detect this change in working class politics through the nature of local strike issues and the temporary loss of member enthusiasm in the CGT and its many syndicates. In contrast to the great May 1, 1906, strike which had led French workers to strike for shorter working hours, strikes after 1910 were restricted primarily to such local issues as reductions in piece rates, unfair foremen and firing of workers. As Theodore Zeldin correctly concludes, "The CGT as a body was revolutionary, but the majority of its members and of the unions in it were not revolutionary."¹³³

In fact, there had long been a large reformist membership in the CGT which, due to the voting system that awarded each union equal representation irregardless of the size, had been underrepresented at the national level. Auguste Keufer had been the leader of the reformist wing of the CGT and secretary of the Fédération du livre since 1884. In reality, the Fédération du livre was the largest and wealthiest of the syndicates before the First World War. Keufer, however, was not respected intellectually by the CGT leadership which had been, under Victor Griffuelhes, sympathetic to the anarchism of Pouget and Georges Yvetot.

To them, Keufer's synthesis of positivism and trade unionism was equivalent to working class deference to the capitalist elites.

Clearly, Keufer's view of the labor movement subscribed to a very limited role for the working class by deferring the formulation of social and economic policy to the ruling elites. Michael S. De Lucia's dissertation on the history of reformism in the French labor movement before the First World War concludes that "the reformism of Keufer was not a dynamic reformism, it was essentially inert."¹³⁴ As such, Keufer's philosophy was deficient in providing a policy of action for those working class groups which felt the changes in the twentieth-century factories threatened their social and professional status. Instead, Keufer's positivism encouraged them to accept a society in which workers would be directed by their more competent superiors.

Léon Jouhaux and Alphonse Merrheim, in contrast, were moving before the war in the direction of formulating a reformist policy that would both end labor's isolation in French society and provide goals that would improve substantially labor's material conditions and its role in establishing policies at the factory and national levels. Merrheim, secretary of the Union des métaux, was the leading theoretician of this new school of syndicalist thought, while Jouhaux, as the secretary of the CGT, was in a position to guide the amorphous French labor movement in a direction that aimed at ending the workers' alienation from French society.

Alphonse Merrheim was unquestionably the most significant figure in the French labor movement from 1910 to 1920. As labor's most perceptive student of the French industrial economy and a tenacious advocate of those policies which he believed right for French workers, he was constantly on the leading edge of worker politics. Although lacking a formal education, his articles on

industrialism displayed a remarkable grasp of detail and understanding. There was a sharp contrast between the liberal, scholarly Merrheim and the anachronistic positivism of Auguste Keufer. Merrheim, in fact, dismissed Keufer's position as incapable of inspiring the labor movement to achieve meaningful reform, but vigorously attacked revolutionary syndicalism for its condoning of violence, its utopianism and its failure to understand the importance of organizing the working class.

His philosophy was deeply rooted in his understanding of the nature of modern industrial capitalism. He recognized that labor strategy had suffered due to its failure to take into account the dynamic nature of industrialism which was destroying the traditional patterns of factory organization and factory relations. Merrheim was convinced that a highly centralized French economy with a close relationship between the state and the patronat required the organization of an equally centralized CGT. The federation system which the revolutionary syndicalists had developed with its stress on individual syndicate action had made the labor movement vulnerable to a better organized patronat, which consistently improved its tactics in handling labor strikes. It was a fact that the CGT, under the leadership of the revolutionary syndicalists, had failed to devote sufficient effort to questions of organization. To the contrary, the anarchist orientation of leaders such as Pouget and Victor Griffuelhes tended to support the belief that elaborate labor organizations would be obstructions to eventual revolution. Merrheim and his supporters viewed this as a weakness and were successful in exploiting the failure of the revolutionary syndicalists to organize locally and accused them of contributing to what many believed was a decline and crisis in the syndicalist movement by 1911.

In contrast to the utopian and impotent strategies of the revolutionary syndicalists, Merrheim's revolutionary strategy was based on the social and

economic realities of industrialization and economic concentration. Merrheim argued that working-class policies must be based on the fact that twentieth-century industry would be more concentrated than that of the previous century. Indeed, he believed that the trend to large-scale industry would work to the advantage of organized labor by simplifying class relations and by encouraging workers to organize in order to defend their interests.¹³⁵ To Merrheim and those who supported his position, the future of the working-class movement did not require violence, general strikes, sabotage and barricades, but greater technical expertise by the workers. "Organization, not violence, was Merrheim's preoccupation."¹³⁶ Ironically, it was due to his intense study of capitalism that Merrheim lost his revolutionary zeal. Nicolas Papayanis, in a recent historical study of Merrheim's experiences during and after the 1906 May Day strike, notes that his concerns focused on the preparation and education of the working class for the revolution rather than on the revolution itself. Consequently, he was responsible for converting his large numbers of followers to reformism.¹³⁷

Merrheim was not alone in his belief that French labor policies needed to be based on the realities of modern industrial capitalism. Within the labor movement, there was a significant degree of dissatisfaction with the French patronat for its lack of dynamism and narrow self interest. Michelle Perrot has identified recently the connection between labor's criticism of French employers for their failure to modernize their operations and to perform the functions of an industrial elite with the development of a "worker Saint-Simonianism." According to Perrot, French workers during the last half of the nineteenth century became aware of the mechanization of other industrial nations and recognized that French industry was failing to compete with other national industries because of the outlook of French employers in industry which was aristocratic and more representative of financial capitalism than industrial capitalism.¹³⁸

The CGT's leadership was not unaware of the changes in attitude towards industrialization among some of its membership. The selection of Léon Jouhaux as secretary general of the CGT provided the French labor movement a leader capable of handling the transition of the organization from the period of revolutionary syndicalism to a more responsible position vis-à-vis modern industrial society. In contrast to Merrheim who was a more accomplished theoretician, Jouhaux was an effective organizer who assumed the top spot in the French labor movement in 1909 and held it for the next four decades. Unlike Merrheim who tended to be dogmatic, Jouhaux also was a pragmatist capable of seizing the moment and turning it to his own advantage. For that reason, he has received the credit for the work started by Merrheim. While Merrheim ultimately proved incapable of adjusting effectively to the opportunities offered by the war and postwar reconstruction, Jouhaux was prepared to shift his strategies to his and the labor movement's advantage.

Indeed, Jouhaux had altered his orientation from his youth when he had been allied with the anarchists. When Jouhaux took control in 1909 of the CGT, he attempted to regain the momentum of the labor movement by gradually easing the organization from its anarchism of the "heroic" period. During the period 1911 to 1914, Jouhaux essentially reached the conclusions regarding labor reforms which he would expand upon during the war.¹³⁹ His conclusions were essentially that labor must seek to reform its anti-patriotic image and to base its policies and action on a more objective assessment of the function of the patronat and labor in modern industry. In contrast to the ouvrièreisme of the anarchists and revolutionary syndicalists, Jouhaux appeared willing to consider proposals that would result in increasing productivity and modernizing French industrial methods. Such changes had to be introduced slowly, and Jouhaux failed to offer a major reform initiative before the war.

One may conclude that factory relations had evolved considerably during the years immediately preceding the war in regard to scientific management. Under the threat of foreign competition, some French entrepreneurs in the automobile industry had attempted to adopt Taylorism. Their efforts to implement scientific management were incomplete and ineffective. They viewed Taylorism within the nineteenth-century struggle with skilled labor to gain control over the production process and to enhance quickly their position in the marketplace by increasing worker productivity. The real meaning of scientific management escaped them, and, as in the case of Louis Renault, they failed to follow Taylor's advice carefully to prepare their workers for the changes that Taylorism would demand. Given the strength of the skilled labor tradition in the automobile industry, it was inevitable that the workers would defend their prestige and status against the new methods. Although the strikes of 1912 and 1913 temporarily halted the system's spread in French industry, Taylorism emerged from its obscurity. By the war, Taylorism was no longer an obscure American industrial system; the automobile strikes and the resulting publicity about scientific management caused Frenchmen to examine its role in French society. More importantly, there were persons within the labor and bourgeois communities who began to recognize the potential of Taylor's ideas for French social and economic reform. The next chapters will show that these individuals and their ideas were important in the role that Taylorism played in the First World War and postwar reconstruction.

NOTES

¹Edwin T. Layton, Jr., "The Diffusion of Scientific Management and Mass Production from the U.S. in the Twentieth Century," in XIVth International Congress of the History of Science, Proceedings no. 4 (Tokyo: Science Council of Japan, 1974), p. 379.

²Aimée Moutet, "Les Origines du système de Taylor. Le Point de vue patronal (1907-1914)," Le Mouvement social, no. 93 (October-December 1975), pp. 24-5.

³Georges de Ram to Frederick W. Taylor, September 17, 1908, Taylor Papers.

⁴Taylor to Ram, October 2, 1908, Taylor Papers.

⁵Ram, "Quelques notes sur un essai d'application du système Taylor dans un grand atelier de mécanique français," Revue de métallurgie 6 (September 1909), pp. 929-33.

⁶Taylor to Ram, September 20, 1909, Taylor Papers.

⁷Ram to Taylor, October 12, 1909, Taylor Papers.

⁸Taylor to Ram, November 1, 1909, Taylor Papers.

⁹Samuel Haber, Efficiency and Uplift; Scientific Management in the Progressive Era, 1890-1920 (Chicago: University of Chicago Press, 1964), p. 53.

¹⁰*Ibid.*, pp. 53-5. Haber has three excellent chapters on the politics of efficiency in America; see pages 51-116.

¹¹*Ibid.*, p. 18.

¹²Frederick W. Taylor, The Principles of Scientific Management, 2nd ed. (New York: Harper & Brothers, 1912), p. 8.

¹³Daniel Nelson, Frederick W. Taylor and the Rise of Scientific Management (Madison: University of Wisconsin Press, 1980), p. 170.

¹⁴*Ibid.*

¹⁵*Ibid.*, p. 168. For more on the relationship between the Taylorist movement and the progressives, see Samuel P. Hays, Conservation and the Gospel of Efficiency; The Progressive Conservation Movement, 1890-1920 (Cambridge: Harvard University Press, 1959) and Haber, Efficiency and Uplift.

¹⁶This analysis of The Principles of Scientific Management is based principally on Daniel Nelson's excellent discussion. See Nelson, Frederick W. Taylor and the Rise of Scientific Management, pp. 168-74.

¹⁷Ibid., p. 171.

¹⁸Robert H. Wiebe, The Search for Order, 1877-1920 (New York: Hill & Wang, 1967), p. 155.

¹⁹Ibid.

²⁰Haber, pp. 33-4. For the engineer's distrust of democracy, see Layton, The Revolt of the Engineers; Social Responsibility and the American Engineering Profession (Cleveland: Press of Case Western University, 1971), p. viii.

²¹William F. Willoughby, "Agencies for Studying Public Administration Generally: Unofficial," in G. A. Weber, Organized Efforts for the Improvement of Methods of Administration in the United States (New York: D. Appleton, 1919), p. 43.

²²Haber, p. 116.

²³Taylor, Principles of Scientific Management, p. 25.

²⁴Ibid., p. 42.

²⁵Ibid.

²⁶Ibid., p. 43.

²⁷Ibid.

²⁸Ibid., pp. 47 and 59.

²⁹Ibid., pp. 71-2.

³⁰For labor's fight against scientific management, see Milton J. Nadworny, Scientific Management and the Unions, 1900-1932; A Historical Analysis (Cambridge: Harvard University Press, 1955).

³¹Haber, pp. 67-8.

³²See on this topic Hugh G. J. Aitken, Taylorism at Watertown Arsenal; Scientific Management in Action, 1908-1915 (Cambridge: Harvard University Press, 1960).

³³Ibid., p.12.

³⁴Ibid.

³⁵Taylor, pp. 141-2.

³⁶Ibid., p. 143.

³⁷Taylor to Le Chatelier, May 5, 1911, Taylor Papers.

³⁸Le Chatelier to Taylor, May 23, 1911, Taylor Papers.

³⁹According to François Le Chatelier, the French translation sold 16,000 copies by 1919 and 24,000 by 1926. François Le Chatelier, Henry Le Chatelier (Paris: Revue de métallurgie, 1968) p. 252.

⁴⁰Moutet, p. 25.

⁴¹*Ibid.*, pp. 29-30. The Taylor Papers include several letters regarding these visits. See, for example, Taylor to Le Chatelier, September 17, 1912; Charles de Freminville to Taylor, December 21, 1912; Le Chatelier to Taylor, July 27, 1913; and Taylor to Le Chatelier, November 10, 1913. However, Aimée Moutet very clearly is mistaken in her belief that Georges de Ram accompanied Louis Renault to the United States. In a letter to Taylor on the eve of Renault's departure, Ram wrote Taylor: "I am exceedingly sorry not to be able to go with him Renault, but I most strongly hope that once over there he may be fully convinced of the utility of the system that he may realize that it is the only good one, the only one that makes employees and employers work together to their mutual benefit." However, Ram did visit the United States and trained under American Taylorists after Renault fired him following the initial strike against the system in December 1912. On this subject, see Moutet, p. 30, and Georges de Ram to Taylor, April 6, 1911, Taylor Papers. Ram spent several months working as an apprentice to H. K. Hathaway during 1913. However, Ram returned to France before Taylor felt the training had been completed. In any case, Ram did not assume an important role in the scientific management movement upon his return. For more on his visit to the United States see: Taylor to Ram, January 27, 1913; Ram to Taylor, March 2, 1913; Taylor to Ram, May 22, 1913; and Ram to Taylor, September 5, 1913, Taylor Papers.

⁴²Édouard Michelin to Taylor, July 28, 1912, Taylor Papers.

⁴³Marcel Michelin to Taylor, September 11, 1912, Taylor Papers.

⁴⁴H. K. Hathaway to Marcel Michelin, October 20, 1912, Taylor Papers.

⁴⁵For Taylor's and Le Chatelier's opinions on the Michelin strategy, see Le Chatelier to Taylor, June 20, 1913, and Taylor to Le Chatelier, July 8, 1913, Taylor Papers. The Michelin brothers remained interested in scientific management; after the war, they did implement the system and established the Comité Michelin which became a major vehicle in disseminating information about Taylorism to French industry.

⁴⁶James M. Laux, In First Gear: The French Automobile Industry to 1914 (Liverpool: Liverpool University Press, 1976), p. 24.

⁴⁷*Ibid.*, pp. 25-6.

⁴⁸Moutet, p. 45.

⁴⁹See Patrick Fridenson, Histoire des usines Renault, vol. I: Naissance de la grande entreprise, 1898-1939 (Paris: Éditions du Seuil, 1972) and James Laux, In First Gear for excellent descriptions of the early automobile industry in France.

⁵⁰Laux, pp. 178-82.

⁵¹*Ibid.*, pp. 181-2.

⁵²Fridenson, pp. 61-3.

⁵³*Ibid.*, pp. 65-6.

⁵⁴Laux, p. 182.

⁵⁵For an excellent brief survey of labor unrest in the industry, see Laux, pp. 183-90.

⁵⁶Moutet, pp. 34-5.

⁵⁷*Ibid.*, p. 35.

⁵⁸For biographical information on Charles de Fréminville, see his necrology in Comité national de l'organisation française (October 1936), pp. 239-42.

⁵⁹Laux, p. 36.

⁶⁰*Ibid.*, pp. 36-8.

⁶¹*Ibid.*, p. 116.

⁶²J. J. Carré et al., French Economic Growth, trans. by John P. Hatfield (Stanford: Stanford University Press, 1975), p. 24. French gross domestic production leveled off during 1908 through 1910. Using 1929 as the standard, production figures for that period were as follows: 1908=66; 1909=67; 1910=67.

⁶³Laux, p. 117.

⁶⁴Godfrey, L. Carden, Machine Tool Trade in Germany, France, Switzerland, Italy and United Kingdom (Washington: Government Printing Office, 1909), pp. 120-1.

⁶⁵Layton, p. 380.

⁶⁶Le Chatelier to Taylor, October 7, 1910, Taylor Papers.

⁶⁷Fréminville to Taylor, May 15, 1913, Taylor Papers.

⁶⁸Moutet, p. 24; and Michele Flageolet-Lardenois, "Une Firme pionnière: Panhard et Levassor jusqu'en 1918," Le Mouvement social, no. 81 (October-November 1972), p. 37.

⁶⁹Fréminville to Taylor, June 16, 1913, Taylor Papers.

⁷⁰Ibid.

⁷¹Taylor to Fréminville, July 8, 1913, Taylor Papers.

⁷²Laux, p. 116.

⁷³Ibid., p. 49.

⁷⁴Ibid., p. 51.

⁷⁵Ibid.

⁷⁶Ibid., p. 143.

⁷⁷Ibid., p. 144. Laux believes that Renault, who was primarily interested in the technical operations of the firm, at this time "seemed to be losing touch with the evolution of the market."

⁷⁸Fridenson, pp. 70-1.

⁷⁹Ibid., pp. 73-5.

⁸⁰Report from the Préfecture de Police to the Ministre de l'Intérieure, December 5, 1912, Archives National, Paris, F⁷13931. The police infiltrated strike meeting throughout France and prepared memoranda collected in the F⁷ series at the Archives National. Hereafter, such reports will be cited as A.N. Police Reports followed by the date and dossier number.

⁸¹Laux, p. 190.

⁸²Fridenson.

⁸³Ibid., p. 73.

⁸⁴Peter N. Stearns, Lives of Labor: Work in a Maturing Industrial Society (New York: Holmes & Meier, 1975), pp. 6-7.

⁸⁵Fridenson, "France-États-Unis: genèse de l'usine nouvelle," Recherches, no. 32/33 (September 1978), p. 387. Fridenson argues that management attempted to break the influence of skilled labor by appropriating their craft knowledge through the hiring of technical staff and imposing new production methods.

⁸⁶Laux, p. 193.

⁸⁷A.N. Police Reports, February 13, 1913, F⁷13931.

⁸⁸John Foster Fraser, L'Amérique au travail, trans. by Maurice Saville, 10th ed. (Paris: P. Roger et cie, 1910), p. 16.

⁸⁹Ibid., p. 45.

⁹⁰Editor of Mon Bureau to Taylor, March 5, 1913; Le Chatelier to Taylor, April 12, 1913, Taylor Papers.

⁹¹Robert L. Binkley, Realism and Naturalism, 1852-1871 (New York: Harper & Row, 1935), pp. 9-11.

⁹²Anson Rabinbach, "The Body without Fatigue: A Nineteenth-Century Utopia," in Political Symbolism in Modern Europe: Essays in Honor of George L. Mosse, Seymour Drescher et al. (eds.) (New Brunswick: Transaction Books, 1982), pp. 47-8.

⁹³Ibid., pp. 52-3.

⁹⁴Ibid., pp. 52-6.

⁹⁵Jules Amar, The Human Motor; or, the Scientific Foundations of Labour and Industry, trans. by Elsie P. Butterworth and George E. Wright (London: G. Routledge; New York: E.P. Hutton, 1920; reprint ed., Dubuque: Brown Reprints, 1972).

⁹⁶A.N. Police Reports, February 13, 1913, F⁷13931.

⁹⁷Victor Roudine, "La Grève est totale chez Renault," La Bataille syndicaliste (February 12, 1913).

⁹⁸Emile Pouget, "Le Système Taylor," La Guerre sociale (March 13, 1913).

⁹⁹Georges Bracke, "Système Taylor," L'Humanité (February 21, 1913).

¹⁰⁰Alphonse Merrheim, "La Méthode Taylor," La Vie ouvrière (February 20, 1913), pp. 210-26.

¹⁰¹Fridenson, pp. 73-5.

¹⁰²Taylor to Le Chatelier, March 20, 1913, Taylor Papers.

¹⁰³Ram to Renault, February 15, 1913, Taylor Papers.

¹⁰⁴Ibid.

¹⁰⁵Le Chatelier to Taylor, May 4, 1913, Taylor Papers.

¹⁰⁶Henry Le Chatelier, Le Système Taylor; science expérimentale et psychologie ouvrière (Paris: Imprimerie Paul Dupont, 1914), p. 5.

¹⁰⁷Ibid.

¹⁰⁸Ibid., pp. 5-6.

¹⁰⁹Ibid., p. 9.

¹¹⁰Ibid., p. 11-4.

¹¹¹Ibid., p. 16.

¹¹²Ibid., p. 17.

¹¹³Ibid., p. 21.

¹¹⁴The literature on the professionalization of the French industrial engineer is rapidly growing. For the early history of engineering education, see Frederick B. Artz, The Development of Technical Education in France, 1500-1850 (Cleveland: Society for the History of Technology, 1966). The best studies of nineteenth-century industrial engineering in France are: C. Rod Day, "The Making of Mechanical Engineers in France: The Écoles d'arts et métiers, 1803-1914," French Historical Studies 10 (Spring 1978), pp. 439-60, and John H. Weiss, The Making of Technological Man: The Social Origins of French Engineering Education (Cambridge: MIT Press, 1982). For information on the shift in emphasis from the state corps to industrial engineering at the beginning of the twentieth century, I recommend Terry Shinn, "From 'Corps' to 'Profession': the Emergence and Definition of Industrial Engineering in Modern France," in The Organization of Science and Technology in France, 1808-1914, Robert Fox and George Weisz (eds.) (Cambridge: Cambridge University Press, 1980), pp. 183-208; Shinn, L'École polytechnique 1794-1914 (Paris: Presses de la Fondation nationale des sciences politiques, 1980); and Harry W. Paul, "Apollo Courts the Vulcans: the Applied Science Institutes in Nineteenth-Century French Science Faculties," in The Organization of Science and Technology in France, 1808-1914, pp. 155-81; and Day, "Education for the Industrial World: Technical and Modern Instruction in France under the Third Republic, 1870-1914," in The Organization of Science and Technology in France, 1808-1914, pp. 127-53. Much of the literature focuses primarily on the engineering education provided in Paris. For the provincial perspective, see Mary Jo Nye, "The Scientific Periphery in France: The Faculty of Sciences at Toulouse (1880-1930)," Minerva 13 (Autumn 1975), pp. 374-75.

¹¹⁵Shinn, "From 'Corps' to 'Profession,'" pp. 201-2.

¹¹⁶Ibid., p. 188. Shinn notes that an education at the École polytechnique provided a graduate a privileged position within the social hierarchy. "Hence, for those families which sought integration with the country's ruling class, engineering careers came to be of primary importance in strategies of social mobility."

¹¹⁷Shinn, L'École polytechnique, pp. 80-99. Shinn's work is a brilliant and clear presentation of the social role that the École polytechnique played in French society and the basis of the criticism against it for its elitist orientation.

¹¹⁸*Ibid.*, p. 126.

¹¹⁹For a history of the École centrale des arts et manufactures which supports Terry Shinn's arguments on the elitist nature of the École polytechnique, see John H. Weiss, The Making of Technological Man. Weiss's study is useful on the origins of the ingénieur civil and the French engineering profession in general before 1850, but of limited use for this dissertation. Weiss has indicated, however, that he is preparing a manuscript on French engineering that will discuss modern French engineering with more information on the relationship between Taylorism and French engineering.

¹²⁰Henry Le Chatelier, Le Système Taylor, p. 23.

¹²¹*Ibid.*, p. 42.

¹²²Michel Crozier, The Bureaucratic Phenomenon, trans. by the author (Chicago: The University of Chicago Press, 1964), p. 146. Crozier criticizes the mechanistic perspective of Taylor and his successors who have failed to recognize the importance of the irrational because it could not be accommodated in their mechanistic models of the real world.

¹²³Nicos P. Mouzelis, for example, has criticized Taylor's method for its "technicist bias" which led Taylor to ignore other dimensions of organizational theory and behavior. See Mouzelis, Organization and Bureaucracy; An Analysis of Modern Theories (Chicago: Aldine Publishing Company, 1967), pp. 70-96, for his criticism of Taylorism and other "formal" theories of administration which have focused on output as the sole purpose of organizational study.

¹²⁴Le Chatelier, p. 35.

¹²⁵Michael S. De Lucia, "The Remaking of French Syndicalism, 1911-1918: The Growth of the Reformist Philosophy," (Ph.D. dissertation: Brown University, 1971), pp. 59-62.

¹²⁶Émile Pouget, L'Organisation du surmenage. (Le système Taylor), (Paris: Marcel Rivière et cie, 1914), p. 3.

¹²⁷*Ibid.*, p. 16.

¹²⁸*Ibid.*, p. 22.

¹²⁹*Ibid.*, pp. 28-40.

¹³⁰*Ibid.*, p. 53.

¹³¹*Ibid.*, p. 59.

¹³²*Ibid.*, p. 60.

¹³³Theodore Zeldin, France, 1848-1945, vol. I: Ambition, Love and Politics (Oxford: Oxford University Press, 1975), pp. 649-54.

¹³⁴De Lucia, p. 50.

¹³⁵*Ibid.*, p. 74-5.

¹³⁶*Ibid.*, p. 81.

¹³⁷Nicolas Papayanis, "Alphonse Merrheim and the Strike of Hennebont: The Struggle for the Eight-Hour Day in France," International Review of Social History 16 (1971), pp. 181-3.

¹³⁸Perrot, "Le Regard de l'autre: les patrons français vus par les ouvriers (1880-1914)," in Le Patronat de la seconde industrialisation, Maurice Lévy-Leboyer (ed.) (Paris: Les Editions ouvrières, 1979), pp. 300-4. Additional work on Perrot's concept of "worker Saint-Simonianism" would be useful.

¹³⁹Martin Fine, "Toward Corporatism: The Movement for Capital-Labor Collaboration in France, 1914-1936" (Ph.D. dissertation: University of Wisconsin, 1971) p. 14.

CHAPTER IV
SCIENTIFIC MANAGEMENT IN FRANCE
AND THE FIRST WORLD WAR

"We must organize the labor of industry for the prosperity of the nation; we must organize to build this new nation where our glorious soldiers can return to better and more productive jobs and a more dignified life; we must organize to build a basis of cooperation between the patronat and labor based, not on an artificial social peace, but on sincere collaboration . . . for the grandeur of France, her genius, prosperity and freedom for all her workers." [Albert Thomas Speech to the Citroën workers, July 12, 1917, Bulletin des usines de guerre (July 16, 1917), p. 89.]

The First World War was unquestionably a major test of the French economic system and its ability to meet the material demand of a war of attrition. While government and industry leaders improvised their policies during the war and although they were rescinded during the postwar reconstruction period, those policies had important historical consequences in demonstrating to labor and business leaders the potential benefits of closer cooperation between workers and employers to increase national productivity, reduce waste and enhance the economic and military power of the nation. It was in this effort that Taylorism gained greater support and recognition.

However, until recently historians have inadequately treated the impact of the war on the social and economic institutions of France.¹ The recent studies by Gerd Hardach, Charles Maier, Richard Kuisel, Marc Ferro, Patrick Fridenson, Thomas Grabau, Stephen Carls, John Godfrey, Henry Peiter, Aimée

Moutet and Martin Fine have focused on the structural and social reforms provoked by the war. Their work has pointed out that the First World War was an event of critical importance to economic and social reforms because it temporarily shocked French leaders out of prewar assumptions about the proper nature of the French economy and society. The unprecedented demands of the war on French industry led governmental, business and labor leaders to accept a degree of experimentation and innovation, including scientific management, that had seemed unlikely before the war. Some of these leaders, in the spirit of national self-sacrifice embodied in the Union sacrée, attempted to reach agreement on fundamental and lasting reform of the French economy and society that relied heavily on the application of scientific management in industry.

The purpose of this chapter is to assess the extent to which France applied Taylorism in the war related industries and to discuss the reasons why certain French leaders supported American techniques. This chapter will not discuss in detail the plans for postwar reconstruction to incorporate scientific management into the building of a new France; that will be discussed in the next chapter. This chapter will argue that the First World War projected Taylorism once again into the center of general French debate about the economy and society. The acute demand for munitions and military supplies encouraged French leaders to consider the role of scientific management in factories engaged in war production. Indeed, the government, particularly in the case of Albert Thomas who was responsible for war production, took the leadership role in support of Taylorism. That Thomas was a socialist is a fact that should not be overlooked; his identification of scientific management with the war effort and national defense defused some of the French left's earlier hostility to Taylorism. Nonetheless, despite the support of the state and the temporary neutrality of the labor

movement, scientific management had relatively little impact on the economic mobilization of the French war economy; while important industries attempted to implement aspects of the Taylorist system, most employers preferred to operate as they had before the war with minimum changes in response to government demands for increased productivity.

Military strategists did not anticipate the impact the war would have on the European economy and society. In preparing for a general European conflict, military plans excluded economic mobilization and massive demands for war materiel as the war was expected to be short and decisive. According to Marc Ferro, Europeans still viewed war in Napoleonic terms of "infantry charging in serried ranks, cavalry winning the decision, the whole thing lasting no more than a day."² Military strategy was predicated on the basic assumption that civilian authorities and their constituencies would not tolerate a protracted general European war.³

French mobilization plans certainly assumed a short war. Plan Seventeen, which had been adopted by French military leaders and the Ministry of War, made no provisions for an economic mobilization of the magnitude that would be required by a war of attrition. Based on the assumption of a short war, no plans were made to increase military stockpiles after the war started or to insure that economic production would not falter. Instead, nearly two-thirds of the industrial labor force was placed under arms during military mobilization; and fifty percent of French businesses closed due to conscription of the workers and employers. Furthermore, Arthur Fontaine later estimated that military mobilization left, by August 15, 1914, nearly 600,000 Parisian workers not called to arms unemployed.⁴ Moreover at the start of the war, the French state was inadequately

staffed with personnel having the technical competence or experience necessary to direct the nation's economy. The Ministries of War and Commerce, the two ministries with the most involvement in the nation's economic affairs under war conditions, had a combined total of less than one hundred fonctionnaires in positions that substantially affected the national economy.⁵

The lack of preparation was exacerbated when the German occupation of eastern France caused the economy to suffer a severe setback from the loss of valuable mineral resources and industrial plants. The German army occupied territory which had employed fourteen percent of the prewar industrial work force. The losses were even greater in the metallurgical and textile sectors of the French economy which were so vital to military production. Businesses in the occupied zones had produced 52.7 percent of iron and steel products, 41.8 percent of raw minerals and 29.4 percent of finished textile goods prior to the war.⁶

As the conflict evolved into a war of attrition, the tremendous demands for military materiel, poor economic planning, and the economic shortages caused by German occupation resulted in a serious munitions crisis. By the Battle of the Marne during the fall of 1914, acute shortages in artillery and shells alarmed military and government officials. To a certain extent, shortages in munitions were the product of French military strategy which depended heavily on the esprit of the French army to overcome the German advantage in artillery. In fact, the French army had only a meager stockpile of artillery and shells compared to German stockpiles. Thus the French army, with only 3,793 seventy-five millimeter cannons in 1914, presented the Germans with a six-to-one advantage in artillery at the beginning of the war.⁷ Military and government leaders, including General Joffre and War Minister Alexandre Millerand, were forced partially due to pressures from the parliament to find a way to provide adequate munitions for the war effort.

The first step was to reexamine the relationship between the economy and military mobilization based on the actual nature of the war. It was perfectly clear that the production of shells by French state-operated factories was inadequate. The total production of shells by these factories did not exceed 10,000 seventy-five millimeter shells daily. That figure contrasted with the High Command's daily estimated needs of 100,000 shells. Obviously, initial assumptions about military and economic mobilization had to be revised immediately. With massive numbers of factory workers pressed into the military and the factory losses due to German occupation, greater productivity was unlikely from the remaining factories and labor force at the end of 1914. The Schneider factory at Le Creusot, for example, potentially could produce large quantities of steel for the war effort, but military mobilization had reduced the labor force of the nation's largest steel factory by nearly fifty percent.

Minister of War Millerand called a meeting at Bordeaux on September 20, 1914, with a number of leading industrialists from the Comité des forges to discuss ways to increase munitions. At that meeting, Millerand realized he had no choice but to secure the cooperation of the business leaders, including the secretary-general of the Comité des forges Robert Pinot and Louis Renault. Millerand's plan called for the immediate engagement of the private sector in the production of munitions and a daily production quota of 100,000 seventy-five millimeter shells. He appointed Louis Renault to coordinate the efforts of private manufacturers with the War Ministry.⁸

Millerand's actions at Bordeaux were limited and based on expediency rather than on a well-defined method. There was no basic departure from normal peacetime relationships between the state and industry. However, his actions unquestionably were appropriate to the situation which the French government

faced in the fall of 1914. Though state arsenals were not meeting the army's demands for artillery, powder and shells, the Ministry of War was unprepared to seize control of iron and steel factories even though there were legal mechanisms to do so. The Comité des forges was prepared to take advantage of the government's weakness by controlling production to the benefit of its constituent factory owners. According to John F. Godfrey's study of the relationship between the state and industry during the war, this arrangement "made for initially amicable relations between the iron and steel industry and the government, but it could hardly be said to have protected the national interest to the fullest."⁹

In fact, historians have generally agreed that French wartime economic policy was improvised. This thesis originated with Pierre Renouvin, a French political scientist. He argued that French governmental leaders were, in principle, supporters of free markets and economic liberalism and that government intrusion during the war into the private sector was undertaken reluctantly.¹⁰ In recent years, Renouvin's thesis has been modified somewhat by historians who have found in economic mobilization noteworthy precursors to French economic planning. Richard Kuisel, for example, has noted recently that several key political figures in French government supported during the course of the war a form of economic dirigisme. According to Kuisel, government intervention in factory production, transportation and banking deepened as the war of attrition worsened. However, government policymakers generally employed what might now be termed "crisis management" as they improvised to meet munitions schedules. They preferred free-market solutions, but ultimately "the exigencies of total war compelled a widening of state intervention until war priorities, as defined by public officials in consultation with private interests, rather than the market allocated resources. State intervention included the encouragement of scientific

management in those factories involved in producing materiel for the war effort."¹¹

A key official in that effort fell to the Socialist deputy Albert Thomas whose task was to coordinate the massive munitions buildup for the Minister of War. Thomas joined his friend Millerand at the War Ministry in October 1914 in order to assure labor's cooperation in the war plants.¹² Soon the failure of Millerand to increase munitions production resulted in parliamentary pressures on him to increase the War Ministry's efforts in economic mobilization. In May 1915, Millerand appointed Thomas undersecretary for artillery and munitions under strong pressure from parliament to provide greater emphasis in the Ministry of War on economic mobilization. He later received a cabinet portfolio when a separate Ministry of Armaments and War Production was created in December 1916.

Albert Thomas was, after the assassination of Jean Jaurès, the outstanding reformist political theorist in the French socialist movement. The son of a baker, Thomas graduated from the École normale supérieure. As a student, he was influenced by the reformist philosophies of such leading French intellectuals as Lucien Herr and Charles Andler. Thomas also read extensively the works of Saint-Simon, Proudhon, Marx and Édouard Bernstein, but his biographer believes that he was most heavily influenced by the evolutionary and reformist socialism of Bernstein, the political opportunism of the nineteenth-century French socialist Benoît Malon, and English Fabianism. Moreover, Thomas was interested in contemporary developments within the American Federation of Labor, which Samuel Gompers was steering into closer cooperation with American captains of industry.¹³ Even more moderate and pragmatic than Jean Jaurès, Thomas used his

influence before the war as a deputy and editor of the Revue socialiste to support the reformist position in the French socialist party. He had supported openly Millerandism and the integration of the French working classes into the political affairs of the French nation. Though he found himself frequently in the minority of French socialist opinion, by 1914 Thomas was the recognized leader of the reformist wing of the SFIO. One recent historian has concluded about his role in the French socialist movement before the war that "Thomas saw his role as that of the reasonable man, the moderator, reconciling the ideological differences of his fellow socialists through compromise based on common sense."¹⁴

Thus, Thomas was intellectually predisposed to the spirit of class cooperation represented by the Union sacrée. His role as economic organizer at the Ministry of War offered him an opportunity to put his ideas into operation. He believed his contributions would be beneficial to the immediate war effort and would also provide a basis for social and economic reforms which he felt would be necessary for postwar reconstruction.¹⁵

Indeed, Thomas was keenly interested in the postwar reconstruction of French society based on class cooperation and maximum productivity, but his immediate problem during the early stages of the war was to increase artillery and munitions production.¹⁶ His first step was to assemble a team of competent staff to work with him at the Ministry of War. Drawing from men whom he had met during his student years, Thomas assembled a team of administrators and economists, including Mario Rocques, Arthur Fontaine, Hubert Bourgin and William Oualid.¹⁷ Their participation provided Thomas's staff with a distinctly intellectual orientation.

The next step was to secure the confidence and support of leaders in the patronat and the labor movement. Thomas, in fact, developed strong links

with the "dynamic sectors" of the French economy. He clearly preferred to work with the owners of the larger factories and those entrepreneurs who were most inclined to cooperate with the state by mechanizing and reforming their production methods. Although he was a socialist, Thomas was no stranger to some of the industrialists in the Comité des forges. As a student at the École normale supérieure, he had developed a friendship with the Ménard-Dorian family which had close ties to the Comité des forges. Through their friendship, he also became acquainted with some of France's leading industrialists. Kuisel argues that Thomas's relationships with some of the employers in the iron and steel factories grew into friendships and that he found them generally "capable, cooperative, and patriotic."¹⁸ He worked closely with Robert Pinot, the influential leader of the Comité des forges, and leading industrialists such as Louis Renault, Henri de Peyerimhoff, René Duchemin and Paul de Rousiers. However, it is important not to exaggerate Thomas's support within the patronat, because there remained a large number of small and medium employers who distrusted his motives and feared that state intervention would threaten the balance which had existed before the war between the static and dynamic sectors of the business community in favor of the latter.

Of course, Thomas's relationship with the labor leaders predated the assumption of his duties at the War Ministry. Before the war, Thomas had contributed articles to La Revue syndicaliste in support of the reformist tendencies in the CGT. According to Martin Fine, Thomas argued in these articles that the future of the labor movement lay in its economic and organizational potential within French society as a whole. To him, the CGT's most effective weapons against the economic system would be its support of progressive social legislation and its ability to educate and prepare the working class intellectually and morally for the future.¹⁹

Thomas's support in the CGT during the war depended heavily on his close personal relationship and ideological communion with Léon Jouhaux, the CGT's secretary general. In the years immediately preceding the war, this friendship had matured as Jouhaux directed CGT policy away from the revolutionary syndicalism of the "heroic period" to a more reformist position. The war and the call from all sides of the political spectrum for cooperation and patriotic self-sacrifice offered Jouhaux the opportunity, with Thomas's constant backing, to participate more closely in the government's conduct of the war.²⁰

The immediate problem which Thomas inherited at the Ministry of War was not so much ideological or political, but how to stimulate production of artillery and munitions for the front. In this, he had little choice; like Millerand, Thomas called on the patronat to step up its efforts in the production of war materiel. At first, he continued Millerand's policy which relied on industrial initiative to accomplish the military buildup. Thomas made no efforts to limit profits for munitions makers or to establish bureaucratic procedures to control factory production.²¹ In short, Millerand and Thomas entrusted the economic buildup for the war effort to Robert Pinot and the Comité des forges which, argues Kuisel, "operated as a monopoly in the state's name."²² To a large extent, the state's relationship with the Comité des forges during this period was that of buyer and seller.

While the state refrained from dictating to French employers, the patronat applied pressure on the government to effect the immediate return of the necessary factory workers and supervisory personnel from the front to return factory production to full capacity. During 1915, the government cooperated by returning thousands of skilled workers, technical personnel and administrative staff from the war to their old posts in industry. Thomas and his staff vigorously

continued their efforts to satisfy the demands of employers on the Ministry of War for more workers. However, this policy improved only temporarily the munitions shortage.²³

Ultimately, the policy of recalling workers from the front paid only limited benefits. The constant need for more men at the front conflicted with employers' demands to recall experienced workers. Moreover, workers and labor leaders criticized employers and the government for expecting too many sacrifices from factory workers and too few from the employers. There were widespread accusations that employers were failing to improve their methods of production. Traditional factory rights were often ignored and workers were expected to labor extraordinary hours during the first two years of the war. Despite the sacrifices of labor, production of shells continued to fall significantly short of quotas throughout 1915 even though the state often underwrote the cost for machine retooling and guaranteed producers' profits for their production.

Within that context, Thomas sought support from Millerand and other government leaders for more active state involvement in economic mobilization. Thomas attempted to achieve compromise between the free operation of the market and a directed economy and to secure the political commitment from the government in terms of budget and personnel to permit the state a greater degree of daily involvement in economic decisionmaking. In a June 1915 memorandum to Millerand, Thomas stated that the government would soon have to intervene to "obtain from private industry and state establishments the necessary maximum efficiency for the National Defense."²⁴

However, Thomas recognized that the government was not politically or ideologically prepared to move quickly in the direction of an économie dirigiste nor was he willing to jeopardize the cooperation of the patronat by supporting

such a policy. He was sufficiently pragmatic to recognize that the patronat and the parliament, due to extraordinary demands placed on industry by the war, would accept a temporary political solution based on an économie concertée in which the government would play a more active policy-making and oversight role; but it would not be possible to displace the patronat as principal partner in economic mobilization. Thus Thomas wrote to Étienne Clémentel, then president of the Budget Commission and later Minister of Commerce, that the Ministry of War could not expect to impose solutions on the patronat because of its lack of experience and personnel, but that, under the direction of Thomas's office, the state could demonstrate to the patronat and labor leaders how "to obtain the maximum possible output in terms of both quantity and quality."²⁵

Later, Thomas was driven to change his policy to a certain degree because of the tremendous pressures placed on the government to satisfy the personnel requirements at the front by the summer of 1915. General Joffre's "war of attrition" had not only failed to win the French their military victory over the German army, it had also forced the government to apply additional measures to replenish the depleted military forces.²⁶ As a result, Thomas was pressured to reverse his previous efforts to fulfill with little question the manpower needs of factory owners. His policy now called for the replacement of those male workers eligible for military service with new workers and implementing procedures aimed at making more efficient use of machinery and scarce labor supplies.

What actions did Thomas's administration take in order to free as many possible eligible males from factory production for military combat? First, he replaced where possible males with female, foreign and handicapped workers. In fact, Thomas and the French government vigorously pursued the replacement of male workers with these new groups of workers. Arthur Fontaine, who monitored

industrial recruitment on Thomas's staff, later described in his economic history of France during the war the extent to which French industry employed female and foreign workers. The number of women employed in French industry increased 29 percent during the war, from 487,474 in 1914 to 626,881 by November 1918. This increase was largely concentrated in the factories producing war materiel. Women working in state arsenals under Thomas's control increased from 14,162 in June 1915, to over 100,000 one year later; over the course of the war, the number of females working in heavy industry increased approximately 900 percent and they comprised 25.2 percent of the labor force in factories under the supervision of the Ministry of Armaments and War Production.²⁷

There was a similar increase in foreign workers in French factories. According to Fontaine, approximately 82,000 workers from Portugal, Spain, Greece, Italy, Poland and other European nations were employed in French factories. In addition, the French government recruited workers from her colonies to work in French factories and agriculture. Over 140,000 non-European workers went to work in French factories during the war, including large numbers of Algerians, Moroccans, Tunisians, Indochinese and Chinese.²⁸

The impact of these large numbers of female and foreign workers was significant in that it contributed to the pressure for changes in the internal organization of French factories. As noted in earlier chapters, French industry before the war was marked by the large number of skilled or semi-skilled workers and their struggle with their employers over job control and worker autonomy. Much of labor's staunch opposition to Taylorism was due to skilled automobile workers' fears that the system directly threatened their professional status and control over production. Employers who would have been otherwise willing to apply motion and time studies were unwilling to fight skilled labor's opposition. That

and the patronat's concerns about the financial resources required to implement Taylorism because of its demand for more engineering staff and greater mechanization had retarded the Taylorist movement before the war.

The exigencies of the war had significant effects in reducing those prewar restraints on internal factory reform. The government's policy of replacing skilled male workers with female or foreign workers weakened the capacity of skilled labor to defer internal factory reforms. Throughout France, skilled turners, machinists, fitters and molders who had fought against Taylorism because they believed it threatened their professional and social status were replaced by unskilled workers, many of them females or foreign workers. French industrialists then had greater flexibility to employ new methods in order to meet the increased demand for iron and steel products at the front by subdividing the production process and installing new machines operated by the unskilled workers who had replaced tens of thousands more skilled workers.

Furthermore, skilled workers who remained in French factories and labor leaders were temporarily at a disadvantage to protest against the derogation of labor and the speedups which accompanied economic mobilization after 1915. While labor leaders such as Jouhaux felt uncomfortable with the large number of unskilled workers employed in the factories, open opposition to that development would have been seen as unpatriotic. Similarly, protests against work speedups in factories producing artillery and munitions for the war effort would have been, in 1915 and 1916, contrary to the spirit of national sacrifice and the Union sacrée. Thus the war enabled French employers, under the guise of the industrial crisis, to make great strides forward in their efforts to reduce the power of French workers and the handicraft tradition in factory production.

Thomas and his staff were instrumental in assisting the patronat in factory reform. As undersecretary and later Minister of Armaments and War Production, Thomas applied pressure on industrialists to make the maximum use of available unskilled workers. He made suggestions on how factories could be organized so as not to overtax physically the women placed in positions previously held by men. He demanded that employers apply standardized production techniques, eliminate manual handling of heavy objects, and minimize waste of labor resources through job specialization. More importantly, the government reduced the possibility of financial loss that could have resulted from factory reorganization. Government contracts with war-related industries guaranteed industrialists profits and permitted them to purchase expensive machinery and to undertake extensive factory reorganization. In some cases, the government advanced industrialists large sums of money to build new factories or to purchase new equipment for existing establishments.²⁹ This policy, in effect, greatly reduced risks for businessmen and removed another obstacle to factory reform and more extensive application of scientific management.

While Thomas and his staff provided technical instruction and financial support to employers to promote the most efficient utilization of French industrial resources, by January 1916 he was concerned that industrial output had not reached its potential and that industrialists were not achieving their quotas.³⁰ It had become apparent that the government's policy of stimulating production through employer initiative was insufficient. Frequently industrialists failed to meet their production quotas; there were scandalous instances when government contracts were awarded to individuals who had never had any intention of fulfilling their obligations.

During the first two years of the war, parliamentary intervention into economic production was minimal. However, from June 1916 to Clemenceau's assumption of power on November 13, 1917, politics played an important part in the production of war materiel. Albert Thomas, by then Minister of Armaments and War Production, was the target of much of parliament's criticism for the failure of government and industry efforts to satisfy munition needs at the front.

As Minister of Armaments and War Production, Thomas exercised considerable power. His ministry's responsibility for purchase of war materiel meant that he had control of enormous credits. As Godfrey has noted about the power of the Minister of Armaments and War Production:

Under the decree which provided for its creation, the minister was responsible for the preparation, production and use of all war materiels, and he was given complete power to search out supplies and organize production to this effect. The Minister was charged with the purchasing, manufacturing, supplying, and maintaining of armaments, and with planning for future production on the recommendations of the High Command Under Article Three, the minister was exclusively responsible for making contracts with industrialists on behalf of the various military services. The Minister purchased all the necessary raw materiels for war production at home and abroad. He arbitrated between the competing demands for armaments from various bodies and services. He was responsible for promoting military inventions, he had the power to requisition materiel, if necessary, he had the use of all hydraulic power on non-navigable waters, and he controlled all military man-power in war factories. But above all, the Minister of Armament was the link between the government and that sector of private industry which produced war materiel.³¹

With such extensive duties and responsibilities, Thomas encountered criticism extensive enough to ultimately contribute to his fall from power.

It was through his interpretation of his ministerial powers that Thomas sought support by 1916 for the widespread application of Taylorism in French industry. He was convinced that industry would not attain its munitions

production quotas solely on the efforts of factory workers driven to increase individual productivity by longer hours and exhausting production schedules. Thomas's endorsement of Taylorism in 1916 was not a dramatic reversal of his position on scientific management. As a reformist he had supported class cooperation and greater productivity from French workers. Moreover, state factories under his administration had incorporated Taylorism in the production of artillery and munitions. Before 1916, Taylorism was being applied in varying degrees at state arsenals in Saint-Nazaire, Bourges, Ripault and Montluçon.³² As the following example demonstrates, the implementation of Taylorism in the state arsenals differed significantly from those attempted in French automobile plants before the war. The engineers who took leadership responsibilities in reorganizing the state arsenals were more orthodox in their understanding of Taylorism and consequently more thorough in their implementation of scientific management than was Louis Renault in his own factories. Furthermore, these engineers were more successful in controlling labor hostility against the system than the French auto makers.

The most extensive application of Taylorism prior to 1916 was at the Penhoet naval yard in Saint-Nazaire. The Penhoet administration hired Henry Le Chatelier's close friend Léon Guillet to introduce Taylorism at Penhoet. Guillet, a graduate of the École centrale des arts et manufactures, had collaborated with Le Chatelier on the production of the Revue de métallurgie and was one of the most highly regarded French experts on metallurgical engineering.

While at Saint-Nazaire, Guillet was given a free hand to make extensive reforms in the entire operations of the naval yard. He reorganized the central control functions to strengthen the oversight of all aspects of factory production. From the planning department, each worker received detailed written

instructions on what he or she was to do each day. Guillet also succeeded in introducing Taylor's bonus system to reduce labor hostility to scientific management. Unlike prewar efforts to implement Taylorism in French automobile factories, Guillet assured Penh et workers that they would be rewarded for their cooperation in adapting to the new methods. Penh et workers received, under this wage system, a salary plus a bonus based on their productivity. As a result, Penh et workers' daily wages varied from 1.8 to 9.5 francs.³³

Guillet left Saint-Nazaire late in 1915, but the implementation of Taylorism continued under Charles de Fr minville. The former Panhard et Levasseur administrator and Taylorist disciple had left P & L at the start of the war to work at the Schneider factory at Le Creusot. At Saint-Nazaire, Fr minville finally was in a position which allowed him carte blanche authority to apply scientific management. While at Penh et, he completed Guillet's application of Taylor's system in an establishment which employed over three thousand workers in over fifty different occupations. Under their leadership, motion and time studies were conducted throughout the naval yard.

In contrast to Renault's efforts to apply Taylorism before the war, the Penh et administration took great pains to smooth the transition to scientific management and to eliminate the numerous bottlenecks in the production process which could have reduced worker productivity. According to one engineer at Saint-Nazaire, Guillet's and Fr minville's careful attention to detail won the support of the Penh et workers for Taylorism. By patiently refusing to treat unsatisfactory results as evidence of deliberate worker slowdowns or sabotage, Guillet and Fr minville did not arouse the opposition of workers and avoided the kind of labor and management confrontations that had occurred at Renault and other automobile plants during 1912 and 1913. More importantly, implementation

at Penh  et, unlike that at Renault, was not perceived by labor as a step towards reduction of piece rates; Guillet fully understood Taylor's reasons against the temptation to limit salaries by adjusting piece rates. In addition, the fact that Penh  et was a state factory negated the profit motive which had led Renault to cut piece rates. Finally, the effect of Thomas's factory inspectors was to inject in factory relations a strong influence against administrative actions which would ignite labor unrest. Furthermore, efforts were made to educate Penh  et administrators, engineers and foremen about the advantages of Taylorism. They were required to read studies by Taylor, Henry Gantt, James Hartness and Le Chatelier on Taylorism which provided the requisite theoretical background on the application and advantages of the system.³⁴ The success of the Taylorist experience at Penh  et was evidenced by the testimony of one of the engineers employed at the naval yard that the administrative staff came to believe firmly that "to waste time in industry steals a part of the wealth of the Nation."³⁵

With the Penh  et example of a successful application of Taylorism in a French factory and the government's continuing problems of satisfying the military's demands for war supplies, Thomas decided in 1916 to take a more aggressive position regarding scientific management in French industry. In January 1916, he alerted the state's labor inspectors that the government soon would have to take whatever steps necessary to see that factory production reached its potential.³⁶ During March 1916, Thomas issued several circulars to the inspectors and employers in war industries which criticized production levels and factory organization. The circulars emphasized the military's serious needs for more war materiel and requested the patronat's cooperation in reorganizing its operations to achieve higher production levels rather than pressing the government for more experienced factory workers from the front.

Thomas requested that employers make every effort to expand production with their current personnel and to make maximum use of female, foreign and handicapped workers. The patronat was urged specifically to employ unskilled female workers and "to research ways to employ each where she can achieve her maximum production."³⁷ He demanded that employers take immediate steps necessary to implement Taylorism in their establishments. He stated:

The directors of establishments must organize immediately, by the most skillful and efficient combinations, the employ of their personnel based on the following principles: the most perfect utilization possible of the efforts of each worker through the use of the Taylor system; job specialization based on individual aptitudes; and organization of shifts in a manner to prevent equipment standing idle.³⁸

He followed those instructions by telling factory inspectors to take more active roles on behalf of the state to insure that factory owners took the appropriate measures to reorganize their operations. In this role, the inspectors and the state moved beyond the placement of workers to oversight of the internal methods of production utilized by the war factories—a step well in advance of the state's traditional *laissez faire* approach to domestic production. On March 24, 1916, Thomas issued a circular which required factory inspectors to monitor the development and implementation of the new procedures designed to increase production outlined in his earlier orders. He instructed the inspectors to approach this task diplomatically in order to assure the cooperation of the patronat. Thomas also offered the patronat whatever assistance his office could provide during the implementation of Taylorism in order that labor and management would not react against the system based on their impressions which had been formed during the strikes at the Renault plant before the war.³⁹

For Thomas, the support of scientific management involved more than the immediate resolution of the munitions crisis. While there is no doubt that the government and Thomas, in particular, were at the time constantly criticized for French industry's inability to achieve quotas in artillery and munitions production, the socialist politician Thomas was also deeply concerned that labor continue its support of the war effort. It was clear, as Thomas recognized, that increased strike activity and labor unrest by 1916 signalled the growing dissatisfaction among French workers and their leaders with the government's conduct of the war. Workers were angry that their wages had not been increased despite the rising cost of living and objected to what they believed was the state's prejudice in favor of employers. Widely publicized scandals involving war contracts and large profits exacerbated the bitterness among the workers who had been willing to accept their sacrifices during the initial months of the war. Many workers had come to believe that the sacrifices had not been shared equally by the patronat.⁴⁰

Thus Albert Thomas's industrial policies were designed and explained to the workers in terms to appease labor's grievances. However, his policies represented more than political expediency; the incorporation of Taylorism within his general economic, political and social plan for France was consistent with his prewar philosophy of social reform. From this perspective, his support of Taylorism and the other social reforms which were initiated by the Ministry of Armaments during his administration constituted a rather radical departure from traditional French factory and social relations as well as from the conservative perspective which Henry Le Chatelier had provided for scientific management. Indeed, the significance of Thomas's tenure as Minister of Armaments on the history of French scientific management is based on the fact that: 1) he neutralized the prewar perception of the labor movement that scientific management was a

weapon of employers designed to destroy labor's power in the factories; and 2) he clearly identified Taylorism with the national defense thereby raising its importance above narrow class interests.

Nonetheless, labor leaders were deeply concerned that the government expected labor to sacrifice its interests in the war effort to an extent much greater than the patronat. Long hours and declining working conditions had tested the ability of the CGT leadership to restrain its membership from bolting the Union sacrée. Thomas's friend and CGT secretary general Léon Jouhaux wrote the munitions minister a strong note of protest in 1916 against the patronat's lack of concern for their workers:

The working class is angry that it is condemned to live miserably, when it sees insolent fortunes built on the public misfortune. The working class regards the present time as rather critical in requiring from all an equal measure of sacrifice. The working class knows that the patronat, in the majority of cases, only bends to the requirements of the national defense when those demands agree with their private interests.

The Union sacrée which the patronat does not consider broken, becomes increasingly a unilateral agreement which applies to the workers only.⁴¹

Though the threat to the Union sacrée and labor support of the government was clear, Jouhaux recognized that labor in early 1916 was not ready to withdraw its support for the war effort. While his patriotism and reformism favored cooperation with the government, he warned Thomas that the government would have to extract some concessions from the patronat to keep labor's support. As Jouhaux explained:

It is certain that current circumstances place our organizations in a situation of inferiority, but they do not exclude all future possibilities for action. If collaboration is not permitted to continue, it is natural for the labor movement not to capitulate before the increasingly unreasonable and arrogant demands of the patronat without a fight.⁴²

Caught between the patronat and labor, Thomas attempted carefully to design his policies to bind the interests of both classes. He believed Taylorism could be applied in a manner that would satisfy the labor leadership's demands for increased productivity at the same time that it improved the efficiency and profits of industry. However, Taylorism's image would have to be revised to avoid its prewar reputation of being antilabor.

Thus Thomas studiously avoided involving Henry Le Chatelier in the government's implementation of Taylorism, because his involvement would have raised serious objections in the labor community. Thomas, in fact, knew Le Chatelier and his work. He and Léon Guillet had recommended to the Ministry of War in 1915 procedures that would reduce the large number of defective shells which had prematurely exploded and thereby caused embarrassingly high numbers of deaths and casualties to French soldiers. Moreover, Thomas and Le Chatelier had served on a number of governmental commissions together, and they had numerous common acquaintances in the iron and steel industries. Although several engineers who had been influenced by Le Chatelier worked for the Ministry of Armaments and War Production in high level posts at the state arsenals, the historical record does not indicate that Le Chatelier had a direct influence on Thomas's support of scientific management. To the contrary, the Thomas papers provide evidence that their relationship was quite formal and cold. Le Chatelier, for example, protested to Thomas about the government's censorship of the engineer Victor Cambon's mild criticisms of the state. Le Chatelier also passed to Thomas communications from American Taylorists who were interested in assisting the French government in the reorganization of French factories. However, there is no record that Thomas acted on those matters which Le Chatelier communicated. Thomas, on the other hand, told one of his aids that the relationship between

the Ministry of Munitions and Le Chatelier should be "polite."⁴³ In short, Thomas denied Le Chatelier any meaningful role in the Ministry of Armaments and War Production because of his overriding social conservatism.⁴⁴

Unlike Le Chatelier, who saw Taylorism as a system which would restore the social control of the privileged classes, Thomas had a vision of industrial democracy that essentially called for the continuation of the Union sacrée in postwar France. As a socialist and syndicalist, he could not support a system, as represented by Le Chatelier, that reduced the responsibility of the worker and the working classes to the status of mere cogs in the wheels of industrial society. Consequently, Thomas reshaped Taylorism to fit his philosophy of social reform and to make it more acceptable to the labor movement.

Believing that his role as organizer of industry was only part of his mission, Thomas intended that the factory reforms implemented during the war would be continued after the war.⁴⁵ To support this position, Thomas drew heavily on his prewar convictions about the evolution of society towards class harmony and cooperation. He summarized his commitment to the new society in his outright support of the policy of "maximum production in a minimum time for maximum wages"--a slogan which in his mind reduced the Union sacrée's economic policy to its simplest terms. As the goal for war production and the reconstruction of France, this policy demanded an end to economic Malthusianism by labor and management. Taken on its own merits, Thomas's presentation of Taylorism, or "the maximum production in a minimum time for maximum wages," represented a radical departure from previous patterns of factory relations comparable to the "mental revolution" supported by Taylor and Le Chatelier. However, it is clear that Thomas's general perspective on economic and social theory clearly separated his position on scientific management from the much more conservative stances of Taylor and Le Chatelier.

Thomas, in fact, did not share Le Chatelier's thoughts on the limited role of the working classes in factory production. Le Chatelier, as noted before, called for the clear separation of the mental and manual aspects of the production process. Thomas, on the other hand, supported a concept of cooperation that embraced a much larger role for labor in the new factory than before the war. His viewpoint was compatible with the more progressive ideas of industrial democracy and labor participation in determining industrial and economic policy. Thus his vision of the future society accorded the working classes and their organized representatives a much more significant role in the decisionmaking process at the plant and national levels.

In his speeches to French factory workers, Thomas told them that their sacrifices would contribute to the creation of a new society after the war in which the particular interests of all classes would be reconciled. Thus, when Thomas talked to the workers at the Citroën factory in 1917 about the "new nation" and continued class cooperation, he was talking about the interaction of the organized working classes and the patronat--a concept foreign to the elitist model of management developed by Taylor and Le Chatelier.⁴⁶

To that end, Thomas was successful in establishing a number of commissions and offices to protect the interests of workers and to provide them greater representation in French industry during the war. At the prodding of Thomas and Jouhaux, the Labor Ministry established regional commissions in 1915. Through these commissions employers, labor representatives and government officials met to discuss wage scales, working conditions and other issues related to the economy of the region. In January 1917, Thomas established compulsory arbitration commissions and shop stewards in government-controlled factories.⁴⁷ While these innovations did not survive the war, Thomas viewed them as critical in his vision of the "new society."⁴⁸

In the final analysis, Thomas's record as economic organizer was mixed. Despite his energy and vision, the production of war materiel continued to lag. The inexperience of the government in meeting the economic demands of the war was telling under his administration. There were many small and medium entrepreneurs who resented the intrusion of the state in industry, particularly when it appeared to them that the government favored large industry. Instances of missed deliveries, unfulfilled contracts and high profits discredited Thomas in the eyes of some politicians and workers. The debacle of Thomas's effort to build a model state arsenal in Roanne based on American methods resulted in great embarrassment. According to Kuisel, the state eventually had to abandon this venture in the face of strong criticism by the press, parliament and industry, "but only after badly damaging Thomas's reputation and the cause of state enterprise."⁴⁹ Nevertheless employment in war industries increased from 50,000 in August 1914 to 1,700,000 in September 1917; French production of 75 millimeter shells rose from 50,000 to 212,000 daily; and 155 millimeter shell production increased from 405 daily to 45,000.⁵⁰

However, it was partisan politics which finally caused Thomas to leave the French cabinet. While Thomas was more effective than Millerand in organizing the economy, he also encountered great difficulties with parliament. In January 1916, he clashed with Senator Raphaél Milliès-Lacroix, a Radical Socialist and a powerful member of the Senate Finance Commission, over Thomas's decision to advance large sums of credits to Schneider to complete construction of a metallurgical complex at C  en which had been started before the war by German investors. Then in June 1916, Thomas was attacked during a secret session of the Chamber of Deputies by several deputies for the poor quality of French munitions which had caused needless casualties to French soldiers.⁵¹ The fact that Thomas

was a socialist made him politically a target of attacks from the center and right. Moreover, he was often criticized by the left for failing to defend the interests of the working class in the war industries and for selling out to the interests of the capitalists.⁵² Indeed, his support for scientific management and the introduction of unskilled females and foreign workers in the factories cost Thomas much support in the skilled work force.

Within the government, Thomas encountered substantial criticism. He often clashed with Étienne Clémentel, the Minister of Commerce, who represented a competing bureaucracy and a group of domestic producers who criticized Thomas for diverting raw materials to those industrialists producing war materiel for the Ministry of Armaments and War Production. In addition, he lost influence in the cabinet for his support of General Nivelle whose offensive failed in April 1917 and for his friendship with Minister of Labor Malvy who was tried for treason. Thomas's other enemies included the three most powerful French leaders at the end of the war: President Poincaré, General Foch and Prime Minister George Clemenceau. Within his own administration, Thomas was undermined by Louis Loucheur, an undersecretary in the Ministry of Armaments and War Production who openly campaigned for Thomas's job.⁵³ Furthermore the growing ideological split within the government over war aims, the government's refusal to allow French socialists to attend the Stockholm Peace conference and the growing strength of anti-war forces in the CGT and SFIO had weakened by 1917 the position of those socialists who served in the government. Thomas's credibility became even more tenuous as the Roanne Arsenal scandal developed. By the summer of 1917, Thomas had lost much of his earlier effectiveness in mobilizing the economic resources of France.⁵⁴ The loss of political support in the government and from the French workers made him increasingly vulnerable.

Toward the end of his administration, the strain finally caused him to lose his nerve and his judgment suffered. He and the other socialists finally resigned their posts in the government when Paul Painlevé formed his government in September 1917 and refused any concessions to the socialists who wanted the government to allow passports to those who wished to attend the Stockholm Conference.⁵⁵

How widespread were the applications of Taylorism in French factories during the war? Were Thomas's efforts to convince the patronat to reform its internal operations effective? These questions are important to the conclusions that one might draw about the role that the war played in the history of Taylorism in France. Aimée Moutet has recently concluded in her study of rationalization after the war that "the new methods were put in operation in only a small number of large factories where the reforms had started at the beginning of the war."⁵⁶ Moutet is correct in arguing that Taylorism, as it was originally presented by Taylor and Le Chatelier, was rarely attempted in French war industries. Indeed, Henry Le Chatelier was accurate when he wrote in 1919 that "there is not in France, at least to my knowledge, any industrialists rigorously applying the Taylor system, with all the components described by its author; but many industrialists have been inspired in varying degrees to adapt it in accordance with their individual mentalité."⁵⁷

In fact, Taylorism during the war was confused frequently with other reforms in the production process inspired by American industry. This was particularly true with the work of Henry Ford, which most French industrialists failed to distinguish properly from that of Taylor.⁵⁸ Ford's contribution to factory reform was the development of the assembly line, which reduced the need for human labor to transport raw materials or the objects being manufactured. The

assembly line was devised for mass production of a limited number of products. However, Taylor's system had been designed to increase productivity with little mechanical reform in plants, particularly in the iron and steel industries, which utilized a wide range of tasks to produce a variety of products. Taylor's system was designed to reform the existing plants organized during the nineteenth century with minimal changes in technology. Fordism, with its assembly line organization and its radical subdivision of the production process, sharply contrasted with French production techniques and economic values which emphasized individual style and diverse product lines. However, there is no evidence that indicates that Fordism was any more successful than Taylorism in inspiring economic mobilization.

Indeed, Thomas and other government leaders were largely unsuccessful in converting French entrepreneurs to scientific management. Though they accepted state funds to upgrade their machinery and to enlarge their plants, French industrialists believed that increases in production would be achieved most effectively by employer cooperation and organization of industry through employer associations.⁵⁹ In the case of small plant managers, there was an unwillingness to change their operations by implementing scientific management. They feared that to do so would expose them to unnecessary economic risks once the war ended. Furthermore, the patronat was willing to concede the state only a limited role in directing the economy during the war. Thus Thomas's instructions to French plant managers about Taylorism had little effect in persuading them to reform their operations. Indeed, economic mobilization depended primarily on capital formation more than improvements in factory organization as provided by scientific management. Thus, industry relied extensively on the government's role in the coordination of raw materials for essential industries, the redirection of

existing factories for war production and the establishment of new factories. Under state patronage, new industries rapidly developed in the Seine region and central and southern France, which had not previously been centers of heavy industry, creating a transformation in the French economy greater, as Gordon Wright concludes, "than any other experience of war depression in modern times."⁶⁰ Though the state had underwritten, as noted earlier, mechanization of some existing plants, the government had been frustrated in its efforts to convert French employers to Taylorism.

If Taylorism contributed little to this transformation, there were a number of areas in which Taylorism did inspire some reforms. Most of these, as at Penhoët, took place in factories working exclusively to produce war materiel. It is significant, as the following examples illustrate, that while Thomas urged factories engaged in the production of war supplies to apply Taylorism, inspired by his ideas about industrial democracy, the plants which did attempt Taylorist reforms did so with little regard to worker participation.

Ernst Nusbaumer's description of his experiences at the state arsenal at Ripault pointed out that the primary reason for applying Taylorism was to increase production. Nusbaumer had visited American factories before the war where Taylorism had been applied. On Le Chatelier's recommendation, Nusbaumer was employed in 1916 at the Ripault plant where 3,500 workers were engaged in the manufacture of powder for the 155 millimeter shells. During the initial months of economic mobilization, the large influx of unskilled workers at Ripault unfamiliar with the plant's operations had caused internal confusion and the deterioration in the quality of finished products. Nusbaumer was expected to restore order and to increase production. Upon arrival, he established a planning

department to centralize control of the factory's operations. As for the workers, Nusbaumer followed Taylor's advice in establishing a bonus system. Piece rates were set to allow workers to benefit from increased productivity. Still, there was initial opposition from workers, whose hourly production per worker fell from fifteen kilograms to eleven in December 1916. But by February 1918, the figures had improved dramatically to forty-eight kilograms per worker per hour.

Nusbaumer's descriptions of the Ripault experience indicated that he was inspired by the traditional view of Taylorism—not that of Thomas. No mention was recorded that Nusbaumer incorporated Thomas's notion of worker participation in decisions about the reforms implemented at Ripault. Indeed, Nusbaumer firmly believed that the functions of management and labor must be separated and that workers must follow the instructions prepared by the planning department. According to him, his approach did not cause insurmountable problems with the Ripault workers who were supportive of the reforms at the conclusion of the implementation phase.⁶¹

Serge Heryngfel, who had previously worked at Michelin, used Taylorism in the automobile repair shops under his control. His application of scientific management heavily stressed the elimination of wasted movements in an activity which did not generally allow a great deal of repetitive work. And like Nusbaumer, Heryngfel utilized the bonus system to assure the cooperation of his workers but did not emphasize labor participation.⁶²

There were a number of other plants which had increased production by the introduction of modern organizational methods. It is not possible to provide a complete list of those factories which attempted to adapt scientific management techniques to their production operations. The records are too fragmented and brief to accomplish that task. However, it appears that the majority of the

factories' reforms were very limited in scope. For example, one Lyon factory was reported to have introduced Taylor's technique of providing workers with daily written instructions to enhance management's control over the production process. The firm of Delauney-Belleville, a Paris factory which was involved in artillery production, employed the Halsey bonus system which was similar to Taylor's in that it permitted the firm to distribute to the workers some of its savings due to higher production levels and lower production costs. Bonus systems were also applied at the Société de Métallurgie du Centre at Bourges and the Darigaud et Texier factory at Mont-de-Marsan.⁶³

At the state arsenal at Chatellerault, the management applied motion and time studies and the Rowan system of pay during the last half of 1916. According to one report, these reforms eliminated a great deal of wasted motions, established reasonable piece rates, and organized work more efficiently in the workshops, even though workers continued to resist the system. On the other hand, the reports indicated that increases in productivity were being realized by October 1916.⁶⁴ The Faves-Lille factory in Paris and the Delaugère-Glayette works in Orléans also were able to maintain and then increase their production by employing more rational organizational techniques which included motion and time studies. One government inspector reported after visiting the Orléans firm that "in a general manner, the factory has decided to make each of its methods and operations the object of a complete study and not leave anything to the initiative of the workers or foremen."⁶⁵ Stephen Carls, in his dissertation, claims that Louis Loucheur had implemented Taylorism in his Lyon factory and thereby was producing three times the quota established for his plant by the end of 1916.⁶⁶

Scientific management did play a role in the aviation industry which, like the munitions industry had been overlooked during prewar military planning

but which ultimately assumed an important role in economic mobilization. Before the war, the aviation industry was marked by its decidedly decentralized production methods. In Paris alone, there were twenty-two workshops engaged in producing engines for airplanes. As in the early automobile factories, labor in those workshops was primarily composed of skilled craftsmen. The military's appetite for planes caused a sharp upturn in demand and production problems for such manufacturers as Citr en, Regy Fr res and Nieuport, all of which applied American production techniques to their factories to increase production; Andr  Citr en utilized the assembly-line methods that he had observed in the Ford plants. With the state providing the necessary funds to purchase up-to-date machinery and encouraging rationalization, scientific management was ideally suited to improving productivity in shops such as those involved in manufacturing airplanes that were undergoing a transition from skilled to unskilled labor. Indeed, it appears that Taylorism was appropriate for the assembly operations of the aviation plants and was combined with state efforts to centralize and rationalize the production of airplanes. The adoption of bonus systems succeeded in securing the cooperation of the workers. In one assembly operation, tasks which had previously required more than fifty hours to complete required only nineteen by late 1917.⁶⁷

What conclusions may be drawn about scientific management's impact on economic mobilization in general and Albert Thomas's interpretation of Taylorism in particular? First, scientific management played a rather minor role in the actual economic mobilization. If there were notable examples in which plants attempted to implement aspects of scientific management, they were a minority of the factories engaged in war production. Second, there is little evidence to indicate that Thomas inspired those engineers and businessmen who did attempt to

adopt scientific management in their production. Their concerns were directed to the task at hand: expanding production quickly. They were largely technicians and therefore not easily persuaded by the ideological currents of Thomas's new factories or industrial democracy. Indeed, their later accounts of their implementation of Taylorism did not indicate that the factory delegates or Thomas's ideas on worker participation in plant decisionmaking were employed during the planning or implementation phases of the reorganization.

His ideas on factory relations were not kept intact after his fall from power. A February 26, 1918, circular issued by French Premier Georges Clemenceau ordering factories producing for the war effort and under the supervision of the state to implement Taylorism completely ignored the innovations in factory relations, such as factory delegates and worker participation, that Thomas had introduced.⁶⁸ Nonetheless, his presentation of scientific management coupled with worker participation and industrial democracy greatly enlarged the debate on Taylorism during the last years of the war and in the immediate postwar period and offered a clear alternative to the more conservative version of Taylorism developed by Taylor and Le Chatelier.

NOTES

¹Gerd Hardach, The First World War, 1914-1918 (Berkeley: University of California Press, 1977), p. 1. Hardach argues that the First World War was an important "climacteric" in the social and economic history of Western Europe, but that many historians have slighted the impact of the war in general histories due to their preference for the "good old days" of the turn of the century European civilization which was shattered by the war.

²Marc Ferro, The Great War, 1914-1918, trans. by Nicole Stone (London: Routledge & Kegan Paul, 1973), p. 27.

³Ibid.

⁴Arthur Fontaine, L'Industrie française pendant la guerre (Paris: Presses Universitaires de France, 1924), p. 51.

⁵John F. Godfrey, "Bureaucracy, Industry and Politics in France during the First World War: A Study of Some Interrelationships". (Ph. D. dissertation: Oxford University, 1974), p. 7.

⁶Ibid., p. 28.

⁷Ferro, p. 93.

⁸Stephane Rials, Administration et organisation: de l'organisation de la bataille à la bataille de l'organisation dans l'administration française (Paris: Éditions Beauchesne, 1977), pp. 76-6.

⁹Godfrey, p. 58.

¹⁰Pierre Renouvin, The Forms of War Government in France, trans. from the French edition (New Haven: Yale University Press, 1927), p. 53.

¹¹Richard F. Kuisel, Capitalism and the State in Modern France: Renovation and Economic Management in the Twentieth Century (Cambridge: Cambridge University Press, 1981), pp. 31-2.

¹²Ibid., p. 35.

¹³Bertus W. Schaper, Albert Thomas; trente ans de reformisme social (Assen, Netherlands: Van Gorcum, 1959), pp. 21-44.

¹⁴Godfrey, p. 216.

¹⁵This dissertation's conclusion on Thomas's plans for using war social and industrial reforms as the basis for postwar social reform differs sharply from that of Godfrey. He argues that: "For all his avowed socialism, Thomas never envisaged the war as a potential vehicle of change, either social, economic, or institutional, in the way which Clémentel did. His essentially pragmatic approach

to wartime problems prevented him from envisaging any great post-war goals toward which his efforts would be continually directed." See Godfrey, p. 224. Godfrey's conclusion minimizes Thomas's introduction of the shop steward system and the application of various industrial commissions in which labor actively participated in the decisionmaking process with business and government officials. Martin Fine's position on this point is more defensible. According to him, "In his private relationships as well as his public appearances, Thomas's attitudes reflected his intention to use the war to prepare, as much as possible, for post-war reconstruction." See Fine, "Toward Corporatism: The Movement for Capital-Labor Collaboration in France, 1914-1936," (Ph. D. dissertation: University of Wisconsin, 1971), p. 24.

¹⁶Alain Hennebique has been extremely critical of Thomas's influence on the working classes during the war due to his attempts to secure the cooperation of employers to the point that he sacrificed the interests of the workers to those of the employers. See Alain Hennebique, "Albert Thomas et le régime des usines de guerre, 1915-1917," in 1914-1918: l'autre front, Patrick Fridenson (ed.) (Paris: Éditions ouvrières, 1977), p. 115.

¹⁷Fine, p. 14.

¹⁸Kuisel, pp. 35-6.

¹⁹Fine, p. 13.

²⁰*Ibid.*, pp. 13-5. In retrospect, Jouhaux and the CGT had little choice other than to cooperate with the government. To have opposed military mobilization would have resulted in the destruction of the CGT; however, it also appears that Jouhaux acted in accordance with his own strong sense of patriotism and that of most of the working classes.

²¹Kuisel, p. 35.

²²*Ibid.*

²³Albert Thomas to Alexandre Millerand, June 1915, Archives National, Thomas Papers, Dossier 119. Information for this chapter and the next will rely extensively on the Thomas Papers at the Archives National in Paris, hereafter cited as A.N. Thomas Papers, followed by the dossier number.

²⁴Thomas to Millerand, June 1915, A.N. Thomas Papers, Dossier 119.

²⁵Thomas to Étienne Clémentel, July 29, 1915, A.N. Thomas Papers, Dossier 62.

²⁶Alfred Cobban, A History of Modern France, vol. III: France of the Republics, 1871-1962 (Baltimore: Penquin Books, 1965), p. 111.

²⁷Fontaine, pp. 42-3; and Jean-William Dereymez, "Les Usines de guerre (1914-1918) et le cas de la Saône-et-Loire," Cahiers d'histoire 26 (1981), p. 165.

²⁸Fontaine, pp. 40-1.

²⁹"Le Problème de la main-d'oeuvre. Note sur l'utilisation de la main-d'oeuvre féminine, " Bulletin des usines de guerre (July 17, 1916), pp. 95-6.

³⁰Ministère de l'armement et des fabrications de guerre, "Contrôle de la main-d'oeuvre. Répertoire chrono-analytique des circulaires, instructions, décisions ministérielles. Documents classés jusqu'au 31 décembre 1916," January 23, 1916, A.N. Thomas Papers, Dossier 129.

³¹See Godfrey, p. 221.

³²Report from Lieutenant-Colonel Appert to Thomas about the methods of paying workers at the state arsenal in Bourges, June 3, 1916, A.N. Thomas Papers, Dossier 122; L. Lavallée, "Résultats obtenus par l'application des nouvelles méthodes de travail dans un chantier de 3000 ouvriers," Bulletin de la Société d'encouragement pour l'industrie nationale 118 (May-June 1919), pp. 441-94; and Ernst Nusbaumer, L'Organisation scientifique des usines (Paris: Nouvelle librairie nationale, 1924), pp. 91-117.

³³Léon Guillet, "Méthode sur le traitement thermique des obus: application de la méthode Taylor," Revue de métallurgie 13 (January 1916), pp. 1-154.

³⁴Lavallée, p. 485.

³⁵*Ibid.*, p. 444.

³⁶Ministère de l'armement et des fabrications de guerre, January 23, 1916, A.N. Thomas Papers, Dossier 119.

³⁷"Pour Augmenter le rendement et économiser la main-d'oeuvre," Bulletin des usines de guerre (May 8, 1916), p. 11. While the circulars were issued in March, they were not published in this publication until May 1916.

³⁸*Ibid.*

³⁹Ministère de l'armement et des fabrications, March 24, 1916, A.N. Thomas Papers, Dossier 119.

⁴⁰Kuisel, p. 37.

⁴¹Léon Jouhaux to Thomas, June 7, 1916, A.N. Thomas Papers, Dossier 122.

⁴²*Ibid.*

⁴³Thomas to William Oualid, December 15, 1916, A.N. Thomas Papers, Dossier 37.

⁴⁴*Ibid.*

⁴⁵Gerd Hardach, on the other hand, argues that Thomas attempted to separate his duties as war organizer from that as socialist politician. According to this view, expediency during the war prevailed over Thomas's political convictions. See Hardach, "La Mobilisation industrielle en 1914-1918: production, planification et idéologie," trans. by Dora Fridenson, in 1914-1918: l'autre front, p. 90. This dissertation accepts Martin Fine's interpretation of Thomas's role during the war: "Thomas's approach to industrial relations reflected his desire to preserve both the Union sacrée and his reformist outlook. Under the rationale of protecting working-class interests, he sought to integrate the labour movement into war-time productive operations." See Fine, p. 14.

⁴⁶Thomas, "Allocution de M. Albert Thomas à l'inauguration d'une cantine de l'usine Citroën, le 12 juillet 1917," Bulletin des usines de guerre (July 16, 1917), pp. 156-7.

⁴⁷Fine, pp. 17-8. A study of these corporatist bodies would be helpful.

⁴⁸*Ibid.*, p. 19. According to Fine, "Viewing the war as a vast testing laboratory both Thomas and Jouhaux sought to apply new ideas and methods in many areas of social and economic activity. These pragmatic ventures were decisive because they deepened and broadened pre-war reformist perspectives. Even if reality never quite came up to expectations, these experiences still established the foundation of post-war theory and action."

⁴⁹Kuisel, pp. 36-7. According to Godfrey, the Roanne Arsenal cost 203,000,000 francs to construct and operate, but produced only 15,000,000 francs worth of material. See Godfrey, p. 225.

⁵⁰*Ibid.*, p. 223.

⁵¹*Ibid.*, p. 63-5.

⁵²*Ibid.*, p. 229.

⁵³*Ibid.*, p. 67.

⁵⁴*Ibid.*, p. 232. On Thomas's actions and interests immediately prior to the creation of the Painlevé cabinet see Stephen Douglas Carls, "Louis Loucheur: A French Technocrat in Government, 1916-1920," 2 vols. (Ph.D. dissertation: University of Minnesota, 1982), 1: pp. 140-8.

⁵⁵Fine, pp. 25-33; and Arno Mayer, Political Origins of the New Diplomacy (New Haven: Yale University Press, 1958), pp. 191-225. According to Mayer, Allied governments opposed participation of their nation's socialist parties at the Stockholm conference for several reasons which included: 1) opposition to discussions with the German socialists; 2) reluctance to permit open discussions about Allied war aims; 3) unwillingness to recognize the International's role in negotiating a peace settlement; 4) fear that peace talks would detract from the war effort; and 5) belief that the Stockholm Conference could work to the political advantage of the socialist parties. Mayer also notes that the Stockholm Conference issue ultimately, with the resignation of Thomas and other Socialist

ministers, ended the Union sacrée and started the internecine conflicts between the "Social Patriots" and the "left dissidents" in the SFIO.

⁵⁶Aimée Moutet, "Patrons de progrès où patrons de combat? La politique de rationalisation de l'industrie française au lendemain de la première guerre mondiale," Recherches, no. 32/33 (September 1978), p. 449.

⁵⁷Henry Le Chatelier, "Notre enquête sur le système Taylor. Les observations de M. H. Le Chatelier," Information ouvrière et sociale (September 14, 1919).

⁵⁸Moutet, p. 454.

⁵⁹Fine, p. 21.

⁶⁰Gordon Wright, France in Modern Times: From the Enlightenment to the Present, 2nd ed. (Chicago: Rand McNally, 1974), pp. 314-5.

⁶¹Ernst Nusbaumer, "Essai d'application du système Taylor dans un grand établissement d'état (poudrerie du Ripault)," Bulletin de la Société d'encouragement pour l'industrie nationale, 118 (May-June 1918), pp. 495-539. Nusbaumer added that after the Armistice, the planning department was abolished and the system dismantled due to neglect.

⁶²Serge Hryngfel, "Procès-verbal de la séance du 25 octobre 1918," Société des ingénieurs civils de France (October 1918), pp. 134-9.

⁶³Contrôle de la main-d'oeuvre militaire, "Résumé des rapports des contrôleurs pour le mois de juillet 1916," September 13, 1916, A.N. Thomas Papers, Dossier 129.

⁶⁴J. Aupetit to the Commission d'utilisation et de repartition de la main d'oeuvre, October 18-27, 1916, A.N. Thomas Papers, Dossier 122.

⁶⁵Direction de la main d'oeuvre to the Minister of Armaments, November 28, 1917, A.N. Thomas Papers, Dossier 123.

⁶⁶Carls, 1: pp. 28-9.

⁶⁷Direction de la main d'oeuvre to the Minister of Armaments, December 29, 1917, A.N. Thomas Papers, Dossier 123. For general background on the aviation problem during the war see Carls, 1: pp. 160-70.

⁶⁸Georges Clemenceau, "Au Sujet de primes de travail aux différents catégories de personnel travaillant dans un même atelier ou chantier et à l'industrialisation du travail," February 26, 1918, Comité Michelin Papers, Paris. Charles S. Maier has cited Clemenceau's circular as evidence to document French interest in Taylorism. In fact, the circular reflected a wider interest in scientific management. However, Clemenceau himself did little to encourage its adoption. See Charles S. Maier, "Between Taylorism and Technology: European Ideologies and the Vision of Industrial Productivity in the 1920's," Journal of Contemporary History 5, no. 2 (1970), pp. 37-8.

CHAPTER V
POSTWAR REFORM OF FRENCH METHODS OF
PRODUCTION AND FACTORY RELATIONS: RETURN TO NORMALCY
OR AMERICANIZATION OF THE FRENCH ECONOMY?

In the last chapter, it was determined that scientific management contributed only in a small way to French economic mobilization during the First World War. Despite the efforts of Albert Thomas and Étienne Clémentel, the government leaders primarily responsible for the production of war supplies, to promote scientific management, the patronat had failed generally to apply Taylor's system in its factories. However, interest in Taylorism continued to grow during the war among French business, labor and government leaders. The effect of the war on French attitudes toward the economy, society and factory relations was manifested by support for Taylorism in reconstruction planning during the war. Reconstruction planning was, in its earliest forms, a product of wartime optimism that the industrial effort and production methods which had been utilized in war production would continue after the war. There was a general belief among economic reformers that the impact of the war would present France the opportunity to modernize her economy. It was in that context that Taylorism played a significant role in discussions of postwar reforms.

There were very important differences among the groups interested in French economic reform. This chapter will examine closely the viewpoints of the

major economic reformers in the government, the industrial engineers, the physiologists of labor, the patronat and reformists in the labor and socialist movements. They were the major forces which attempted to shape to their advantage the general belief of Frenchmen that postwar conditions would require some accommodations to the twentieth-century industrial values of efficiency and class cooperation. The critical point to the dissertation is the fact that the factors which divided these groups of reformers prevented them from forming a viable coalition for economic reform.

This chapter will conclude with the discussion of the definitive break between labor and capital resulting from the strikes of 1919 and 1920. Though reconstruction did not terminate at that point, the strikes and the era of hostile relations between labor and bourgeois society which followed after the strikes also ended the possibility of labor and management cooperation to construct a new factory system based on full production and scientific management techniques. Coupled with the coal shortages, severe disruptions in the transportation system, inflation, and the tremendous dislocations of the European and domestic markets, the resumption of class conflict spelled the end to earlier optimistic projections about reconstruction. By the summer of 1920, French industrialists exhibited a great deal of pessimism about the economic future.

Why Taylorism once again failed to produce fundamental changes in French factory relations and the nation's economy after the war is the problem which must be solved in this chapter. If the First World War, as with the Franco-Prussian War, caused Frenchmen to criticize weaknesses in the basic institutions of the French economy, then why was there not an economic renaissance on a large scale? Why did France renege on its apparent commitment to emulate American and German methods of national economic organization and industrial

efficiency? What happened to the commitment to institutionalize in French society the values of cooperation and production? At the intellectual level, what became of the consensus against prewar France's "excessive individualism" which had made her vulnerable to German militarism? In short, one major task of this chapter will be to explain why the war-time support for French economic and social reorganization had such meager results in the immediate postwar period.

During the middle of the First World War, a number of French intellectuals, industrialists and political leaders compared the nature of French general economic and social theory with that in Germany. Their interest in the comparison had been provoked by German claims of organizational superiority. The French publications of Friedrich Naumann's L'Europe centrale and Wilhelm Ostwald's Les Fondements énergétiques de la science de la civilisation caused great concern in French intellectual circles about the nature of the German threat to France.¹ Naumann was a spokesman for the Pan-Germanic movement, while Ostwald was a respected German chemist. Both emphasized the particular German talents for organization and the ultimate destiny of the German race to impose the German system on the European continent. To Ostwald, German national superiority was demonstrated by the failure of other European nations to recognize the importance of the demands of the nation over the rights of individuals. Thus he viewed French respect for the small producer as a sign of national weakness and decadent individualism.²

French intellectual and political reaction to the Ostwald and Naumann claims of German organizational superiority over France was an important factor in the questions raised during reconstruction planning. Jean Labadie, for example, solicited input from a wide number of France's leading politicians, scientists and

political economists on whether or not Germany was uniquely gifted with organizational talents. Émile Boutroux, Georges Sorel, Charles Gide, Lucien Lévy-Bruhl, Charles Maurras, Jacques Bainville, Henry Le Chatelier and Édouard Herriot were among those whose responses were included in Labadie's L'Allemagne a-t-elle le secret de l'organisation? which was published in 1916. Most of the responses denied that Germany was unique in her abilities for economic and military organization. To admit otherwise would have elevated organizational technique to a metaphysical level or racial trait. Such a conclusion was certainly not well established empirically or easily verifiable scientifically. Moreover, they pointed out that German history before Bismarck had been characterized more aptly by the struggle among numerous German states for influence and power within the Holy Roman Empire, while France, under leaders such as Colbert and Napoleon, had demonstrated that a well-organized state could dominate militarily and economically the European continent.³

The content of the arguments against the Ostwald-Naumann thesis is perhaps less significant than the emotional intensity of those who chose to debate against it. Stéphane Rials has concluded recently from his reading of the Labadie book that the attack against the Ostwald-Naumann thesis was more an exorcism than a discussion of its intellectual merits. In fact, the Ostwald-Naumann thesis was controversial because it struck chords deeply embedded in the French collective image of Germany and her superiority over France.⁴ French intellectuals had been preoccupied with the image of the German menace since the Franco-Prussian War; Claude Digeon characterizes the period 1871 to 1914 in French intellectual history as the "German crisis in French thought."⁵ Indeed, the history of French educational and economic reform before the war is difficult to understand without reference to the German challenge.

To some French intellectuals, the economic struggle between France and Germany had been the underlying dynamic in European politics since 1848. Thus the Ostwald-Naumann thesis informed French fears of the ultimate national destiny and goals of the German nation. Henri Hauser, a French economic historian and a respected authority on the German economy who was closely associated with some of the leading French industrialists and one of Étienne Clémentel's top staff at the Ministry of Commerce, argued in 1915 that the war had been caused by the industrial dynamism of the German economy with its insatiable appetite for dominance in European and colonial markets. According to Hauser, military defeat of Germany would not guarantee French national security, because the impetus for German industrial and territorial expansion and the nature of German Weltpolitik would result in the resurgence of German aggression in an economic form equally as threatening to France as the current military challenge. According to Hauser:

We must not have any illusions: while Germany may be defeated and weakened, Germany will not cease to exist. It is useless to believe, as some journalists write, that we will suppress a nation. Even if we can control the Germans militarily, our politics and ethics will not permit it. After our victory, there will arise a new Germany, which will return patiently and stubbornly to its task. Shortly after the great war ends, another war, the economic war, will be declared. If we do not wish to be overcome, it is necessary to prepare for the future economic mobilization.⁶

Hauser's attitude was shared by others who believed French economic reform was essential for postwar reconstruction. André Lebon, a leading industrialist in the French Chamber of Commerce and president of the Fédération des industriels et commerçants français, agreed with Hauser that France would have to adopt German methods of organization and employ the most modern machinery available after the war. Lebon warned that Germany would attempt to conquer

France by flooding the domestic market with German products and urged the French not to buy German products.⁷

Henri Lichtenberger and Paul Petit's L'Impérialisme économique allemand epitomized the argument of those French intellectuals who viewed the war in terms of the economic struggle between France and Germany. L'Impérialisme économique allemand was published in 1918 for Gustave Le Bon's Bibliothèque de philosophie scientifique. According to Lichtenberger and Petit, the war was clearly more important in terms of its economic dimensions and the German struggle for economic hegemony over the European continent than for its purely military dimensions.⁸ They believed that German methods of factory organization were linked intimately to her political and military goals of imperial expansion, and her Weltpolitik. The entire social structure of Germany was characterized by what Lichtenberger and Petit called "organized capitalism." In contrast to the class conflict exhibited by French factory relations, the German proletariat and employers cooperated to produce manufactured products in the most efficient manner possible.

They discussed at length the postwar economic peril that would result from the resumption of economic relations between France and Germany. France was threatened with becoming a German client state after the war when French capital would flow once again to the Germans in order to meet payments for German goods. But what solutions did Lichtenberger and Petit offer for French postwar economic reconstruction? Essentially, they offered two solutions. The first was a policy of reparations and economic sanctions against Germany based on French national security and industrial expediency. This policy called for the continuation of Allied support for France against Germany and the economic isolation of Germany until France could compete effectively with German industry in the domestic and foreign markets.⁹

Their second solution aimed at making France competitive with her enemy by putting greater emphasis on economic organization. Lichtenberger and Petit concluded that the war should convince Frenchmen that the nation's strength would depend upon the productive efforts of all workers and greater concern for the collective well-being. Ostwald was correct to single out the important advantage that industrial organization had provided Germany before the war.¹⁰ Similarly, France had to develop her own system of economic organization:

The most serious error that we can commit is to imagine that organization, method, patience and discipline are "German traits" and, therefore, contrary to the French character The danger, to us, would be for France to abandon her future to a soft and feeble anarchism and to refuse the necessary effort and sacrifices required from all individuals in an organization. Between "organization" and "individualism," there is no contradiction.¹¹

The most outspoken supporter among those who called for fundamental French factory reform was the French engineer Victor Cambon. He was the brother of the prominent French diplomat Paul Cambon and was a noted authority on German industrial methods. Victor Cambon's L'Allemagne au travail and Les Derniers progrès de l'Allemagne were among the most respected French prewar accounts of the manner in which Germany organized her factories to minimize the waste of materials and manpower.¹² Cambon was also a Bonapartist who was critical of the French government's handling of the war effort during the first two years of the war and believed that political power should be ascribed to an authoritarian executive rather than the ineffective parliament of the Third Republic.

During the war, Cambon wrote several important books which attempted to diagnose the factors which were depleting the material and spiritual resources of France and proposed solutions that would result in a national renaissance. In 1916, Cambon's Notre avenir declared that "all enlightened persons and

all thinking men among us have concluded that we are on the verge of a decadence that they fear will be definitive."¹³ The national crisis which France faced compared with that of 1789. The Third Republic had been racked by governmental scandals, ministerial instability, alcoholism, declining birth rates and weak economic production. His solutions were twofold: a strong executive-style government and economic organization.

By "organization," Cambon meant Taylorism, which he concluded "extracts the maximum product and profit from men and materials that is the result of its method when rigorously applied."¹⁴ According to Cambon, Germany had realized before the war the advantages that would result from the application of scientific management, but France had refused to give it sincere consideration and had suffered during the early months of the war due to a lack of organization. He claimed that Taylorism should be given the highest priority in postwar reconstruction. "Not only our prosperity, but our existence and even our future will depend on Taylorism."¹⁵

Cambon sharply criticized the efforts of Albert Thomas and his staff for their technical incompetence in organizing the war economy. In contrast to the staff at the Ministry of Armaments and War Production which included a significant cadre of intellectuals, Cambon's envisioned reforms incorporated the ascendancy of engineers and military officers because they alone possessed the technical competence and leadership needed to organize society.¹⁶ In his support of authoritarian leadership, Cambon called for a society based on social class discipline and obedience to authority very different from the industrial democracy which Thomas hoped to realize from the war economy. In short, he expected the bourgeoisie, led by the professional experts, to assume the leadership in society and the working class to willingly follow for the good of the nation. Cambon's

ideas were consistent with the patronat's attempts to eliminate the obstacles in the production process resulting from the traditional controls of the handicraft worker over his work. This was evident in Cambon's enthusiasm for the production methods he had observed in the steel factories of Gary, Indiana and the Ford factories in Detroit. There, the workers were organized to complete their work in the quickest possible fashion; Cambon commented on Ford's production of the Model-T that it "shows that the assembly thereby completed in less than an hour is a marvel of ingenuity and precision as well as logic: it represents the epitome of efficiency and the utilization of the worker."¹⁷

Cambon clearly believed that Taylorism, which to him also included Fordism as the fruition of scientific management, would eliminate the skilled workers' control over the production process and unite worker and machine in a perfect harmony that would maximize productivity. As Cambon noted, the Taylor system would permit the unskilled laborer to exceed the production of the skilled artisan working under traditional production methods. His enthusiasm for the system was total. To those who complained that Taylorism forced workers to work under monotonous and dehumanizing conditions, Cambon replied that the opposite was the case: American methods reduced fatigue and had acclimated American workers physically, materially and mentally to factory work conditions because their work was subdivided to require constant repetition. Work organized according to Taylor's and Ford's ideas caused less fatigue because it engaged only the subconscious.¹⁸

Cambon extended his arguments in Notre avenir in a series of other publications which followed during 1917 and 1918. In États-Unis, France, he re-emphasized that French reconstruction would require the implementation of Taylorism. He warned his readers that France was not threatened by German

militarism alone, but also by American materialism which would result ultimately in the shift of the balance of power to America. The only alternative open to France would be to imitate American business methods which, according to Cambon, encouraged every worker to believe it possible that he could acquire the wealth and power of a Rockefeller or a Carnegie by hard work and diligence.¹⁹

Cambon attempted to quiet labor's opposition to scientific management by placing it within a corporatist social structure. In addition to the material advantages that Taylorism promised workers, it offered to reduce substantially the physical and mental stress of the factory system which capitalism had frequently ignored. To Cambon, Taylorism overcame those deficiencies, and, by so doing, eliminated a major obstacle to the improvement of factory relations. In contrast to labor's prewar criticism of Taylorism that its subdivision and specialization of the production process resulted in dehumanization of working conditions, he forcefully argued that it would be the duty and responsibility of management to establish factory conditions that would minimize stress by applying Taylor's methods. Cambon's argument employed as justification the pseudoscientific ideas of the French crowd psychologist Gustave Le Bon. According to Le Bon, human activities which originated in the unconscious were less fatiguing than those originating in the rational faculties. The obvious conclusion that Cambon drew from Le Bon's thesis was that Taylorism would reduce fatigue by making work more repetitious and requiring less conscious involvement of the worker. As Cambon explained, "Habit, as well as assuring less fatigue of the body, suppresses all fatigue of the brain."²⁰

Nevertheless, there was no indication that he tested his conclusions on the relationship of Taylorism and labor fatigue. Cambon, like Taylor, did not incorporate in his work the recent developments in personnel management and the

physiology of labor which, as will be discussed in this chapter, raised real questions in France about Taylorism's assumptions and conclusions. Cambon's discussions of the beneficial impact of Taylorism on the physical and mental health of the French worker was ideological rather than scientific in origin. His understanding of the nature of the French labor movement, was very superficial; and he capitalized on the temporarily vulnerable position of the labor movement, which was unable to criticize strongly methods to increase factory production. He simply refused to believe skilled workers' objections to Taylorism that it would lead to an unacceptable acceleration of production, eliminate jobs for the average worker, result in the loss of professional status and derogate work in Taylorized factories. Cambon assumed that French workers would accept the new factory methods in return for the accompanying salary increases. In Le Taylorisme, a 1917 publication, he concluded that it was absurd to believe that French workers would oppose a system which would result in substantial salary increases for their increased productivity.²¹ His greatest concern was that the French economy and society, after the tremendous depletion of human resources by the war, would be on the verge of total collapse. He hoped Taylorism could prevent a national collapse by extracting greater output from the French factory worker with a minimal increase in physical and mental fatigue.

Cambon's corporatist vision was compatible with Le Chatelier's and Taylor's to the extent that scientific management would depend on the more rigorous control of the factory administration over the production process. However, Cambon questioned the leadership capacity of the French patronat to exercise the administrative control over the production process outlined by Taylor. As evidence that French engineers and industrialists were unprepared to assume the leadership role in French economic reconstruction, Cambon cited their failures to

implement Taylorism in French automobile factories before the war. He concluded that "most of them will prefer to convince themselves that their workers do not want change."²²

Changes in entrepreneurial practices would require the intervention of the state. On this issue, Cambon disagreed with Le Chatelier who generally expected the free-market process and employer self-interest to force wider application of Taylorism. He counted on the state, not the free-market economy and competition, to encourage the development of professional "organizers" analogous to the Saint-Simonian priesthood of engineers. The nation would bestow on these organizers the professional and social status of an elite. The mission of this elite would be to restore French power and to function as the guardians of industrial expertise and organizational skills. In this regard, Taylorism was the heir to the Saint-Simonian tradition within French engineering. The future was for those engineers capable of utilizing American organizational techniques to their advantage. However, he warned that:

If they are only technicians, they will lose their prestige and become important cogs, but only cogs in the great machine. There will be over them men of decision and execution who will preside sovereignly over all their operations; such men must be organizers and leaders.²³

In contrast to the prewar years when French support of scientific management was very weak, by the end of 1916 there was significant agreement that the reconstruction of French society should incorporate American methods of economic organization and efficiency. Thomas W. Grabau's dissertation on French economic reconstruction correctly argues that reformers during the war urged adoption of scientific management in French factories because they believed that the war would prove to be a complete break from earlier patterns of factory

organization and that national survival in the postwar period would demand French producers to compete on equal terms with Germany in domestic and international markets.²⁴ While there is little question that there were ideological and political differences among the reformers which precluded formation of a cohesive reform movement, there was general agreement that effective reform would require, as Cambon had outlined, considerable modification of prewar economic and social values.

The key to economic renaissance according to the reformers was the exorcism of the "excessive individualism" of the French people.²⁵ The attack on French individualism was hardly new; the French right, particularly Hippolyte Taine, had criticized at length the deleterious effects of this national characteristic since the Franco-Prussian War. During the First World War, the criticism of French individualism had the support of a broad consensus which believed that the recognition of the collective good over the individual was a panacea for the ills of French society. After all, it was "excessive individualism" which had been the cause of social problems such as class conflict, high costs of production, low productivity, jealousy and suspicion among factory owners, and the failure to standardize production. Moreover, the return of the French economy and society to "excessive individualism" would mean the eclipse of France by other nations such as the United States and Germany. Thus it was clear to the French reformers that the survival and prosperity of France hinged on her repudiation of an anachronistic attachment to individualism in economic and social matters and the embrace of the values of discipline, cooperation and action demanded by twentieth-century industrial society.

The reformers' strategies also differed sharply from the prewar assumptions of Taylorists such as Henry Le Chatelier and Charles de Fréminville

regarding the role of the state. Le Chatelier and Fréminville never considered the state as an agent to encourage reform; their attitudes generally were representative of liberal theory which precluded the state from playing an active role in the economy. Nonetheless, the war economy offered another model in which the state played a more active role in economic reform. In fact, scientific management had strong support among influential circles in the government by the end of the war. Economic reformers were attracted by the opportunity to utilize the state to their benefit in accelerating what they believed were essential changes in business practices and social values. It was in this way, as noted in the examples of Albert Thomas and the Ministry of Armaments and War Production, that Taylorism gained official governmental support during the reconstruction planning process. However, perhaps the most interesting effort to incorporate Taylorism within an overall framework for postwar reconstruction was that provided by Étienne Clémentel, the Minister of Commerce whose control of supply, agriculture, labor, communications and the merchant marine gave him economic responsibilities which approached those of Thomas.

Clémentel's rise to direction of major functions of the economy and industry could not have been predicted. As a young man, Clémentel's true interests were in the fine arts. He fancied himself a painter and playwright, and his friends were artists and writers. As a youth his ambition was to attend the École des beaux arts, but his parents dissuaded him from doing so. Instead, he entered local politics in Riom and was elected later to the Chamber of Deputies in 1900 as a Radical. In the Chamber, he developed friendships with deputies on the parliamentary right and left center. He specialized in budgetary matters, and before the war he briefly held positions in the government as Minister of Agriculture and Minister of Finance. The war offered Clémentel the opportunity to apply his

creative abilities to help design a rather ambitious plan for postwar economic reconstruction. With the assistance of a reform-minded staff at the Ministry of Commerce, he became, as Kuisel concludes, "the principal architect of the remodeling of the economy."²⁶

Clémentel's strategy in assembling a staff differed from that of Albert Thomas at the Ministry of Armaments and War Production. Rather than recruiting intellectuals, Clementel drew heavily from the engineering ranks. He wanted individuals with proven experience in French industry, but who were not conservative in their vision of business practices. His staff included significant numbers of graduates from the École centrale des arts et manufactures. One of his leading staffers from the École centrale was Henry Le Chatelier's friend Léon Guillet. Guillet brought to the Ministry of Commerce a deep commitment to improve the efficiency and production of French industry through the application of Taylorism.

Clémentel's activities often overlapped with those of Thomas at the Ministry of Armaments and War Production. At first, Clémentel, as had Thomas, depended heavily on the cooperation of the patronat to increase production. Nonetheless, Clémentel never lost sight of the fact that his primary concern as Minister of Commerce was to enhance France's ultimate position in the economic war which he and his staff believed would follow the conclusion of hostilities. They also recognized that economic decisions must be made during the war which would enable France to free herself of foreign dependence on raw materials and finished products and take precedence over the simple defense of existing industries and their inefficient methods of production.²⁷ Therefore, the Ministry of Commerce made a serious attempt to organize coordinated efforts by French businessmen. Clémentel and the historian Henri Hauser, who was on the Ministry of Commerce staff, were active in establishing in 1915 the Association nationale

d'expansion économique which aimed to develop strategy for capturing German markets. In one of his more controversial moves, Clémentel established economic consortiums to control the import of raw materials and to enable the Ministry of Commerce to promote the growth and survival of the strongest and most productive industries.

Clémentel's staff firmly believed that the organization of a war economy did not necessarily preclude and should not overlook the opportunities for permanent reform. Henry Peiter argues that Pierre Renouvin failed to recognize the support for economic reform at the Ministry of Commerce when he concluded that French wartime economic policy was not premeditated. According to Peiter, "considerable evidence suggests that on the contrary, fonctionnaires within the Ministry of Commerce sought to elaborate a distinctive method of stimulating a special kind of production and to establish a durable framework for regular post-war economic expansion."²⁸ The purpose of the economic reformers at the Ministry of Commerce was not to break completely with the French tradition of reliance on private initiative. However, they did believe that the state should play a much more active role in organizing the economy than permitted by liberal economic theory which had prevailed in France before the war.²⁹

Like many Frenchmen, Clémentel and his staff genuinely believed the thesis that Germany wished to dominate the European continent economically. Henri Hauser had been one of the leaders in warning the French of the inherent dangers of ignoring the postwar German economic threat to French national security. Indeed, Clémentel was convinced that economic reconstruction and reorganization would be essential to French national security and that economic policies should be based on preventing German domination of French industry. Thus, scientific management was no longer the individual concern of aggressive

entrepreneurs in the dynamic sector of the economy, who sought to better their position in the international market or to break the control of skilled workers in their plants over the production process. Taylorism was now also a vital link in the nation's security; it was a key part of economic reconstruction and essential to French national security against further German military or economic aggression.

The economic policies of the Ministry of Commerce were directed at a corporatist reform of liberal capitalism: Clémentel proposed strategies which would "renovate production processes, encourage producers' self-discipline, and promote collaboration between organized business and the administration."³⁰ To that end, Clémentel organized under the auspices of the Ministry of Commerce the Comité consultatif des arts et manufactures (CCAM) to prepare a comprehensive plan for postwar economic reconstruction. Membership on the CCAM included heavy representation from the Société d'encouragement pour l'industrie nationale, the Société des ingénieurs civils de France, the Société de chimie industrielle and the Association nationale d'expansion économique. To assist the committee's work, the government ordered the Direction des études techniques of the Ministry of Commerce and the Ministry of Armaments and War Production to assist in providing research and technical information. The committee's work, which began in April 1917, was published in a three volume report in 1919 to the French President. The report demanded a victor's peace which would require Germany to make economic reparations to France and permit the French government to requisition German factory machinery, and favored policies designed to insure that French industry would be able to compete in foreign markets with Germany.

Clémentel endorsed the application of scientific management in all sectors of the French economy. On this issue, Clémentel credited the work of his

director of technical studies Léon Guillet for persuading the CCAM that Taylorism could assist France in rebuilding her economy. Guillet, of course, was a strong supporter of Henry Le Chatelier and Taylorism. In fact, Guillet succeeded in securing committee appointments for key French Taylorists such as Le Chatelier, Cambon and Charles de Fréminville who saw in the work of the CCAM an opportunity to secure official support for Taylorism in French factories. Le Chatelier was vice-president of the CCAM and presided over the subcommittee on metallurgical industries. Under their influence, Clémentel argued that the national wealth and security of France depended primarily on the ability of French industry to produce faster and more efficiently, not simply on the pillaging of German industry and an economic policy based on protection of inefficient factories.

Clémentel's policies on postwar reconstruction and economic reform alarmed many employers. There had been during the war strong objections by employers to his policies on consortiums which many small employers believed favored large employers and was contrary to the historical free market practice of the French economy. To many businessmen, Clémentel, like Albert Thomas, had interfered too much in the economy by placing controls on the production process and business profits. While some could accept such interference as expedencies resulting from the war, employers realized by late 1916 that Clémentel's policies might not be temporary, but were designed to dovetail with the postwar restructuring of the business community. He openly supported the expansion of large industry and encouraged the innovative entrepreneurs over more conservative and cautious businessmen. The war, he believed, had resulted in the victory of mechanized and organized factory production over the more traditional artisanal industries. Clémentel not only accepted those developments, but sought to base future French economic policy on them.³¹

Checked by French employers who applied pressure on parliament from effectively reforming industry by institutionalization of scientific management, Clémentel's major contribution to the history of Taylorism in France was the work of the CCAM. In its final report, he placed Taylorism in the center stage as the major principle of postwar economic reform. He said of Taylorism in postwar France:

Here we will apply the organization of work, based on the experimental study of the body's movements at work and the precise coordination of tasks assigned to each person executing them. The principle idea is not to impose on any worker, by superfluous movements, useless fatigue and to commit the necessary movements to the state of habit; that will result in an effort much less taxing for the muscles and less tension on the brain.³²

Throughout the report, there were historical statistics and forecasts on production and exports which warned France of the serious deficiencies in the nation's economy. The CCAM appealed to the patronat and labor for the continuation of class cooperation in the postwar period. The members of the CCAM applied a biological analogy to explain the importance of the postwar economic renaissance. According to that analogy, the health and prosperity of France was dependent on the physical, moral and intellectual hygiene of the body politic. Just as the body has thousands of individual cells and a number of functional organs which must be healthy for the body to perform at its maximum, France would be dependent on the quality and cooperation of individual citizens and classes to make her strong.³³ Indeed, the CCAM's final report argued that Taylorism would contribute substantially to improving the nation's physical and moral hygiene by increasing wages and reducing fatigue. More importantly, it paternalistically suggested that Taylorism would secure the loyalty of the workers to industry and make them more sober, economical and ambitious.

The CCAM's recommendations for elimination of the labor problem were as ineffective and incomplete as those proposed by Le Chatelier and Cambon. In fact, Clémentel made fewer concessions to the concerns of the working class than did Thomas. The CCAM had not solicited any meaningful input from the leaders of the labor movement. Not surprisingly, the CCAM's final report failed to address the concerns of the skilled workers who, in accordance with the modernization plans of the committee, would find themselves returning to factories after the war which had reorganized their production methods to accommodate the large infusion of unskilled workers and new machinery. To the CCAM, the demise of the skilled worker was the acceptable and inevitable result of advanced industrialization. The introduction of the assembly line in several factories during the war left little doubt in the members' minds that the vestiges of the handicraft industry would quickly be swept aside. The CCAM defended the changes in production on the expectation that the majority of French workers would realize, as had American factory workers, substantial increases in their standard of living. This reasoning failed to address the professional objections of the skilled workers, nor did the CCAM's report provide for active participation of organized labor in economic decisionmaking at the plant or national levels. Thus Clémentel offered labor with the promise of higher wages for the average worker even less than Albert Thomas's vision of industrial democracy.

Clémentel fared little better with the patronat, which was suspicious of his plans for industrial reform. It was noted earlier that many businessmen complained that his policies favored large industry over small and medium industry. Furthermore, there was nearly unanimous agreement among employers by the end of the war that the role of the state in their affairs must be sharply reduced from that played by the bureaucracies at the Ministries of Commerce and

Armaments. However, behind the rhetoric of the private sector versus the state bureaucracy lay a very fundamental disagreement about the nature of economic reconstruction and the policy of industrial modernization.³⁴

Nonetheless, there was a significant degree of government support for his general outline of a new economy based on increased production and efficiency in French plants. Louis Loucheur, Albert Thomas's successor at the Ministry of Armaments and War Production and later Minister of Industrial Reconstitution, also believed that French economic renewal would require enough modification of economic liberalism to allow the state to play a more active role in economic affairs. While Loucheur, who was a graduate of the École polytechnique and a successful businessman in the electrical engineering industry, was more conservative than Clémentel regarding the degree to which the state should interfere in business affairs after the war, Loucheur tempered his liberalism with a realistic recognition that industry would require encouragement from the state if France was going to make the transition to a society based on economic organization and full production. As one historian has recently noted, Loucheur's plans for postwar reconstruction involved the modernization of economic liberalism "with strong government encouragement and some state involvement" to recast the French economic spirit to one based on the twentieth-century values of productivity and efficiency.³⁵

Loucheur became Clemenceau's chief advisor on economic affairs and ultimately eclipsed Clémentel when the task of economic reconstruction was given to the newly created Ministry of Industrial Reconstitution, which Loucheur headed. There were also many other groups which also officially supported economic renewal and Taylorism. Grabau notes on the theme of postwar reconstruction:

Throughout the war responsible men in politics, administration, industry, and commerce invoked the urgent need to prepare for the postwar period incorporating the lessons of the war. The requests almost became a monotonous litany by 1917, and they continued into 1918 and 1919 with virtually no change in content.³⁶

Clémentel's ideas regarding the application of Taylorism in postwar French factories and the reorganization of the economy also drew an enthusiastic response from French ingénieurs civils who were potentially the major benefactors from widespread application of scientific management in French factories. Through their professional organizations, the Société des ingénieurs civils de France and the Génie civil, French industrial engineers rallied in support of Clémentel's programs for postwar economic renaissance. Their support was predictable based on the history of French industrial engineers. Industrial engineers had had a traditional interest in clarifying their duties and responsibilities in resolving conflicts between labor and factory owners. Positioned in the factory hierarchy between workers and factory owners, the engineers believed they had the technical expertise and experience to resolve conflicts between the two groups. Indeed, the origins of the Société des ingénieurs civils de France went back to the 1848 Revolution when a group of École centrale engineers organized themselves in order to play a mediating role between the bourgeoisie and the working-class revolutionaries. Other students and graduates of the École centrale were involved in the national workshops. Moreover, there were a number of French industrial engineers after the Revolution of 1848 who continued to discuss the social responsibilities of the engineering profession. Frédéric Le Play, who developed a "science social" in the last half of the nineteenth century which had a significant influence on bourgeois social thought, was a graduate of the École polytechnique. Of course, Henry Le Chatelier, Victor Cambon, Léon Guillet and Charles de

Fréminville were also ingénieurs civils and deeply interested in resolving the social problems of the twentieth-century factories and organizing the French economy. The First World War and the discussion of postwar reconstruction offered industrial engineers the opportunity to come forward with their suggestions on factory reform and to position themselves to enhance their social and professional status.

The Société des ingénieurs civils' interest in scientific management started during the Renault strikes of 1912-3. At that time, comments in the Société's journal and Le Génie civil about Taylorism were divided. One letter by an engineer published in the November 1913 edition of Génie civil argued that Taylorism was the inevitable product of industrialization and that the application of scientific management in French factories would require engineers and other technicians to play key roles in Taylorizing workshops, assigning work, designing machinery, overseeing employment and instructing workers to insure maximum production from them.³⁷ In contrast, another engineer defended the workers' interests after the Renault strike on the basis that the applications of scientific management in the United States had demonstrated that its success depended on the subjection of man by machine and that the system would destroy the self-confidence and integrity of the skilled worker.³⁸

During the war, the Société des ingénieurs civils rallied in support of Taylorism; the Société sponsored several lectures on Taylorism by Victor Cambon and letters and brief articles supportive of scientific management were published in the Société's bulletin. Similarly, the Génie civil actively encouraged its members to apply Taylorism in their workshops. In the organization's journal, one engineer argued vigorously for the widespread application of Taylorism in French industry. Félix Drouhet, a leader in the Génie civil, believed that the large losses

of men during the war could be offset by scientific management in a manner that would increase production without causing overwork or unemployment for the workers. He repudiated the argument that Taylorism was detrimental to the labor force. In modern industry, there simply was less opportunity for worker initiative than there had been in the handicraft industry. Labor had little choice but to accommodate itself to their restricted role as an instrument in the production process, but there would be advantages for workers in terms of higher wages and more leisure in better organized factories. It would be the responsibility of the engineers to instruct the work force in a manner that would insure the complete union of machine and worker.³⁹

The Génie civil went further in its support of scientific management by sponsoring a national congress of industrial engineers which was held in Paris during March 1918 to offer solutions for resolving the urgent issues which French industry would face after the war.⁴⁰ The congress was supported by the government; French President Raymond Poincaré, Étienne Clémentel, Louis Loucheur and Alexandre Millerand encouraged the congress's work. Millerand, the former socialist politician and Minister of War who had shifted to the political right and was a strong advocate of industrial organization and Taylorism, was the congress president. The theme of his opening speech was that postwar reconstruction would require the end of individualism, the integration of science and industry and cooperation of labor and capital. Millerand told the assembled engineers that the war had taught France the benefits of organization and that the industrial engineer would be expected to play a mediating role between labor and capital.⁴¹

The congress was divided into eight different sections, one of which, under the chairmanship of Victor Cambon, was directed to offer recommendations on scientific management. Charles de Fréminville, Henry Le Chatelier's close

friend and disciple of Taylor, drafted the report which was ultimately adopted by the congress. Fréminville wrote in its final report that "the name of Taylor evokes such great interest and symbolizes a 'new spirit' that promises such great things, that the congress of the Génie civil cannot avoid giving an important place to Taylorism and to the study of the methods of that celebrated engineer."⁴² Though Fréminville's report emphasized the positive impact that Taylorism would have on the social problem, it offered little that was new. Critics of Taylorism were wrong to believe that Taylor's ideas reduced the worker to the level of a machine. However, Fréminville, like Taylor and Le Chatelier, ignored labor's major criticism of the system that it eliminated the workers' control of the production process. Ignored in the discussion of the "collaboration of all the cogs" in the organization is the fact that management would be expected to eliminate the labor autonomy characteristic of the nineteenth-century factory.

The report recognized that there would continue to be many employers who would oppose changes in their operations due to the initial cost of hiring engineers and technical staff to implement the system. To offset that objection, Fréminville argued that the costs of production in French factories could be reduced only by maximizing the use of machinery and labor according to Taylor's methods.⁴³ However, it was Fréminville's contention that the employers' greatest gains from applying Taylorism would be to reduce class conflict. Much of labor's criticism of the patronat was that it was administratively incompetent. Taylorism would reduce that criticism since workers would recognize ultimately that the gains in labor productivity and salaries were due to employer reforms.⁴⁴ Fréminville was convinced also that the industrial engineers stood to gain in status and power from Taylorism. He believed that the industrial mechanization of the previous century had oriented engineers toward technical considerations rather

than organizational concerns.⁴⁷ Taylorism, argued Fréminville, offered industrial engineers the option of a professional career in factory administration at a level between the ownership and workers. By doing so, the engineer would become the link between the two classes and thereby realize the original mission of the industrial engineer envisioned at the foundation of the Société des ingénieurs civils.

To some degree, Taylorism benefited from the pro-American fervor in France at the end of the war after the United States joined the fight against Germany. Indeed, David Strauss has recently written a study on French anti-Americanism which identifies the period between 1916 and 1927 as a period of amicable relations between France and the United States.⁴⁵ Frenchmen such as Victor Cambon; Émile Schrieber, editor of the French business newspaper Les Echos; the historian Henri Hauser; Firmin Roz, who taught American civilization at the University of Paris; Charles Cestre, the first Frenchman to complete a graduate program in an American university and Roz's successor at the University of Paris joined politicians such as the Radical leader Édouard Herriot and Albert Thomas in their enthusiasm for American society. According to Strauss:

The advocates of Ford and Taylor methods . . . were interested in America largely because she might become a model for a new social and economic system in France. In this respect they resembled the philosophes who had also urged France to adopt American ways.⁴⁷

Indeed, Taylorism was nurtured by the favorable diplomatic relationship between France and the United States. Firmin Roz edited a pro-American journal, France-Amérique, which supported American production methods. J. L. Duplan, a French emigre to the United States who owned a silk factory in Hazelton, Pennsylvania, published in 1918 Lettres d'un vieil américain à un français

which received considerable attention from French journals. Duplan's book, which was prefaced by Lysis, argued that France could learn about industrialization from the American example.⁴⁸ American technology and organizational advances could be instructive for French industrial planning by incorporating the lessons learned from munitions production. Moreover, he told his French readers that American industrial society, with its corporatist cooperation between labor and capital, served as an example for France to imitate. The values of both French labor and capital would need to be reformed in order to adjust to the modern industrial society. Duplan particularly admonished French workers for defending their anachronistic privileges in the workshop and failing to make the required adjustments to modern technology. He also criticized the bourgeoisie for its efforts to place family interests before those of society and industry.⁴⁹

Duplan shared with Cambon and Le Chatelier a corporatist vision of postwar reconstruction based on full production, factory organization, class cooperation and bourgeois domination. Duplan's warnings were couched in terms of France's struggle to compete in the new international economy which he believed would be dominated by the United States. His argument was organized in a Darwinian survival-of-the-fittest framework in which the best organized nations would dominate the less organized. According to Duplan, "French industry must produce or disappear."⁵⁰ He believed, as did many other Frenchmen, that the American pattern of industrial relations established the example that France must follow both in technological and social reform.⁵¹ He also agreed with Cambon that the essence of American industry was represented by the work of Henry Ford and his system of mass production and the assembly line. In fact, Duplan did not mention Taylor in his work. However, he said of Ford's factories:

In his factories, the division of labor is pushed to the limit. His method economizes time, and workers make the machines produce to the maximum. It is only after he reduced his operating costs per car to a fraction of its original costs that Henry Ford has been able to solve the fantastic problem of paying high wages, of selling inexpensively and of becoming rich.⁵²

While it might appear that French postwar economic planning was totally imitative, there were indigenous ideas about economic and labor reform which offered other options to scientific management and which challenged some of the basic assumptions of Taylorism. In the case of the physiologists of labor, it was a primarily scientific and academic approach which originated in European concerns about the nature of human fatigue and questioned the findings and methods of the Taylorists. With Henri Fayol and his doctrine administrative, French employers had the opportunity to select an alternative management strategy that was more acceptable than Taylorism to the patronat.

Henri Fayol was born in 1841 and died in 1925. He received his engineering education from the École des mines in Saint-Étienne. Unlike the engineering students of the École polytechnique and École centrale des arts et manufactures, Fayol came from a lower middle class family of modest means; he was forced to leave school at the age of nineteen to work as an engineer at the Commentry Collieries north of Clermont Ferrand. In 1888, he became the general manager of the financially troubled Société de Commentry-Fourchambault which he restored to fiscal health. During his thirty years at that post, Fayol developed his ideas on administration, but he did not publicly present his ideas on administration until 1916 when his Administration industrielle et générale was published in the monthly bulletin of the Society of Mineral Industries. It was separately published in 1918.⁵³

Fayol's approach to business administration was quite different from Taylor's. To Fayol, the major problem in modern factories was how to strengthen the administrative function. His concern led him to formulate, based on his experiences in management, what he called the doctrine administrative. His administrative doctrine borrowed heavily from biology for its structure and analogies.⁵⁴ He organized his ideas into functional categories; the healthy operations of a firm's individual functional units would be the result of an organically healthy operation. Thus, it was Fayol's mission to detail the morphological elements that constituted a healthy business. His approach was attractive to many readers due to its straightforward and simplistic presentation promising quick benefits with little expense. In contrast to the more complicated and expensive reforms advocated by Taylor which shifted power and authority to the engineers, Fayol's methods were intended to consolidate the position and strengthen the effectiveness of the existing administration. His emphasis was on the "unity of command." In Administration industrielle et générale, Fayol reduced the administrative doctrine to general principles which were applicable to all managers and which were capable of being taught to existing managers.⁵⁵ As Blancpain has concluded: "What Fayol proposed to his contemporaries was a technique of administration which was at the same time a 'sociology of action.'"⁵⁶

Of equal importance was the fragmentation of French management reform efforts brought about by Fayol and his disciples. Although Fréminville and Fayol's disciples attempted to unite the Taylorists and Fayolists after 1924, Henry Le Chatelier and Fayol were correct in arguing that the two philosophies were different. Le Chatelier believed that Fayol was "like an intellectual lost in the philosophy of command."⁵⁷ Fayol, on the other hand, felt Taylor's work was inadequate on the issue of administration. In addressing this "deficiency," Fayol

and his followers placed an extraordinary emphasis on the role of "the leader." In doing so, Fayol deflected the focus away from enhancing the technical competency and professional status of the engineers to maintaining the administrative tasks of organizing, coordinating and controlling the production process in the hands of the employer or general manager. Thus the orthodox Taylorists and Fayolists maintained their distance from each other until 1924 when Fréminville brought the Fayolists into the Conférence d'organisation français.

In addition to the Fayolists, the French physiologists of labor were critical of Taylor's system for its inadequate understanding of human physiology and the role that fatigue played in the labor process. While one might assume that the objective of the physiologists was to correct a deficiency in the Taylor system, the physiologists of labor ultimately operated outside the scientific management movement. By focusing on adjusting labor to their work environment, the physiologists of labor attempted to arbitrate the concerns of the workers with their employers. Thus the physiologists of labor had a very different relationship with the patronat than the scientific managers who were aligned more clearly with employers.⁵⁸

The work of the physiologists of labor originated during the nineteenth century following the discovery of the laws of the thermodynamics. Once scientists established the concepts that energy is conserved and that it could be converted into various forms of work, physiologists provided intellectual constructs useful to the study of human movement and work. During the last half of the nineteenth century, Jules Marey (1830-1914) and Auguste Chauveau (1827-1917) were among the leaders in the field of physiology. Marey, who was the director of the laboratory at the École des hautes études in Paris, was the pioneer in using cinematographic techniques in studying human movement. However, Marey's work

was limited to technical considerations; he did not provide the physiologists of labor a theoretical framework.⁵⁹ Chauveau, on the other hand, approached the study of human movement with the purpose of determining optimal conditions of performing certain tasks such as a man moving an object a given distance. To Chauveau, it was important not to overlook the expenditure of energy in performing a given task. While both Marey and Chauveau employed a mechanistic perspective in their work and viewed man as a "human motor," Chauveau demonstrated a more sophisticated understanding of human physiology which recognized the effects of fatigue on muscular activity, and opened a new experimental direction for the next generation of French physiologists to pursue.⁶⁰

It was the next generation of physiologists who were in a position to criticize the findings of the scientific management disciples. Included in this group of outstanding French physiologists of labor were Jules Amar (1879-1935), Charles Frémont (1855-1930), Armand Imbert (1850-1922) and Jean-Marie Lahy (1872-1944). Amar was director of the Laboratoire de recherches sur le travail professionnel at the Conservatoire national des arts et métiers; Fremont was research director of a laboratory at the École des mines in Paris; Imbert taught medicine in Montpellier; and Lahy was connected with the laboratories at the École des hautes études.

To this new generation of French physiologists, Taylorism presented a professional challenge and offered them an issue on which to focus their attention. In fact, Imbert's work on skilled workers for the Ministry of Labor occurred simultaneously with the introduction of Taylorism by Le Chatelier. At an international congress on hygiene held in Berlin in 1907, Imbert stated that physiologists should become involved as scientists in resolving conflicts in factory relations involving reasonable work standards. He believed that the new science of

ergonomie could effectively reduce labor-management conflicts. His work attracted the attention of the CGT, and he participated in a number of meetings on factory hygiene organized by the French syndicalists before the war.⁶¹

While Imbert's work went relatively unnoticed, Lahy's criticisms of Taylorism in applying scientific management which were published in French socialist journals and provided the French labor movement useful ammunition against Le Chatelier and the employers. These articles established a general tone for the French physiologists' opposition to orthodox Taylorism which persisted throughout the war and postwar reconstruction. Unlike many French employers, Lahy and the physiologists of labor fully understood the nature of scientific management. Lahy admitted that scientific management had a great deal of merit for French workers because it would help establish a more rational production process and modernize French factories. Indeed, he wrote that Taylorism represented a necessary reform of factory administration. Under Taylorism, factory administration could benefit from the specialization and expertise established in the planning department. Lahy approved Taylor's efforts to limit the influence of the factory foremen and to substitute in its place the more professional direction of the engineers.⁶²

On the other hand, Lahy criticized Taylorism for its inadequate understanding of the machine humaine. Taylor's interests were limited to the increase in productivity; he failed to examine carefully the relationship of the worker and his work. Lahy concluded that scientific management was deficient in its understanding of the physiology and psychology of work. In fact, he defended the values of the handicraft tradition in which the laborer had a certain degree of pride in his tools and derived a degree of self-satisfaction from his work.⁶³ While Lahy warned French employers not to confuse men with machines or to overlook the

psychological and physiological factors of work, his solution was to synthesize the work of Taylor and that of the physiologists of labor and to claim the superiority of the physiologists of labor over the engineers in establishing the most efficacious working conditions in French factories.

Lahy remained a critic of the French Taylorists during the war and maintained his moderate left-wing political orientation, which severely limited his influence on developments in industry. In 1916, Lahy's Le Système Taylor et la psychologie du travail lashed out against the Taylorists for their preoccupation with improving individual productivity with no consideration of the social, psychological or physiological well-being of French workers. He had prepared his study before the war, but the beginning of hostilities delayed publication. He believed the war gave his message greater significance. Indeed, Lahy's criticism of scientific management had lost none of its edge since the war had begun. The Taylorist emphasis on the "one best way" and intensive production had prevented scientific management engineers from understanding the physical consequences of their methods in terms of the destructive effects of fatigue and physical deterioration of the musculature and nervous systems. Equally important was that the efficiency experts failed to recognize that there were important values derived from labor that scientific management threatened. He lamented that "each time that the question of organizing production on a new basis arises, reformers have given the perfection of technique the top priority and considered the worker equal only to one of the elements of production, as a complement to the machine."⁶⁴ From his perspective, Taylorism appeared to be a technical advance designed to simplify human labor methods in order to drive them harder at work.

While Lahy reiterated his position that the physiologist of labor should act as intermediary between labor and management, his attack on Taylorism more

clearly identified him with the concerns of French skilled workers. To Lahy, the Taylorists had designed their system to benefit the employers. Labor, on the other hand, was threatened by loss of professional status and physical well-being. French industrialists, for their part, preferred scientific management over the assistance of the physiologists because the latter's methods represented greater risks to management's authority and higher costs.⁶⁵

Lahy's attack went even deeper when he examined the impact of Taylorism on society. In its methodology which isolated each element in the production process, Taylorism failed to understand the relationship of the individuals to the factory or to the society as a whole. Employing a biological analogy, Lahy concluded that Taylorism's principal threat to French society was its destruction of the initiative of thousands of individual workers. Like cells of the body, the weakening of the human resources of French society would have a pathological effect on French society.⁶⁶

Lahy's political convictions were not shared by all physiologists of labor. Jules Amar, for example, also criticized scientific management, but he was much more conservative and ultimately espoused social and political views which were shared by French fascists.⁶⁷ Amar was not as critical of scientific management as was Lahy. Preoccupied with his work during the war on the rehabilitation of the wounded, Amar concentrated on the contribution that physiologists could make to assisting the wounded back to a productive life. However, he felt that scientific management was deficient in its understanding of human fatigue. This deficiency was the product of the divergent development of industrial engineering and physiology. Amar argued that the two disciplines, as far as the study of human labor is concerned, had been competitive until the formulation of the first and second laws of thermodynamics which provided a greater impetus for the

engineering profession of which Taylorism was the final product. Indeed, the introduction of scientific management in twentieth-century factories had placed the physiologists at a temporary disadvantage because the engineers were prepared to offer employers a system that promised complete order and harmony to their shops and higher profits for themselves.⁶⁸

Nonetheless, Amar joined Lahy in arguing that the physiology of labor was prepared to supplement scientific management and thereby complete the reorganization of factory production according to the principles of science. Indeed, Amar believed that the physiology of labor surpassed the competence of scientific management in dealing with factory workers. In short, Taylorism had not solved the problem of human fatigue which Amar argued "is the result of muscular and nervous phenomena which gives rise to an increasing malaise or uneasiness, and above all a feeling of impotence."⁶⁹ His solution to the problem basically involved better methods for factory workers. To accomplish that goal, Amar proposed a classification system based on metabolic types. According to his system, workers could be divided into the following groups: 1) the digestive type which eats hardily and works slowly, but for long periods of time; 2) the muscular type which can exert great quantities of energy for short periods of time; 3) the respiratory type suited to sustain great efforts for long periods of time; and 4) the nervous type which can work quickly and economically with resistance to fatigue.⁷⁰

Amar's ideas were essentially conservative and were influenced by corporatism. He believed that society's responsibility was to see that each individual is placed according to his physiological and mental characteristics. He asserted that: "It is a matter of putting the right man in the right place."⁷¹ He attempted to make his position more palatable by concluding that society should

recognize equally the contribution of each occupation. This masked an elitism that accorded heredity a central role in his vision of social organization. According to Amar, intellectual and physiological factors "are transmitted, as are physiological defects and mental weaknesses, through several generations."⁷² It was ideas such as these which ultimately led him to support eugenics and fascism.

In the end, the influence of the physiologists in French factory relations was not very great. In contrast to the Taylorists, some of the leading physiologists such as Lahy drew support from the labor movement and the left. Moreover, it was not clear how the physiologists saw that their work could be practically applied in French factories. Finally, it appeared that their proposals would be costly to implement, result in less productivity from the worker than from the Taylorism system and put the physiologist in the position of arbitrating labor-capital relations. For those reasons, the physiologists' influence in postwar reconstruction was small. Nonetheless, like Fayol, their criticism and dissatisfaction with Taylorism contributed to the fragmentation of outlook among the economic reformers.

There was an even more disabling fragmentation among economic reformers on the left who offered France a very different social viewpoint on scientific management from that of the engineers. As noted previously, there had been significant indications from the labor movement and socialist leadership both before and during the war that the left would end its opposition to economic and political reform. Léon Jouhaux and Alphonse Merrheim had attempted to develop gradually a syndicalist strategy based on acceptance of modern capitalism and improved productivity. Moreover, Jouhaux had cooperated with Albert Thomas and other government leaders during the Union sacrée. While the policies of the

Clemenceau government were less acceptable to labor, Thomas and Jouhaux had continued to support major economic reform. Indeed, one could argue that one of the major developments of the war was the evolution of what Michelle Perrot has called a labor Saint-Simonianism that encouraged higher productivity and mechanization.⁷³

Thomas's role in reconstruction planning has been well documented by the work of Martin Fine. Although Thomas left the government during the fall of 1917, he continued to have considerable personal and intellectual influence. His efforts on behalf of economic reform were directed primarily through two vehicles. First, he was president of the Permanent Committee for the Study of the Prevention of Unemployment (PCSPU) which was an advisory group to the Ministry of Labor. The PCSPU included both prominent members from labor and the patronat such as Auguste Keufer, Jouhaux, Merrheim, Robert Pinot, René Duchemin, Henri de Peyerimhoff, Louis Renault, Paul des Rousiers, Arthur Fontaine, Max Lazard and Charles Dulot. While the focus of the PCSPU was never defined clearly, Thomas utilized it to promote his ideas that economic reconstruction would require the application of scientific management in industry.⁷⁴

However, Thomas's major efforts to educate Frenchmen about economic reforms were concentrated in the creation and development of the intellectual circle which formed around the weekly newspaper, L'Information ouvrière et sociale. First published in March 1918, it continued publication until 1935 from its office on the Rue Pasquier. Thomas collaborated with the journalist Charles Dulot to establish L'Information ouvrière et sociale in order to inform the working class and employers about the significance of modern reforms, to reconcile the two groups through informed articles about their concerns, to counter the potential growth of Bolshevism in the working class and to allay the fears of Bolshevism

in the patronat. Thomas and Dulot also hoped to publicize significant reforms sponsored by French industry.⁷⁵

Thomas held weekly luncheons and meetings at the newspaper's office on the Rue Pasquier. There he gathered workers, employers, economists, intellectuals, journalists and politicians to discuss a broad variety of social topics. According to Martin Fine, these meetings attracted a regular group of forty individuals including Robert Pinot, Andre Citr en, L on Jouhaux, Alphonse Merrheim and Arthur Fontaine who shared Thomas's desires to formulate reformist economic and social policies for postwar France. For Thomas, these meetings provided him the opportunity to "wield enormous influence in government, business and labor and to establish himself as the virtual coordinator of the post-war reformist effort."⁷⁶

Thomas's greatest success came from the change in political direction of the CGT at the end of the war. As noted in earlier chapters, French labor leaders had been before the war in the process of reexamining in the context of modern economic organization the official CGT policy of ouvri reisme. The experiences of L on Jouhaux and other labor leaders in governmental decision-making and of workers with new production methods encouraged Jouhaux and members of the CGT central committee to formulate a new direction for the French labor movement.

As early as March 4, 1916, Jouhaux outlined to his colleagues on the central committee his ideas on the "new reformism" which would be based on dramatic increases in labor consumption of material products, an end to the spirit of routine and Malthusianism on the part of labor and the patronat, a more rational organization of production methods, better working conditions and higher wages.⁷⁷ Nonetheless, Jouhaux made his program of reforms conditional on the

patronat's acceptance of worker control—a condition which employers ultimately deemed unacceptable.

Jouhaux did not retreat from this new program despite the facts that labor unrest and strike activity clearly increased during the last year of the war and that Clemenceau did not include in the government pro-labor individuals. That he did not discontinue his support for cooperation in the war effort may be attributed in part that Jouhaux had been impressed by Clemenceau's abilities and personality. The prime minister met with Jouhaux and other high-ranking labor leaders on frequent occasions during 1918. According to Jouhaux's biographers, Clemenceau offered his support after the war for the eight-hour day and other social reforms in return for labor's support for postwar economic reforms. He privately courted Jouhaux's support for his government by indicating to the labor leader that the prime minister believed that the war represented the end of the bourgeoisie's hegemony in French politics and that labor would have to share in the rebuilding and reform of postwar France.⁷⁸

Encouraged by Thomas's ideas and his experiences with the government during the war, Jouhaux continued to push his ideas on the "new reformism." However, he did so against the strong opposition of those who were to become the minoritaires in the labor movement who were inspired by the Bolshevik experience and ultimately left the CGT. However, before the schism Jouhaux was successful in receiving official endorsement of his reforms at the December 1918 national congress of the CGT in Paris. The social and economic ideas of Jouhaux and Thomas were expressed clearly in the Minimum Program presented to the national congress on December 16, 1918. The basic message was that the CGT desired political, economic and social responsibility and wanted to participate in the reconstruction of the French society and economy.⁷⁹

The Minimum Program included a long list of labor demands such as the eight-hour day, collective contracts, the right to organize, better working conditions and improved social legislation. More importantly, adoption of the Minimum Program demonstrated that union leaders officially had adopted a policy which ended labor opposition to modern production methods. Although the Minimum Program failed to endorse scientific management *per se*, it did support rational production methods based on the principle of the "maximum production in a minimum time for maximum wages with a minimum of fatigue."

However, the Minimum Program also emphasized the principle of workers' control. In retrospect, it now appears that Jouhaux's emphasis on workers' control was included to defend his policies against the expected accusations of collaboration from the minoritaires and to inspire emotional support from workers for his ideas. Clearly, he was sensitive to the fact that his program would require some revolutionary elements capable of arousing the emotional support of French workers against the revolutionary minority. It was in that context that Jouhaux employed Thomas's and Woodrow Wilson's ideas on economic democracy and gave them a revolutionary interpretation. In contrast to the prewar efforts of the French patronat to exert total authority in its factories, Jouhaux's call for worker participation did appear radical. At the local level, he demanded labor's participation in factory decisions, and at the national level he called for labor-management collective contracts and the creation of a National Economic Council which would bring labor, management and the state together to formulate policies to guarantee industrial efficiency and social harmony.⁸⁰

What did the "new reformism" mean in terms of labor's attitudes toward Taylorism? There was no question that Jouhaux and his followers avoided *carte blanche* adoption of scientific management; it provoked memories of

Renault's attempts to break the resistance of his skilled workers and, at least in the French experience, recalled pre-war efforts to gain control of the production process. Thus Taylorism appeared inconsistent with Jouhaux's policy of labor participation. On the other hand, his identification of consumer interests with those of the workers and his signal that the labor movement was prepared to participate in economic growth demonstrated a more favorable outlook.

In fact, Alphonse Merrheim commented at a CGT congress in July 1918, that while he still did not believe Taylorism was scientific in nature, he urged the union to organize so it could negotiate effectively with employers on new production methods.⁸¹ Merrheim, like Jouhaux and Thomas, believed that American techniques would be applied in postwar society to improve productivity and, if labor was included in their implementation, could improve the physical and material well-being of the working class. Thus, they firmly asserted that labor cooperation in the application of new production methods would necessitate the participation of the workers and the CGT.

Albert Thomas responded enthusiastically to Jouhaux's program. He was particularly active in the establishment of the Conseil économique du travail (CET) formed to bring the special interest groups together to discuss economic and social issues of general interest. The CET was limited from the start by the refusal of the patronat and the state to participate in its activities. At its first meeting on January 8, 1920, representatives from the CGT, the Union syndicale des techniciens de l'industries du commerce et de l'agriculture (USTICA), the Federation of Civil Servants and the National Federation of Consumer Cooperatives. Though the CET failed to effect meaningful economic and social reform due to the lack of participation of business leaders and the state and because of internal divisions within the labor movement, the activities of the CET and the USTICA marked another step in the left's support of scientific management.⁸²

The USTICA was composed of a small number of French engineers and technical personnel who rallied at the end of the war to the cause of meaningful social and economic reform in France and shared Thomas's vision of industrial democracy. In fact, he had recruited Roger Francq, the leader of the USTICA, who Thomas met on a diplomatic mission to Russia in 1917. Francq was then a director of a number of armaments factories in Petrograd under the control of the French Ministry of Armaments and Munitions. Thomas was impressed by the young engineer who fervently believed that he could help the reformist cause by informing the bourgeoisie and working class of the benefits of scientific management.

For his part, Thomas aided Francq in establishing the USTICA and outlined its mission as providing the necessary professional and technical assistance to Charles Dulot, editor of L'Information ouvrière et sociale, and the CGT. Indeed, Thomas believed that the USTICA would provide the CGT invaluable help by reducing the technical superiority of the patronat. Francq concurred, at least in the beginning, with Thomas's directions. In the March 9, 1919, edition of L'Information ouvrière et sociale, Francq presented the manifesto of the USTICA which called for the economic and social reorganization of France in accordance with advanced industrialization. Drawing on the historic role of the engineering profession, he explained that the USTICA would function as an intermediary between the working class and the bourgeoisie and develop practical solutions to economic and social problems.⁸³

In fact, the USTICA's history was clouded by controversy and the ebullient character of Francq. Though its creation received considerable press attention, it failed to attract a large membership. Its connection with Thomas and L'Information ouvrière et sociale was undeniable since the USTICA was

officed in the headquarters of the newspaper. Due to its connection with Thomas and Dulot, the USTICA was regarded with suspicion by many in the CGT; if Jouhaux welcomed its role in the CET, the minoritaires attacked him for collaboration with the group of bourgeois engineers. Ultimately, Francq deeply disappointed and wounded Thomas when the USTICA leader joined the French Communist Party in early 1921 and deliberately attempted to discredit Thomas by accusing him of betraying the French labor movement.⁸⁴

However, before the rift between Francq and Thomas, the USTICA had advanced the cause of Taylorism on the French left. Through a series of articles written for L'Information ouvrière et sociale during the first half of 1919, Francq and the USTICA argued that France could attain increased national productivity and implement an eight-hour law by applying scientific management. As one of Francq's colleagues noted, once the French workers are made to understand that Taylorism will benefit them economically and physically, they will support it enthusiastically.⁸⁵ For Francq, the passage of an eight-hour law and the challenge of postwar reconstruction required the patronat and the state to call upon the industrial engineers to provide the social and technical policies necessary to increase productivity equitably for employers and the working class.⁸⁶

The policies of Francq represented a slight tendency in the French engineering tradition to support alliances with the left. As noted earlier, nineteenth-century industrial engineers frequently attempted to depict themselves as arbiters of the class struggle since they were neither employers or workers. It was Lenin himself who gave credibility to the labor movement's alliance with the industrial engineers and acceptance of Taylorism. Speaking before the All-Russian Congress in March 1918, Lenin argued that the fate of the Bolshevik Revolution would depend on how well it would incorporate the Western ideas of Taylor

and Ford in Russian factories. Thus he tacitly accepted the reality that he needed the expertise of the engineers to maintain and improve factory production. In France, Alphonse Merrheim shrewdly used Lenin's position vis-à-vis the engineers and Taylorism to defend Jouhaux against the minoritaire's stiff criticism of the CGT alliance with Francq and the USTICA. Merrheim argued: "What the Russian Revolution has been obligated to assimilate in a period during which it is extremely difficult to accomplish, we must require the French working class not to hesitate to adopt today and for the future."⁸⁷

How was the "new reformism" received at the time? The employers' immediate reactions to Jouhaux's policies were supportive. Jean Hardy, the social affairs expert for La Journée industrielle, warmly discussed the philosophy of the Minimum Program. La Journée industrielle, the newspaper of big industry, viewed the Minimum Program as an important step forward in labor recognition of its responsibilities in a modern industrial economy. Hardy suggested that the patronat study the significance of Jouhaux's overtures and that it take the opportunity to respond in a positive fashion to the Minimum Program. It was Hardy's belief that some positive actions would diminish social tensions and avoid embarrassment for Jouhaux in the eyes of his opposition in the labor camp.⁸⁸

Nonetheless, Jouhaux's reform proposals were presented just prior to the period in which labor-capital relations were to take a turn for the worse. After all, the Minimum Program was revealed in December 1918, one month after the German defeat, when French optimism about the future seemed highest. Social relations continued to show promise through the spring of 1919 when the Clemenceau government achieved passage of significant labor legislation which was crowned by the passage of the eight-hour law and the recognition of collective contracts on April 23, 1919. Implied by this legislation was the trade-off that

the shortened work day would be labor's reward for accepting Taylorism and higher productivity.⁸⁹

However, passage of the eight-hour law was to be the watershed in French labor-capital relations in the immediate postwar period. To the minoritaires in the labor movement, such measures were insufficient in comparison with the victories of the international working class movement in Russia. More importantly, Jouhaux and his supporters badly misjudged the outlook of the number of French workers who would throw their support to the minoritaires.⁸⁶ CGT leaders were unprepared for the violence and intensity of the May 1, 1919, demonstrations in Paris. The situation worsened when metal workers in the Seine struck during June 1919 against the settlement reached by its union leaders with industry over working hours. Confronted by a delicate situation in which the minoritaires exploited their advantage by calling for a general strike, Jouhaux stubbornly refused support for the strikers for fear that Clemenceau would disband the union. The significance of these developments was that they demonstrated that Jouhaux and his policies had failed to arouse support among the rank-and-file membership. Martin Fine writes:

This insensitivity to rank-and-file demands sharply demonstrates the degree of alienation that existed between the C.G.T.'s reformist leaders and its activist members. These successive failures not only discouraged many militants but it also gave new found confidence to government and business. Incapable of revolutionary action, the C.G.T. could only watch as its Minimum Program was progressively watered down.⁹⁰

On the other side of the political spectrum, large numbers of small- and medium-scale employers were bitterly opposed to the eight-hour law and to any further amelioration of labor-capital relations. Indeed, it was the patronat which held the key to the future of scientific management in postwar France. French

employers were unquestionably opposed to the proposals of the CGT and Thomas. Employers were not supportive of the eight-hour law, but they acquiesced to its passage in their anxiety about the spread of Bolshevism to France.⁹¹ Indeed, the patronat exercised its influence to impede the passage of the law. Even before the bill had passed parliament, employers warned that its effects would be disastrous to the nation. Though employers represented by the Comité des forges were prepared to engage in the collective bargaining, entrepreneurs from other industrial sectors sought delays in implementation of all provisions of the law. The Minister of Commerce received numerous letters asking him to intercede against the Labor Minister; the Chambers of Commerce spoke against the law to parliament. The opposition called the eight-hour day a national disaster and a crime against the nation. Furthermore, they certainly disagreed with Thomas and the labor movement that the patronat could handle the shortened work day by mechanization, Taylorization or allowing the workers participation in factory decisions.⁹² Nonetheless, they recognized that the real keys to the law were how it would be implemented by employers and enforced by the government. As for the latter, the government did not plan to enforce strictly its provisions. Indeed, the later victory of the Bloc national government insured that the state would view implementation in a manner favorable to employers.⁹³

As for employers, their attitudes reflected on the whole the values of the small and medium employers who found the law unacceptable on the grounds of reduced productivity and because it encouraged an unhealthy increase in idle time for French workers. There were underlying economic and social reasons for the opposition of employers which help explain their attitudes and which signalled the end of employer optimism about postwar industrial growth. A recent study by Thomas Grabau carefully documents the economic problems which the transition

from a war economy caused French industry. Shortages of coal and other raw materials, breakdowns in the transportation system, changes in domestic production and the international market, and difficulties in restoring the economy of the occupied territories resulted in a more difficult transition period than anticipated and heightened bourgeois insecurity.⁹⁴ Economic insecurity and fear of Bolshevism created a climate which encouraged the patronat to take a more cautious and defensive approach to economic reconstruction, deferred factory reforms such as implementation of Taylorism, and effectively terminated the period of labor-capital cooperation.⁹⁵

Indeed, the deterioration of labor-capital cooperation paralleled the disintegration of the left's hopes for significant social and economic reform and the emergence of the bourgeois determination to restore order to postwar society. Bourgeois conservatives were quite concerned about the social unrest and revolutionary activity which had rocked Europe since the Russian Revolution. The large number of strikes in France during 1919 and the increasingly militant opposition of the minoritaires in the CGT to Jouhaux's policies alarmed the bourgeoisie. The unplanned violence of the May 1, 1919, demonstrations in which Jouhaux was struck in the head by a Paris gendarme, the acquittal of Jaurès' assassin, the example of the Bolshevik Revolution and the inflation and unemployment which followed the war contributed to the wave of strikes in the Paris metals factories which caught the CGT leadership by surprise. These events and the detested eight-hour law caused the bourgeoisie to act.

Thus the conservative press defiantly exhorted their readers to stand up against the defiance of the workers. In fact, the government and the bourgeoisie was prepared to offer resistance against the threat of socialism in France which was culminated in the election of the Bloc national in the fall of 1919.⁹⁶

With this political defeat and the developing schisms in the CGT and SFIO provoked by the communists, Thomas's and Jouhaux's visions of industrial democracy and worker participation evaporated and the patronat missed its opportunity to secure labor cooperation in the application of scientific management in French factories. The seriousness of the situation was reflected by Jouhaux' deep concern that Millerand would act on his threat to dissolve the CGT following the 1920 railroad strikes which were instigated by the minoritaires against the advice of Jouhaux and his followers in the labor leadership. Labor's weakness and vulnerability was made painfully obvious when the poorly-prepared strike cost the union nearly two-thirds of its membership.⁹⁷

The change in political climate was reflected also in the writings of two of the major players in French wartime factory relations: Albert Thomas and Robert Pinot. Pinot, who was the leader of the Comité des forges and who had cooperated closely with the government during the war in the economic mobilization of the metals industry, strongly repudiated Jouhaux's "new reformism." In an article published in the May 9, 1920, issue of L'Information ouvrière et sociale, Pinot attacked Jouhaux and the Minimum Program for its revolutionary efforts to limit the authority of the patronat. Though Pinot conceded that Jouhaux's ideas represented a maturing from the pre-war revolutionary syndicalism theory of the CGT, he found the Proudhonist tendencies unacceptable to the bourgeoisie which would be limited in its ability to act as it was required to in the difficult conditions of the postwar economy. That Jouhaux would believe that the patronat would concede its authority to his ideas on participation only demonstrated the naivete of the Proudhonist theory of mutualism. Pinot argued that the Minimum Program would have a disastrous economic effect on the French nation in that the CGT's ideas on economic nationalization and worker participation were designed

to destroy the leadership of the patronat. The threat that the Minimum Program represented to the bourgeoisie and the nation was reiterated by Pinot whose determination to take to the offensive must have been encouraged by the renewed vitality of the French bourgeoisie to stand its ground against the challenge from the left. He asserted about leadership in French factories that "it is necessary to understand that they cannot be directed by a headless body analogous to a council of technicians, workers and consumers, but by one leader."⁹⁸ He went on to denounce the Jouhaux and Thomas vision of industrial democracy which would entitle consumers and workers roles in factory decisions and destroy the "legitimate authority" of the existing industrial elite and its expertise:

Perhaps the greatest error that has been committed in the name of democracy has been not to understand that, far from accepting a diminished role of its leaders, a democratic regime must, to the contrary, extend, fortify and exalt them. Democracy is nothing other than the right to select them for their superiority and for their proven capabilities, and, once chosen, for them to command and be obeyed.⁹⁹

Pinot effectively employed Henri Fayol to support his arguments about the leadership of the industrial elite. According to Pinot, the industrialist had emerged from the crowd by virtue of his energy and knowledge, and he alone possesses the ability to maintain harmony in the factory and society. The task of the patronat, argued Pinot, was made more difficult by the actions of the CGT leadership. Though Jouhaux had departed from the destructive path of revolutionary syndicalism, the "new reformism" was to blame for the economic problems that France had encountered since the war. Indeed, the eight-hour law, designed to placate labor, had proven a disaster to French industry. Pinot warned Jouhaux that labor's victory was a pyrrhic one in that the resulting economic confusion had aroused a reaction from the bourgeoisie which threatened to destroy the CGT.¹⁰⁰

Pinot's hostility was matched by the pessimism of Albert Thomas who recognized that his expectations of national renaissance would not be realized due to existing international and domestic conditions. In his assessment of conditions in France for 1920 published in the January 1 edition of L'Information ouvrière et sociale, he admitted that the reform of French factory relations was doubtful because of the anti-socialist and anti-labor orientation of the Bloc national parliament. He sarcastically asked: "Where are the noble efforts of those industrialists, of those patrons who had wanted to understand and had wished to open the way towards a better future?"¹⁰¹

In terms of real economic and social reforms, the expectations of the postwar reformers and planners greatly exceeded the gains made immediately following the First World War. Despite the public's exorcism of prewar French "excessive individualism" and the apparent commitment Frenchmen had made during the last years of the war to adapt American methods of efficiency and organization in French factory production, French governmental, industrial and labor leaders failed to formulate a cohesive reform program capable of binding the disparate interests which recognized the need for far-reaching reform in factory production. The fact is that the greatest obstacles that scientific management reforms encountered were social and political in nature. Indeed, the clashes which occurred between the patronat and the state over the extent to which state intervention in the economy would be tolerated and between the employers and the labor movement about industrial democracy demonstrate the fact that the commitment to Taylorism and fundamental economic reform was intrinsically linked to general political and social ideas of postwar France. Thus it was not surprising that French employers, who were the key force in establishing

the conditions under which real economic reform in factory production could be affected, applied the brakes to postwar reforms as much in reaction to domestic and international labor unrest as to real economic conditions which made economic expansion and reform difficult to undertake. Certainly, French efforts in support of scientific management and economic renewal had failed by 1920.

Though, as in the prewar period, scientific management had limited success in provoking a French economic renewal, there had emerged among French political, industrial and labor leaders a deeper understanding of scientific management and other American industrial techniques which could, if applied in French factories, have improved the efficiency of French production. Moreover, the experience of grappling with Taylorism during the war, even if it had been greatly distorted by French adaptation, had resulted in significant changes in attitude regarding scientific management since before the war. Briefly those changes may be summarized as follows: 1) French industrial engineers' support of Taylorism had become widespread as they recognized the opportunities it represented to enhance their social and professional status as a technocratic elite; 2) government leaders were attracted to Taylorism because they believed it offered a viable economic solution to France's national inferiority to Germany; and 3) labor and socialist reformers moderated their opposition to scientific management when it was combined with other reforms such as the eight-hour day and industrial democracy. Finally, the debate between the left and right over scientific management and economic reform raised critical issues about the appropriate roles of labor and management at the national and factory level; those issues were to continue throughout the interwar period and, in the name of co-participation, after the Second World War.

NOTES

¹Friedrich Naumann, L'Europe centrale (Neuchatel: Delachaux & Niestle, 1916) and Wilhelm Ostwald, Les Fondements énergétiques de la science de la civilisation, trans. by E. Philippi (Paris: V. Giard & E. Brière, 1910).

²For a brief description of the impact of the Naumann and Ostwald thesis on French intellectuals, see Stéphane Rials, Administration et organisation de l'organisation de la bataille à la bataille de l'organisation dans l'administration française (Paris: Éditions Beauchesne, 1977), pp. 42-9.

³Jean Labadie, L'Allemagne a-t-elle le secret de l'organisation? Enquête (Paris: Bibliothèque de l'opinion, 1916).

⁴Rials, p. 45.

⁵See Claude Digeon, La Crise allemande de la pensée française, 1870-1914 (Paris: Presses universitaires de France, 1959).

⁶Henri Hauser, "L'Allemagne économique; l'industrie allemande considérée comme facteur de guerre," Bulletin de la Société d'encouragement pour l'industrie nationale 114 (May-June, 1915), p. 439.

⁷André Lebon, "La Renaissance économique de la France après la guerre," La Renaissance politique, littéraire et artistique 9 (April-May, 1916), pp. 387-93.

⁸Henry Lichtenberger and Paul Petit, L'Impérialisme économique allemand (Paris: Flammarion, 1918), p. 1.

⁹*Ibid.*, pp. 49-50.

¹⁰*Ibid.*, pp. 197-22.

¹¹*Ibid.*, p. 265.

¹²Victor Cambon, L'Allemagne au travail, 18th ed. (Paris: P. Roger et cie, 1909) and Les Derniers progrès de l'Allemagne, 4th ed. (Paris: P. Roger et cie, 1914).

¹³Cambon, Notre avenir (Paris: Payot et cie, 1916), p. 9. See also his Où allons-nous? (Paris: Payot et cie, 1918).

¹⁴Notre avenir, p. 18.

¹⁵*Ibid.*, pp. 22-3.

¹⁶*Ibid.*, p. 176.

¹⁷*Ibid.*, pp. 215-6.

¹⁸Ibid., p. 227.

¹⁹Cambon, États-Unis, France (Paris: P. Roger et cie, 1917), p. 59.

²⁰Ibid., p. 168.

²¹Cambon, Le Taylorisme (Nancy: Imprimerie nancienne, 1917), p. 184.

²²Ibid., p. 185.

²³Ibid., p. 184.

²⁴Thomas W. Grabau, "Industrial Reconstruction in France after World War I" (Ph.D. dissertation: Indiana University, 1976), pp. vi-vii.

²⁵Ibid., p. 11.

²⁶Richard F. Kuisel, Capitalism and The State in Modern France: Renovation and Economic Management in the Twentieth Century (Cambridge: Cambridge University Press, 1981), p. 38.

²⁷Ibid., p. 151.

²⁸Henry D. Peiter, "Men of Good Will: French Businessmen and the First World War" (Ph.D. dissertation: University of Michigan, 1973), p. 150.

²⁹One extreme example of this tendency was the "proto-fascist" Ernest Letailleux (Lysis) whose enthusiasm for corporatist cooperation grew out of his obsession with solving the social questions and insuring the expansion of French power. Grabau has noted about Lysis and his followers that: "For them expanded industrial output was the key to power that coincidentally offered the additional benefits of the unifying discipline of a national goal and the possibility of using standards of living for all within the existing social and political order." See Grabau, pp. 14-5. Other reformers agreed that corporatist reform would offer residual benefits in terms of reduced class conflict and a stronger France, but differed from Lysis in that they were less obsessed with the issue of power.

³⁰Kuisel, p. 44.

³¹Ministère du Commerce, Rapport general sur l'industrie française, sa situation, son avenir de l'industrie, des postes et télégraphes, des transports maritimes et de la marine marchand, direction des études techniques, 3 vols. (Paris: Imprimerie nationale, 1919), 1: p. vii.

³²Ibid., 1: p. ix.

³³Ibid., 2: pp. i-ii.

³⁴There is little good work on the attitudes of the business community after the First World War. Nonetheless, one can construct some conclusions about

the businessmen's views about the state's intervention in economic affairs from several secondary sources. For example, Fridenson argues that French automobile manufacturers, who were among the most aggressive entrepreneurs in France, aggressively utilized economic liberalism to restrict state intervention in their affairs after the war. Henry Peiter further notes that small and large producers quickly joined ranks after the war to limit state policies that might have been detrimental to small-scale producers. Thomas Grabau points out that parliamentary debate about reconstruction broke down as small-scale producers and their defenders forced politicians to consider policies in the context of étatisme versus laissez faire policies. In the final analysis, the business community was essentially content with the social and economic stability and the "stalemate society" of the pre-war Third Republic in which the state functioned as a negative instrument precluded from active intervention in the economy. See Patrick Fridenson, "L'Idéologie des grands constructeurs dans l'entre-deux-guerres," Le Mouvement social, no. 81 (October-December 1972), pp. 52-3; Peiter, pp. v-vi; Stephen Douglas Carls, "Louis Loucheur: A French Technocrat in Government, 1916-1920" (Ph.D. dissertation: University of Minnesota, 1982), pp. 352-5; and Stanley Hoffman, "Paradoxes of the French Political Community," in In Search of France; The Economy, Society, and Political System in the Twentieth Century, Hoffman et al (eds.) (New York: Harper & Row, 1963), p. 15.

³⁵Carls, pp. 310-3.

³⁶Grabau, pp. 43-4.

³⁷"L'Organisation scientifique du travail dans les usines," Le Génie civil, no. 64 (November 15, 1913), pp. 54-5.

³⁸"Une Critique du système taylor", Le Génie civil, no. 62 (April 12, 1913), p. 474.

³⁹Félix Drouhet, "La 'Taylorisation' et son application aux conditions industrielles de l'après-guerre," Le Génie civil, no. 69 (November 25, 1916), pp. 350-2.

⁴⁰E. Barbet, Premier congrès général du Génie civil pour l'étude et la mise en oeuvre des programmes d'après-guerre (Paris: Génie civil, 1918).

⁴¹"Le Congrès national du Génie civil," Bulletin des usines de guerre (March 25, 1918), pp. 377-8. Millerand's speech was printed by the Bulletin.

⁴²Charles de Fréminville, "Rapport mise au pratique des nouvelles méthodes des travail", in Travail préparatoires du congrès national du Génie civil. (Paris: Génie civil, 1918), p. 54.

⁴³*Ibid.*, pp. 56-7.

⁴⁴*Ibid.*, p. 64.

⁴⁵John Hubbell Weiss, The Makings of Technological Man: The Social Origins of French Engineering Education (Cambridge: MIT Press, 1982), p. 225.

⁴⁶David Strauss, Menace in the West: The Rise of French Anti-Americanism in Modern Times (Westport: Greenwood Press, 1978), p. 19. By 1927, the international diplomatic scene combined with an intellectual reaction against American economic methods, racism and mass culture which put a definite end to the Franco-American entente. The symbol of French anti-Americanism during the 1920's was Georges Duhamel's Scenes de la vie future.

⁴⁷Ibid., p. 20.

⁴⁸Jean Léopold Duplan, Lettres d'un vieil américain à un français (Paris: Payot et cie, 1917), p. 24.

⁴⁹Ibid., pp. 29-30.

⁵⁰Ibid., p. 111.

⁵¹Ibid., p. 114.

⁵²Ibid., p. 159.

⁵³Henri Fayol, General and Industrial Management, trans. by Constance Storrs (New York: Pitman Publishing Corporation, 1949), and Morris Bernard Brodie, Fayol on Administration, (London: Lyon, Grant and Green, 1967), p. 1. There has been no French major studies of Fayol despite his important role in the history of business administration which certainly has been, in the long term, as important as that of Taylor's.

⁵⁴Frédéric Blancpain, "Les Carnets inédits de Fayol: présentation," Bulletin de l'Institut international d'administration publique (October-December, 1973), p. 19.

⁵⁵Ibid., p. 20. Fayol and his followers founded the Centre d'études administratives to instruct management about Fayol's ideas.

⁵⁶Blancpain, p. 23.

⁵⁷Rials, p. 105.

⁵⁸Georges Ribeill, "Les Débuts de l'ergonomie en France à la veille de la première guerre mondiale," Le Mouvement social, no. 113 (1980) pp. 5-6.

⁵⁹Ibid., pp. 9-10.

⁶⁰Ibid., pp. 12-4.

⁶¹Ibid., pp. 20-4.

⁶²Jean Maurice Lahy, "Le Système Taylor et l'organisation intérieure des usines," La Revue socialiste, syndicaliste et cooperative 57 (August 1913), pp. 127-30.

⁶³Ibid., p. 134.

⁶⁴See his Le Système Taylor et la physiologie du travail professionnel (Paris: Masson, 1916), p. viii.

⁶⁵Ibid., p. 13.

⁶⁶Ibid., p. 104

⁶⁷Ribeill, pp. 33-4. Amar actively supported the eugenics movement and warned his readers that French society was organized on the basis of mediocrity and social parasitism. He also charged that cubism and surrealism illustrated the intellectual debilitation of modern society and called for a dictatorship to address the ills of contemporary France.

⁶⁸Jules Amar, The Physiology of Industrial Organization and the Re-employment of the Disabled, trans. by Bernard Miall (New York: Macmillan, 1919; reprint ed.: Easton, 1980), p. 7.

⁶⁹Ibid., p. 76.

⁷⁰Ibid., pp. 47-50.

⁷¹Ibid., pp. 62-3.

⁷²Ibid., p. 55.

⁷³Perrot, "Le Regard de l'autre: les patrons français vus par les ouvriers (1880-1914)," in Le Patronat de la seconde industrialisation, Maurice Lévy-Leboyer (ed.) (Paris: Éditions ouvrières, 1979), pp. 300-2.

⁷⁴Martin Fine, "Toward Corporatism: The Movement for Capital-Labor Collaboration in France, 1914-1936" (Ph.D. dissertation: University of Wisconsin, 1971), p. 36.

⁷⁵Ibid., pp. 38-41.

⁷⁶Ibid., p. 71.

⁷⁷Bernard Georges and Denise Tintant, Léon Jouhaux, cinquante ans de syndicalisme, vol. I: Des Origines à 1921 (Paris: Presses universitaires de France, 1962), pp. 184-5.

⁷⁸Ibid., pp. 197-8.

⁷⁹Fine, p. 53.

⁸⁰Ibid., p. 54.

⁸¹"Les Travaux du congrès," L'Information ouvrière et sociale (July 18, 1918), pp. 2-4.

⁸²Fine, pp. 87-8.

⁸³*Ibid.*, p. 72.

⁸⁴*Ibid.*, pp. 108-10.

⁸⁵Montagnon, Bertrand. "Les huit heures et l'effort de production," L'Information ouvrière et sociale (April 27, 1919).

⁸⁶Francq, Roger. "La Journée de huit heures. Le rôle des techniciens," L'Information ouvrière et sociale (March 23, 1919).

⁸⁷Alphonse Merrheim, "La Révolution économique," L'Information ouvrière et sociale (May 4, 1919), pp. 4-7.

⁸⁸Jean Hardy, La Journée industrielle (January 7, 1919).

⁸⁹"La Loi sur la journée de 8 heures. La discussion devant la Chambre," L'Information ouvrière et sociale (April 24, 1919). Thomas took a leadership role in support of the law by arguing that he was confident that the application of Taylorism would increase national productivity despite reduced work days. On the mentality of French workers after the war, see especially Max Gallo, "Quelques aspects de la mentalité et du comportement ouvriers dans les usines de guerre, 1914-1918," Le Mouvement social no. 56 (July-September 1966), pp. 3-33.

⁹⁰Fine, p. 66.

⁹¹Charles S. Maier, Recasting Bourgeois Europe: Stabilization in France, Germany, and Italy in the Decade after World War I (Princeton: Princeton University Press, pp. 78-9.

⁹²A. Richelme et cie of Marseille to Étienne Clémentel, June 18, 1919, A.N. F¹²8033; Union des syndicats patronaux des industries textiles de France to Clémentel, July 22, 1919, A.N. F¹²8033; report of speech by Adrien Artaud, President of the Marseilles Chamber of Commerce on October 3, 1919 to the Société d'économie politique in Paris, L'Information ouvrière et sociale (December 11, 1919); and published letter from Ferdinand Lespinasse to the Minister of Labor, L'Information ouvrière et sociale (August 28, 1919).

⁹³"La loi de 8 heures et le gouvernement," L'Information ouvrière et sociale (March 14, 1920). M. Isaac, the Minister of Labor, told the Lyon Chamber of Commerce that the government did not support the law and preferred to leave the implementation of the act to the employers.

⁹⁴Grabau, pp. 195-323.

⁹⁵There is a growing literature which discusses the attitudes of business leaders after the war. In Charles Maier's Recasting Bourgeois Europe, the

explanation for the cautious and conservative behavior of French business leaders was explained by their desire to restore order and "to reassert their older social hegemony in the context of corporate capitalism." See Maier, p. 87. Henry Peiter, on the other hand, sees compromise between the innovators who sought limited changes but did not want to jeopardize the survival of other employers and the conservative employers who preferred the pre-war status quo over widespread economic change and industrial modernization. See Peiter, "Institutions and Attitudes: The Consolidation of the Business Community in Bourgeois France, 1880-1914," Journal of Social History 9 (June 1976), p. 520.

⁹⁶Maier, p. 94; and Arno Mayer, Politics and Diplomacy of Peacemaking: Containment and Counterrevolution at Versailles, 1918-1919 (New York: Alfred A. Knopf, 1967), pp. 853-73.

⁹⁷Maier, pp. 91-109; letters in the Thomas Papers indicate that he was working behind the scene to assist Jouhaux with President Millerand. See Albert Thomas to Paul Boncour, June 3, 1920, A.N. Thomas Papers, Dossier 407; and Thomas to Eugène Petit (Millerand's secretary), December 21, 1920, A.N. Thomas Papers, Dossier 392.

⁹⁸Robert Pinot, "Réflexions sur la CGT et les idées proudhoniennes," L'Information ouvrière et sociale (May 9, 1920), p. 9.

⁹⁹*ibid.*, p. 11.

¹⁰⁰*ibid.*

¹⁰¹Albert Thomas, "1920," L'Information ouvrière et sociale (January 1, 1920), p. 1.

CHAPTER VI

CONCLUSION

It takes the rather naive optimism of the nineteenth century 'dandies' to imagine that the bourgeoisie is stupid. On the contrary, one has to reckon with its strokes of genius, and among these is precisely the fact of its managing to construct machines of power allowing circuits of profit, which in turn re-inforced and modified the power apparatuses in a mobile and circular manner The power of the bourgeoisie is self-amplifying, in a mode not of conservation but of successive transformations. [Michel Foucault, Power/Knowledge: Selected Interviews & Other Writings, 1972-1977, Colin Gordon (ed.), trans. by Gordon et al. (New York: Pantheon Books, 1980), p. 160.]

Histories of the French Third Republic have been frequently very critical of the performance of French business leaders. This was particularly true of studies written by American historians who based their conclusions as much on their comparison of rapidly expanding American economy during the first seventy-five years of the twentieth century with the older and smaller French economy as on the realistic opportunities for economic growth which French industries had between 1870 and 1940. The "failure of entrepreneurship thesis" which was so widely accepted in the 1950's and which evolved into the "stalemate society" paradigm of the 1960's and early 1970's is being attacked currently by French and American historians who now believe that the French economy and French entrepreneurs have been unfairly criticized. According to the revisionist thesis, the "failure of entrepreneurship thesis" ignores the influence of the dynamic sectors of the French economy and the performance of French managers who were willing

to take market risks and to modernize their operations. The revision of American historical attitudes toward Third Republic businessmen is not only the product of new information about the influence of "dynamic France," but it is related also to the more modest performance of American business over the past decade which have led Americans to reexamine the nature of their economy and economic values.¹

As one might expect, there has been a shift since 1970 in the historical treatment of the French adaptation to scientific management. The earliest studies of Taylorism in France treated it primarily as a precursor of post-Second World War French planning and modernization, minimized the extent to which Taylorism was applied in France before 1920 and overlooked the French intellectual antecedents of scientific management.² In contrast, recent historians have hinted that the historical foundation for the factory discipline of scientific management originated in the efforts of nineteenth-century managers to eliminate the autonomy of their skilled workers and to impose greater discipline over the labor force.³ According to this view, the introduction of Taylorism is of historical interest not only as the precursor of the modernization process during the Fourth and Fifth Republics, but also as the climax of the struggle between traditional work methods and the efforts of management in the "dynamic sector" to impose its authority in the workshop.

Indeed, this dissertation demonstrates that Taylorism did not reflect a dramatic departure from the efforts of the more dynamic managers to impose more management discipline over the production system. As early as the 1820's, there was a significant minority of French employers who had experimented with rationalization and applied piece rates, increased supervision and imposed stricter rules in their workshops to bring order to the production process.⁴ In fact, one of

the major dynamics of French factory relations during the nineteenth century was the patronat's efforts to overcome the vestiges of the handicraft tradition which provided skilled labor a considerable degree of job autonomy and control over the production process. It appears that French organizational reforms during the last half of the nineteenth century clearly were designed to make factory work more repetitive and routine so that management could replace skilled and semi-skilled labor with unskilled workers.

The patronat's organizational reforms precipitated a "structural crisis" for the skilled workers at the turn of the century. Skilled labor was faced with changes in factory production which threatened its professional status, job security and traditional prerogatives in the workshop. One historian has recently explained that the structural crisis among skilled workers can be reduced to two antithetical processes: "the proletarianization of skilled workers and the survival of skill."⁵ This structural crisis was a major factor in French social relations before the First World War and played a major role in determining how Taylorism was received by French society.

While the debate about the strength of revolutionary syndicalism and whether or not it represented accurately the majority of workers continues, there is no question that social tensions between labor and the bourgeois institutions of the Third Republic increased before the First World War. Dramatic increases in strike activities, spectacular instances of violence against strikers and the middle class fear of the working class were evidence that class conflict had intensified and factory relations worsened. French labor was alienated and isolated from the representative institutions of the Third Republic.

The historical context in which Taylorism was introduced in France is extremely important because without it there is no appreciation of the unique and

very different histories of scientific management in the United States and France. The American scientific management movement was incorporated in the Progressive movement and reflected the expansive, energetic nature of the American economy. In contrast, French Taylorists offered scientific management as a national cure to renew the vitality of a society and economy which many Frenchmen believed was in a state of decline. French concerns about fatigue and national degeneration were much stronger than similar tensions in America. Moreover, the strength of the skilled labor tradition and the small-scale industry in France which perceived Taylorism as a threat to their continued existence delayed its implementation in French workshops and ultimately influenced the way it was incorporated in the general debate on the economy and society.

While the scientific management goals of industrial efficiency, managerial competence, economizing of time and motion and increased productivity came to be incorporated in American progressivism, Taylorism itself was neither as progressive or democratic as many of the Progressives believed. In contrast to the claims of the Taylorites that scientific management represented a completely objective and inclusive management system, Taylor's own work was marked by a total absorption in increasing worker productivity and by a minimal understanding of personnel management. Nonetheless, Taylor's claims that his system offered a final solution to the "social problem" of industrial society played a major role in the conversion of many industrialists and engineers to his ideas. Ironically, orthodox Taylorism had little to offer in resolving social class tensions other than by increasing salaries of workers who met their production quotas. Indeed, Taylorism raised worker anxieties by encouraging greater repetition and monotony in the production process and the derogation of skilled workers which accompanied the reorganization of production in Taylorized factories.

Taylorism was introduced in France by Henry Le Chatelier, an eminent industrial scientist, professor and metallurgical engineer. Le Chatelier was essentially a conservative bourgeois whose republicanism was tempered by his elitist and antidemocratic philosophy. He incorporated scientific management in a general philosophy which called for the social and educational reform of the Third Republic and recognition of the leadership of a scientific and industrial elite. The creation of this elite would be critical in the national economic renaissance which he believed was necessary to reverse the decline relative to the development of Germany as an international military and economic power. Le Chatelier's presentation of Taylorism combined the values of bourgeois conservatism and a dynamic program of economic reform and factory reorganization that clearly aimed to stop the growth of socialism and syndicalism.

Between 1904 and 1907, French industrialists and engineers were introduced to the essentials of scientific management but there was little interest in applying it in French industry. With the exception of Georges de Ram's work at the Renault factory, there were no indications that Taylorism had been applied in French factories before 1912. That did not deter Taylor or Le Chatelier from disseminating information about the system. Taylor tried, but failed, to locate qualified French industrial engineers to train under him in America as consultant engineers.

Contacts between American and French supporters of scientific management and general French interest in Taylorism increased during the years immediately before the First World War; nonetheless, it was the impact of the recession and the rapid expansion of the American automobile industry which caused French automakers to implement Taylorism in their factories. Indeed,

their efforts were weak and were thwarted ultimately by French workers. The car manufacturers encountered numerous problems in trying to implement scientific management because: (1) they failed to follow Taylor's advice to prepare carefully factory personnel before implementing scientific management and to raise salaries to reward increased productivity; (2) they had only a partial understanding of scientific management and sought quick increases in productivity rather than embarking on a complete overhaul of their production methods as Taylor required; and (3) the workers struck against motion and time studies in an effort to stop what they clearly believed was a direct threat to their professional status and autonomy in the production process. The strikes against Taylorism in the French automobile factories during 1912 and 1913 serve as evidence that the "structural crisis" affected skilled labor's acceptance of scientific management before the First World War. Taylor's concept of the "one best way," management control over the work process and the subdivision of the production process were in direct conflict with traditional handicraft values of French machinists, who had maintained a significant degree of autonomy in French automobile factories. Thus it was the threat that Taylorism represented to the skilled workers' basic assumptions about work and their social status which forced the CGT to take its position against scientific management.

Although the automobile strikes had brought scientific management to the attention of the French public, Taylorism appeared to have lost its momentum on the eve of the First World War. In fact, the war and its insatiable demands for munitions and other war materiel eventually placed Taylorism back in the mainstream of French policy, but not necessarily industrial practice, because of the need to meet production quotas during the war and to help organize postwar

economic planning.⁶ At the beginning of the war, the French bureaucracy was unprepared and too inexperienced in economic and industrial affairs to provide the necessary leadership and coordination for economic mobilization. Thus the Minister of War had to rely heavily on the Comité des forges during the first two years of the war. The government, in turn, cooperated with the industrialists by providing them with the experienced manpower from the front, economic credits, and raw materials that industry required. The state guaranteed industry profits for its efforts and provided millions of francs to finance the acquisition of industrial machinery and the building of new plants. The government also relaxed the legal protection of labor to enable industrialists to increase individual productivity largely by increasing the hours of work for the war effort.

Gradually, the state increased its involvement in the economy and industry. Under the leadership of Ministers of Armaments and War Production Albert Thomas and his successor Louis Loucheur and Minister of Commerce Étienne Clémentel, the state bureaucracy assumed greater accountability for economic mobilization. Thomas and his staff played an active role in placing unskilled female and foreign workers in French factories to replace male workers needed at the front, encouraging factory reorganization, providing mechanisms to encourage greater labor participation in the decisionmaking process and promoting the application of Taylorism in French factories. Indeed, Loucheur, Thomas and Clémentel all agreed that Taylorism would benefit the war effort and should be a central part of postwar reconstruction.

Despite the efforts of government leaders to encourage Taylorism, there is little evidence that it was widely applied during the war other than in state munitions factories. That did not prevent Taylorism from becoming one of the central features of reconstruction planning. The Ministry of Commerce,

numerous engineering societies, employer associations, and politicians supported scientific management. Their positions during the last months of the war were shaped both by optimism and fear. They believed that the war offered economic reformers an opportunity to pursue economic modernization based on the American values of economic organization, full production and industrial efficiency; but their optimism was tempered by the fear that unless France reoriented its social and economic values and made a complete commitment to increasing production, Germany would dominate France economically. For a brief moment, Taylorism was raised to the level of a national imperative.

The economic reformers were frustrated, to a degree, by the postwar performance of the French economy. Reconstruction did not result in the total victory of "dynamic France" over "static France." The end of hostilities and the change in political climate after the war enabled the enemies of state intervention to reduce the influence of the state bureaucracies in economic affairs. Moreover, the optimistic assumptions about the postwar economic environment conflicted with the uncertainties which French businessmen faced due to changes in the domestic and foreign market places, high inflation, the transition from a war to peace economy, difficulties in securing raw materials and the resumption of class conflict in France and in other European countries. Under those circumstances, it was understandable that French business leaders would take a more cautious approach than the one urged by the economic reformers and that Taylorism would fail once again to be widely applied in French industry. Businessmen, as one might expect, reacted to the opportunities the external environment realistically provided rather than the policies of governmental committees.⁷

It would be easy to conclude, based on the fact that French industry had not embarked on a determined effort to apply scientific management in its factories and that the attitudes of small and medium-sized employers about Taylorism remained at best sceptical, that it had failed to affect French society. This dissertation has taken issue with that conclusion. It is true that integral applications of Taylorism were few by 1920. Nonetheless, the French experience with Taylorism since its introduction during the early 1900's had contributed substantially to the ideological reorientation of various groups in French society regarding industrial modernization. On the right, scientific management had a major impact by enhancing the authority of industrial engineers in the factories and society.

Of course, French industrial engineers were in position to benefit in status and power in the factory hierarchy by the emphasis Taylor placed on the centralization of the mental functions in the factory planning department staffed by the industrial engineers. Indeed, Taylorism, as articulated by Henry Le Châtelier, Charles de Fréminville and Victor Cambon, provided the engineers with an ideological raison d'être that was particularly attractive to the graduates of the elitist École polytechnique and École centrale des arts et manufactures who had been entering private industry in increasing numbers before the war. For them, scientific management supported their position as technocratic elites on the basis of their potential contribution to improving industrial productivity and raising profits.

Though Taylorism may have become the "ideology of engineers," French employers were ambivalent about its consequences. Those French employers who had been interested sufficiently in Taylor's ideas to apply them in their factories had done so with little regard to the general principles which the

system represented. In the case of French automakers before the war, scientific management offered technical advances that offered them increased labor productivity, greater administrative control over the production process in their factories and maintenance of their position in the European and international markets against American competition. In any case, it is difficult to detect in the application of Taylorism by these employers any enthusiasm for the reform of the factory hierarchy advocated by the engineers. Renault and other French automobile manufacturers shared with other large and small employers the strong belief that the employer must be the complete master of his house. Thus, Henri Fayol's ideas which were directed at enhancing the administrative effectiveness of the traditional factory management, rather than the industrial engineers, captured a substantial following among the patronat after they were introduced in 1916.

Moreover, the conversion of French employers to scientific management was made even more difficult by: 1) the highly politicized debate over the reform of factory relations; 2) widespread employer hostility to state intervention in the economy; and 3) the political, economic and cultural influence of the small and medium-sized employers. During the war, the demands of economic mobilization temporarily subdued opposition of the patronat to scientific management for fear of being accused of anti-patriotism. However, the end of the war and the discussion of postwar economic reorganization created tensions among employers about Taylorism. While there was a minority of employers whose experiences with American production ideas encouraged them to consider wider application of scientific management in their shops, they were outnumbered by small and medium-sized entrepreneurs. They were sceptical about or hostile to Taylorism because it threatened the survival of the traditional French economy which accommodated a prosperous small industrial sector with its emphasis on low

production of quality-crafted goods. With good reason, they feared the transition to an economy in which their products would have to compete against the mass-produced goods from Germany and the United States. Given the deterioration of the international situation, the economic problems which such French employers faced after the war and the additional complications caused by labor strikes and the eight-hour day, it would have been difficult for those employers who supported scientific management to have turned their backs on their less competitive colleagues. Indeed, confronted by the realities of the postwar business climate, small and medium-sized employers prevailed over the "innovators" by encouraging policies based on economic security and the status quo.⁸

The fate of Taylorism at the end of the war hinged, to a large extent, on the outcome of the patronat's struggles against two external competitors: the state and the labor movement. In fact, the results were mixed as the patronat successfully squelched efforts after 1916 to impose far-reaching economic reforms—including scientific management—on French employers. Nonetheless, the employers' defense demonstrated that they had borrowed from Taylorism where it was useful as justification for the elite position of the industrial bourgeoisie in French society. That was certainly true in the case of the debate about étatisme after the war in which the entire patronat rallied to protect its traditional autonomy from state intervention in its activities. Based on the war-time experience with state intervention and the conviction that fundamental economic reform would require government coordination, there were advocates of scientific management who supported a degree of government dirigisme, modeled after the examples established during the war. However, government controls imposed on industry by the Ministries of Armaments and War Production and Commerce were in sharp contrast to prewar theories of economic liberalism which continued to

shape the patronat's view of state-business relations. Moreover, such a transfer of power from the patronat to the government was unacceptable both to large and small employers.

The patronat was equally determined to defeat the challenge from the left which, in the form of the CGT Minimum Program of 1918, had fashioned its own program for industrial modernization based on a mélange of labor participation, industrial democracy, Proudhonism, patriotism, mechanization, consumerism and greater industrial efficiency and productivity. However, labor's Minimum Program, inspired by Albert Thomas and Léon Jouhaux, was unacceptable to the patronat which viewed labor's efforts as an attempt to limit the authority and power of the employers. Indeed, the bourgeoisie acted swiftly after the war, following the passage of the eight-hour law and the revival of strike activity in 1919 and 1920, to place the labor movement on the defensive.

It is important to note that the terms which the patronat defended its power and status after the war illustrates that Taylorism had prepared employers well by providing them the intellectual justification necessary to maintain their elite status. Despite the fact that employers did not apply scientific management as prescribed by Taylor and Le Chatelier, it justified their belief in their total authority over factory operations. Indeed, their experiences during the First World War and the postwar reconstruction had done little to dislodge such attitudes in French employers who, more than other European managers, were committed to their convictions that management must be masters of their workshops. Moreover, knowledge of scientific management, with its emphasis on the role of management and the separation of mental and manual functions, encouraged French managers to redefine their role as elites on the basis of managerial and organizational imperatives rather than proprietorship and wealth. As one historian recently noted, "l'èse majesté became l'èse logique."⁹

Taylorism helped arm the French businessman with the ideological weapons against the labor movement that enabled him to prevail in the industrial war in which the two sides had been engaged since the early nineteenth century, and which had become even more intense after the turn of the twentieth century.¹⁰ At stake was the power of the patronat in their factories and the bourgeoisie in society.¹¹ As the issues of management control and labor participation became the focus in the restoration of postwar factory relations, the ultimate success of the bourgeoisie, at least in part, may be attributed to the ideological power of scientific management in whatever form, which had been insisting for decades on the development of the factory bureaucracy, the gradual elimination of the skilled crafts' control by mechanizing the production process, the derogation of craft skills, the transfer of the skilled workers' control of the production process to the factory bureaucracy, and the use of motion and time study and the standardization of the production process to speed up productivity. In the final analysis, this watered-down form of Taylorism, as an ideology of management efficiency however altered or weakened by Frenchmen, was effective in consolidating the efforts of French employers since the early nineteenth century to gain control over their shops and to reinforce their position in French society vis-à-vis the labor movement following the First World War.

NOTES

¹See note 9 in the introduction to the dissertation for the literature relating to the "failure of entrepreneurship thesis." Aimée Moutet's article on the response by French employers to Taylorism before the war blames its slow development on the patronat's mentality. See Aimée Moutet, "Les Origines du système Taylor en France. Le point de vue patronal (1907-1914)," Le Mouvement social, no. 93 (October-December 1975), p. 45.

²Richard Kuisel's work reflects this perspective. See Capitalism and the State in Modern France: Renovation and Economic Management in the Twentieth Century (Cambridge: Cambridge University Press, 1981); and "Technocrats and Public Policy: From the Third to the Fourth Republic," Journal of European Economic History 2 (1973), pp. 53-100.

³See note 19 in the introduction to the dissertation for references to articles on discipline in nineteenth-century factories.

⁴Peter N. Stearns, Paths to Authority: The Middle Class and the Industrial Labor Force in France, 1820-1848 (Urbana: University of Illinois Press, 1978); and Joan W. Scott, The Glassworkers of Carmaux: French Craftsmen and Political Action in a Nineteenth-Century City (Cambridge: Harvard University Press, 1974).

⁵Bernard H. Moss, The Origins of the French Labor Movement, 1880-1914: The Socialism of Skilled Workers (Berkeley: University of California Press, 1976).

⁶Moutet, p. 50.

⁷Thomas W. Grabau, "Industrial Reconstruction in France after World War I," (Ph.D. dissertation: Indiana University, 1976), pp. 350-2.

⁸Grabau, pp. 347-8. He notes "that French reconstruction in the 1920's exhibited the contradictory impulses of modernization and stabilization."

⁹Charles S. Maier, Recasting Bourgeois Europe: Stabilization in France, Germany, and Italy in the Decade after World War I (Princeton: Princeton University Press, 1975) pp. 82-3.

¹⁰On the notion of factory discipline, see Patrick Fridenson, "France-États-Unis: genèse de l'usine nouvelle," Recherches, no. 32/33 (September 1978), p. 387; Ronald Aminzade, "The Transformation of Social Solidarities in Nineteenth-Century Toulouse," in Consciousness and Class Experience in Nineteenth-Century Europe, John H. Merriman (ed.) (New York: Holmes & Meier, 1979), p. 102; and Michelle Perrot, "The Three Ages of Industrial Discipline in Nineteenth-Century France," in Consciousness and Class Experience in Nineteenth-Century Europe, p. 149. For excellent studies on the process of proletarianization on the skilled crafts during the late nineteenth century, see particularly the studies by Moss and Scott cited above.

¹¹Maier, pp. 153-4. However, this dissertation, as does Grabau's work, finds Maier's conclusions that French employers simply wanted to return to prewar industrial relations of limited use. Grabau concludes on postwar reconstruction that it did not represent complete defeat of modernization. He writes: "In this topsy-turvy environment the vision of the future was compromised, but not totally lost. The vision had seen the necessity of a complete transformation of the economic structure including the development of new values, the introduction of new industries, and the modernization of existing industries The markets of the 1920's, however, seemed fraught with more dangers than opportunities and old 'malthusian' practices reared their heads On the whole, then, the economic environment of the 1920's strengthened tendencies toward a cautious restoration of the prewar equilibrium and gave precedence to the quest for security over the commitment to bold solutions to novel problems. Yet, the record of industrial reconstruction indicates that the impulse to modernize was not totally vanquished." He concludes that individual firms made progress, but that the move to change "was snuffed out by depression." Grabau, pp. 363-4.

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