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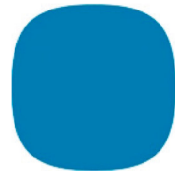
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Family and Bureaucracy in German Industrial Management, 1850-1914: Siemens in Comparative Perspective*

¶ This study analyzes the changing role of pre-industrial family and bureaucratic traditions in the development of Germany's leading electrical manufacturing firm. The Siemens company developed a decentralized, multi-divisional structure ten to twenty years before duPont and General Motors pioneered a similar organization in the United States. The pre-industrial bureaucratic traditions, considered in a multi-national context, facilitated the development of efficient modern management in Germany and help explain the relative success of German industry in the two decades before World War I.

When German industrialization began in the 1830's, powerful public bureaucracies had already developed.¹ They increasingly displayed certain characteristics which, in varying degrees and with many modifications, were shared by other large-scale organizations, especially those developed since the end of the nineteenth century. They served as the empirical basis for Max Weber's definition of bureaucracy. According to that definition, used in this article as a model, "bureaucracy" refers to organizations with highly formalized internal relations, mostly in the form of impersonal, general, written rules; with a practice of handling affairs as cases according to general rules; with a fixed, institutionalized distribution of functions and responsibilities; with a hierarchical, institutionalized pattern of authority corresponding to the distribution of responsibilities; and with an intensive, continuous system of written

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¹ See W. G. Hoffmann, "The Take-Off in Germany," W. W. Rostow (ed.), *The Economics of Take-Off into Sustained Growth* (London, 1964), 95-119, esp. 96 for the first period of German industrialization from the mid 1830's to 1873.

information, of records and files. Persons employed in such organizations hold a specific status; they are appointed on the basis of contractual agreement, according to general rules, qualifications, and examinations; they hold tenure and enjoy seniority rights (such as in matters of promotion and salaries) as well as old age security (pensions). Further, they are expected to display a specific kind of loyalty. "Bureaucracy" also refers to patterns of behavior within such organizations, and to correlated values and beliefs.²

Bureaucratic structures, processes, and values sharply contrasted with some attributes of the type of family which was prevalent at the beginning of industrialization. Families (especially middle class families) were based on personal, direct, intimate, and often informal relations. They were characterized by much less specified claims of authority and obedience, a lower degree of functional specialization, and a traditional, emotional loyalty, based primarily on neither financial nor legal relationships.³

In their internal structures and processes, both families and bureaucracies were clearly distinguished from certain patterns which were essential and specific for industrializations occurring in a capitalist form. In both institutions the allocation of functions and rewards was not regulated by the market. In neither institution did rewards closely relate to measured achievements. In both families and bureaucracies, competition and risk-bearing were of much less importance than in the market economy, and the profit motive and financial incentives played only minor roles. In Germany the institution of the family had, of course, been in existence long before industrialization began. In contrast to countries like Great Britain and the United States, strong, bureaucratic public administrations were created in the German states before the beginning of industrialization. In Germany as in other continental countries with an absolutist tradition, not only the family but also bureaucratic structures, processes, and patterns were clearly pre-industrial.⁴

² For the purposes of this article this "ideal type" seems sufficient. See M. Weber, *Wirtschaft und Gesellschaft* (Köln/Berlin, 1964), 160-66, 703-738. Weber's concept applies better to public administrations around 1900 than to those in 1830. Most of the above mentioned attributes were already existent, though less developed, in the German *Vormärz*, especially in Prussia. See H. Rosenberg, *Bureaucracy, Aristocracy, and Autocracy* (Cambridge, 1958); R. Koselleck, *Preussen zwischen Reform und Revolution* (Stuttgart, 1967).

³ For a definition of the modern family stressing its character as a primary group, its intimacy, and cooperative features see R. König, *Materialien zur Soziologie der Familie* (Bern, 1946), 103-131, esp. 119.

⁴ A. D. Chandler, Jr. and L. Galambos recently stressed the temporal differences between the development of largely private bureaucracies (since the 1870's) and of coordinating and regulating public bureaucracies (which remained relatively weak until the 1930's) in the United States. See their "The Development of Large-Scale Organizations in Modern America," *Journal of Economic History*, XXX (March, 1970), 201-207. In Germany the pattern was reversed.

Consequently, strong and efficient public administrations played an important role in the process of economic, social and political modernization in Prussia and in other German states during the early nineteenth century. This role was in part helpful and in part harmful to economic growth. Industrialization was started and continued partly under governmental supervision, partly with limited administrative help, mostly under strong bureaucratic influences. The active role of the bureaucracy was probably accepted by a large majority of the population. In Germany more than in other countries bureaucratic patterns and ideals thus permeated nearly all sectors of the society.⁵

There were many channels through which bureaucratic patterns spread to the developing factory system and its management. Various amalgamations and interdependencies between governmental agencies and civil servants on the one hand and early enterprises on the other continued after the mercantilistic period. Prussian civil servants acted as entrepreneurs, and the government continued to run some enterprises, especially in mining (until the 1860's), and later in the railroad sector. Civil servants played a leading role in the system of technical and industrial education begun in the 1820's, and also in early scientific and industrial associations.⁶ Engineering expertise was concentrated in the Prussian technical administrative branches and in special military units. Technical civil servants and military men were hired by private entrepreneurs who paid higher salaries than the government. A substantial minority of the salaried employees of the Siemens & Halske electric

⁵ The Prussian-German experience not only differed from the pre-bureaucratic Anglo-Saxon industrializations. It was also peculiar if compared with other European countries such as France. Here, it is true, a strong central bureaucracy had developed before industrialization; but the processes of economic, social, and political modernization occurred in France with more criticism, rejection, and distrust of the governmental authorities and their interventions than in neighboring Prussia. The bureaucratic permeation of the French social fabric thus remained much weaker. See Koselleck, *Preussen*; L. Buntin, "Das Bürgerthum als Gesellschaftsstand im 19. Jahrhundert," in *Gesammelte Schriften* (Köln/Graz, 1963), 284ff.; W. O. Henderson, *The State and the Industrial Revolution in Prussia 1740-1840* (Liverpool, 1958); W. Fischer, *Der Staat und die Anfänge der Industrialisierung in Baden 1800-1850* (Berlin, 1961); C. P. Kindleberger, *Economic Growth in France and Britain, 1851-1850* (Cambridge, Mass., 1964), 193; F. Goguel, "Six Authors in Search of a National Character," in *Search of France* (Cambridge, Mass., 1963), 369.

⁶ For examples of close connections between government agencies and industrial enterprises in the mercantilist period: R. Rachel, *Das Berliner Wirtschaftsleben im Zeitalter des Frühkapitalismus* (Berlin, 1931), 14, 123, 142. For the active role of Prussian civil servants around 1800 see F. Redlich, "The Leaders of the German Steam-Engine Industry During the First Hundred Years," *Journal of Economic History*, IV (1944), 121 ff.; F. Zunkel, "Beamtenschaft und Unternehmertum beim Aufbau der Ruhrindustrie 1849-1880," *Tradition*, IX (1964), 261-276; H. D. Krampe, *Der Staatseinfluss auf den Ruhrkohlenbergbau in der Zeit von 1800-1865* (Köln, 1961). For technical and industrial schools and associations: *Chronik der Kgl. Technischen Hochschule zu Berlin 1799-1899* (Berlin, 1899); F. Schnabel, *Die Anfänge des Technischen Hochschulwesens* (Karlsruhe, 1925); C. Matschoss, *Preussens Gewerbeförderung und ihre grossen Männer* (Berlin, 1921); C. Matschoss, "Geschichte der Königlich-Preussischen Technischen Deputation für Gewerbe," *Beiträge z. Gesch. d. Technik u. Industrie* III (1911), 239-253.

manufacturing company in Berlin were former Prussian civil servants. No doubt they brought bureaucratic patterns, styles, and values with them into the growing enterprises.⁷ In addition, the early entrepreneurs and their employees were influenced by a general value system in which civil servants ranked extremely high. Their favorable public image denoted power, general education, a sense of duty, and security. Bureaucratic patterns and values enjoyed a broad recognition in German society, often to the surprise of visitors from Anglo-Saxon countries.⁸ All these factors contributed to the diffusion of bureaucratic patterns into industry.

The interconnections between the sphere of family relations and the developing factory system are similarly manifold. For centuries, economic activities had prevailed in which household and economic enterprise were closely connected in terms of locality, labor, capital, decision making, and life in general. The rise of the factory system brought a separation between the individual's sphere of living and his sphere of working, between household and enterprise. This reduced the family's direct and permanent influence on economic pursuits.⁹

On the other hand, mutual influences between family and business activities did continue. Pre-industrial family-business relations often survived in industrial enterprises. Furthermore, while urban families were freed from some of their earlier functions, they continued to perform numerous social and ideological functions and to be of strong importance to their members. Especially in the middle classes, the increasingly private families served as protected locations in which the husband and father found emotional safety and relaxation from the pressures of a business, professional, or civil service life. The more removed the family became from public and economic life (at least in the eyes of its members), the easier it could be interpreted (and celebrated) in exclusively pri-

⁷ In 1850 Prussia had an engineering corps of 220 officers and 4,000 men. See J. Kocka, *Unternehmensverwaltung und Angestelltenschaft am Beispiel Siemens 1847-1914* (Stuttgart, 1969), 177 ff. for the Prussian technical civil service, and p. 101 for former civil servants among Siemens employees. An example of a civil servant hired by a private railroad company is in V. v. Unruh, *Erinnerungen aus dem Leben*, H. v. Poschinger (ed.), (Stuttgart, 1895). The participation of civil servants in private railroad building became a problem for Prussian authorities, who tried to reduce this steady loss of trained personnel. See Beuth's ordinances from September 25, 1844 and March 31, 1845, in L. v. Rönne and H. Simon, *Die Baupolizei des Preussischen Staates*, suppl. (Breslau, 1852), 44 f.

⁸ See for example S. Laing, *Notes of a Traveller*, 2nd ed. (London, 1854) 95 ff., 121 ff. Rather similar fifty years later is S. Whitman, *Imperial Germany* (Boston, 1899), 88-115. The popularity of the civil service was reflected by a tremendous run on open positions. See Koselleck, *Preussen*, 438 ff., 444. See also the recognition of a leading industrialist: W. Siemens, *Lebenserinnerungen* (München, 1967), 47.

⁹ See M. Weber, *Wirtschaftsgeschichte*, 2nd ed. (München, Leipzig, 1924), 199 ff. and W. Sombart, *Der moderne Kapitalismus*, 2 vols. (Leipzig, 1902), I, 30 f. See also W. Sombart, "Die Entstehung der kapitalistischen Unternehmung," *Archiv f. Sozialwissenschaft und Sozialpolitik*, XLI (1916), 300 ff.

vate, partly emotional, even sentimental terms.¹⁰ It is in this context that one has to understand the strong concern early German entrepreneurs felt for their families.¹¹ The orientation of the founders and owners of factories provided a strong link between family traditions and early industry.

The impact of bureaucratic and family traditions on the development of modern industrial management in Germany, their varying relations to each other, and their changing role in the process of industrial growth are the topics of this study. The discussion of these problems relies heavily on the evidence derived from the experience of Siemens & Halske, a pioneering firm in the electrical industry. Additional information will be used to put the experience of this enterprise into perspective and to suggest some general conclusions.

EARLY YEARS OF SIEMENS & HALSKE

Siemens & Halske was founded in Berlin in 1847 and quickly expanded internationally, opening branches in St. Petersburg and London by the early 1850's. It produced and installed cables, telegraphs, signals, measuring devices, and other mechanical instruments. In 1857, 1867, and 1872 S&H employed 127, 192, and 581 persons in its Berlin headquarters, and 240, 480, and 1,010 were employed abroad in these years.¹²

This company was strongly affected by both traditions under discussion, perhaps more so than the average nineteenth century firm. Werner Siemens, the founder and active leader of the enterprise until 1890, was reared in a middle class family which consciously explored and cherished its history back into the seventeenth century. The well-being of his family served as an ultimate end, justifying his economic efforts and making his profits and expansions meaningful to him. He later recalled: "From my early youth,

¹⁰ See O. Brunner, "Das 'Ganze Haus' und die alteuropäische Ökonomik," *Neue Wege der Verfassungs- und Sozialgeschichte*, 2nd ed. (Göttingen, 1968) 103-127; J. Habermas, *Strukturwandel der Öffentlichkeit*, 3rd ed. (Neuwied/Berlin, 1968) 55-63; H. Schelsky, *Wandlungen der deutschen Familie in der Gegenwart*, 2nd ed. (Stuttgart, 1954), 19 f., 150 ff.; F. Oeter, "Die Familie als soziale Funktionseinheit," *Familie und Gesellschaft*, F. Oeter (ed.), (Tübingen, 1966), 1-22; E. K. Bramsted, *Aristocracy and the Middle-Classes in Germany*, rev. ed. (Chicago/London, 1964), 200 ff., 214 f. See also W. H. Riehl, *Die Familie* (Stuttgart and Augsburg, 1885), critical from a reactionary standpoint, but with some sharp observations: see for example p. 150 for the transition from previous extended family life, including servants, to smaller, more intimate relations. Similarly critical, but from a socialist viewpoint, is Dr. Müller-Lyer, *The Family* (New York, 1931), 241 ff.

¹¹ See F. Zunkel, *Der Rheinisch-Westfälische Unternehmer 1834-1879* (Köln/Opladen, 1962), 72 f.

¹² For an informative history of the Siemens enterprises see G. Siemens, *History of the House of Siemens*, 2 vols. (Freiburg/Munich, 1957).

I was enthusiastic about founding a world-wide business à la Fugger, which would give power and reputation not only to me but also to my descendants, and which would provide the means to raise also my brothers and sisters and other near relatives on to higher standards of life."¹³

In addition to his strong family ties, the young Siemens was influenced by the military. He received part of his training in a technical military school in Berlin and spent fifteen years in a military career before starting his own business. Thus he initially acquired, in his own words, "an appointment for life as an army officer which is highly regarded in Prussia, a fact which helped me substantially [in my career]."¹⁴

The family orientations and connections of this entrepreneur strongly determined the management of his company in the first two to three decades of its existence, and they were a major factor responsible for the long-range success of Siemens & Halske. As was so often the case, family connections provided most of the initial capital.¹⁵ Management problems, however, turned out to be more difficult than capital needs. As in Great Britain fifty years earlier, or in developing countries today, it was difficult for German factory owners around 1850 to find qualified and reliable officers and office employees. Threatened by frequent frauds, they found loyalty and honesty even more important criteria of employee selection than training and ability.¹⁶ As much as he could, Werner Siemens filled positions which carried decision-making power and which were hard to control with relatives and close friends. Thus personal loyalty performed functions which were later provided by direct, often bureaucratic controls, by financial incentives, and by professional ethics. The first salaried employee of the company was a brother of Werner Siemens, the first general manager his closest friend from school and military years. When a diversification of the production program created new management problems, Sie-

¹³ Werner to Carl Siemens, December 25, 1887, in: C. Matschoss (ed.), *Werner Siemens* (Berlin, 1916), 911. See for his family background and concern: W. Siemens, *Lebenserinnerungen*, 12, 30, 34. Two more recent biographical sketches are by K. Busse, "Werner Siemens," *Die Grossen Deutschen*, 5 vols. (Berlin, 1956), III, 422-55 and S. v. Weiher, *Werner von Siemens* (München, 1966).

¹⁴ See W. Siemens, *Lebenserinnerungen*, 20 ff., 298 f.

¹⁵ A cousin provided for nearly 7,000 Taler. See G. Siemens, *History*, I, 17.

¹⁶ Werner Siemens called the salaried personnel the company's "Achilles' heel" in a letter to Carl Siemens, December 21, 1857, in: Matschoss, *Werner Siemens*, 125. "My yardstick for salaried employees is whether they never put their own interests beyond the company's interest, or whether one cannot rely on that." (Werner to Carl Siemens, April 7, 1880, in: *Siemens-Archiv-Akte* (hereinafter cited as SAA) *Briefsammlung* (hereinafter cited as BB). Similar problems in Great Britain are mentioned by S. Pollard, *The Genesis of Modern Management* (London, 1965), 17 ff., *passim*; also Harbison and Myers, *Management in the Industrial World* (New York, 1959), 49, 87 ff. with respect to recently developing countries.

mens responded by establishing an independent company for the production of the new article (alcohol measurement devices) and by putting one of his cousins in charge of it. Thus family loyalty provided the controls, though informal ones, necessary for successful decentralization of responsibility and authority.¹⁷

The coordination of the three main Siemens branches in Germany, Russia, and Great Britain was primarily achieved by private correspondence and the family-based confidence among the three Siemens brothers, Werner (Berlin), Carl (St. Petersburg), and William (London), each of whom headed one of the branches without day-to-day interference from the other two. In a time when communication was difficult, the loyalty of the brothers provided a kind of coordination on the international level which probably could not have been achieved by other means. The importance of these family ties is suggested by the fact that disruptive and dysfunctional conflicts emerged when one of the brothers left his branch or lost influence because of other reasons.¹⁸ The "nepotism" of early industrialists served not only their strong family inclinations but also facilitated the growth and success of the enterprise.¹⁹

To a limited extent family relations also served as a model for Siemens' labor management. Especially in its first years, the Siemens management apparently felt some responsibility towards its few employees, a feeling which may have been shaped by Siemens' tendency to think in family categories, and by the traditional master-journeymen relationships. The shortage of skilled workers and the necessity of securing a stable core of employees motivated Siemens and other industrialists to make conscious use of paternalistic devices and tools of direct, personal leadership in order to induce loyalty and personal attachment to the company. This tendency was strengthened in the late 1860's, as a result of labor unrest. Entrepreneurs often consciously revived paternalistic devices after

¹⁷ See Werner to Carl Siemens, December 12, 1847 in: Matschoss, *Werner Siemens*, 51, for the first office employee Friedrich Siemens; for William Meyer ("Oberingenieur und Prokurist") see W. Siemens, *Lebenserinnerungen*, 272; R. Ehrenberg, *Die Unternehmungen der Brüder Siemens* (Berlin, 1906), 458; for the foundation of "Gebrüder Siemens" under Louis Siemens see the contract of partnership from December 14, 1872 (SAA 21/Lc 594).

¹⁸ For details of the international coordination see Kocka, *Unternehmensverwaltung*, 76, 82, 132 f., 207, 253. For conflicts between Siemens Brothers London and S&H Berlin in the 1880's: S. v. Weiher, "Die Entwicklung der englischen Siemens-Werke und des Siemens-Überseegeschäftes in der zweiten Hälfte des 19. Jahrhunderts" (Diss., Freiburg/Br., 1959), 156 ff. — Carl Siemens left Petersburg in 1867. See Ehrenberg, *Die Unternehmungen*, 97 ff.

¹⁹ See for British examples S. Pollard, "The Genesis of the Managerial Profession," *Studies in Romanticism*, IV (Winter, 1965), 63 f. See also H. J. Habakkuk, "The Historical Experience on the Basic Conditions of Economic Progress," in L. H. Dupriez (ed.), *Economic Progress* (Louvain, 1955), 159, who regards the family firm as a main agent of rapid industrial progress in the nineteenth century.

they had declined under the impact of ideals of laissez-faire liberalism, strong competition, rapid market changes, and an increasing labor supply.

Traditional and humanistic beliefs, concern about a loyal and permanent core of skilled employees, and the attempt to pacify the challenges of organized labor thus merged to motivate a type of labor management which offered excursions, parties, gifts, medical benefits, company-based insurance and pension plans, and personal concern to the workers. Especially in its conservative form such paternalism had illiberal and repressive consequences. Krupp and Stumm are well-known cases in point. Other enterprises (like Siemens & Halske) followed a less heavy-handed policy, but they all shared the strong inclination to base their personnel management on additional controls as well as direct orders and financial incentives. In their search for additional instruments of control and motivation, German entrepreneurs utilized traditional, family-related devices to a lesser extent than later Japanese enterprises but probably more than in earlier and contemporary British and American factories.²⁰

Bureaucratic traditions were also clearly visible within the Siemens management. As early as 1855 shop rules were formulated and written down.²¹ Such written and general rules of shop discipline (*Arbeitsordnungen*) were applied in German factories at least as early as the 1830's. They were used to stress the duties of the workers (sometimes also with reference to their behavior outside the factories), much more than their rights.²² The Siemens company developed very quickly a system of written and generalized instructions which provided fixed lines of communications

²⁰ Werner Siemens' statements of his labor policy principles: Werner to Carl Siemens, December 21, 1857 and to Stülpnagel, November 19, 1875, in Matschoss, *Werner Siemens*, 125 f., 482; W. Siemens, *Lebenserinnerungen*, 324. Labor shortage: Werner to Carl Siemens, December 15, 1854 and April 29, 1872 (SAA BB). For a sympathetic overview see K. Burhenne, *Werner Siemens als Sozialpolitiker* (München, 1932). For the company's insurance plan of 1872 in addition SAA 14/Lm 727, and: W. Siemens, *Lebenserinnerungen*, 297. E. C. McCreary, "Social Welfare and Business," *Business History Review*, XLII (Spring, 1968), 24-49; A. Ascher, "Baron von Stumm," *Journal of Central European Affairs*, XXII (October, 1962), 271-285. Other examples of paternalism in German enterprises are: L. H. A. Geck, *Die sozialen Arbeitsverhältnisse im Wandel der Zeit* (Berlin, 1931). Some comparisons between Germany, Britain, and the U.S. are in A. Shadwell, *Industrial Efficiency* (New York, 1909). Examples of "familism" in Japanese factories: B. K. Marshall, *Capitalism and Nationalism in Prewar Japan* (Stanford, 1967), 62 ff.; J. Hirschmeier, "The Japanese Spirit of Enterprise 1867-1970," *Business History Review*, XLIV (Spring, 1970), 13-38, esp. 28.

²¹ See W. Meyer to Werner Siemens, June 9, 1855 on a "Werkstattdienstinstruktion" (SAA 2/Lh 849). The shop rules of 1872 and 1895 are reprinted in Kocka, *Unternehmensverwaltung*, 575 ff.

²² See Fischer, *Der Staat*, 357 for an example from 1837; O. Neuloh, *Die deutsche Betriebsverfassung und ihre Sozialformen bis zur Mitbestimmung* (Tübingen, 1956), 79 mentions the wide application of such rules in the 1870's. For an early British example (1821), see Pollard, *The Genesis*, 216.

within and between the offices. The sources show a well developed sense of hierarchy, and sometimes read like the files of a contemporary administrative agency.²³ This small or medium-sized enterprise was marked by a degree of bureaucratization and systematic orderliness which certainly matched and probably excelled the bureaucratic tendencies in American railroads, which at about the same time pioneered modern systematic management in the United States.²⁴ This high degree of bureaucratization cannot be explained merely as managerial response to the operational requirements of the enterprise; it also resulted from the acceptance of traditional organizational models developed outside industry.

The influence of bureaucratic patterns from outside the firm was also evident in the status and self-image of the early white collar employees. Their remuneration by monthly salaries, which were based in part on seniority, their actual job security,²⁵ vacation privileges, and the non-manual nature of the work they performed, differentiated them clearly from the wage earners. They were, in these respects only, comparable to German civil servants. Indeed, they were called *Privatbeamte*, and they regarded themselves somewhat inaccurately as a private kind of civil servants bearing delegated authority and deserving certain privileges.²⁶

It should be noted, however, that the bureaucratic tendencies within the management of the early Siemens company were clearly limited by several interrelated factors, more so than in later and larger companies. The strength of family traditions within this organization set a limit to its bureaucratic character. It pointed to the role of personal factors in the recruitment and promotion of the personnel, in the performance of the functions of the enterprise, and in the distribution of authority. The power of the owner-entrepreneur and his closest aides was such that they could cut the hierarchical lines and break through established patterns of

²³ See the correspondence between W. Siemens and W. Meyer in 1855 (SAA 2/Lh 849). An early example of written office rules is mentioned by W. Köllmann, *Friedrich Harkort* (Düsseldorf, 1984), I, 187 (Harkort's mechanical factory in Wetter-Ruhr, 1830).

²⁴ A. D. Chandler, "The Railroads: Pioneers in Modern Corporate Management," *Business History Review*, XXXIX (Spring, 1965), 16-40. It is however, interesting to recognize that Siemens (like the railroads) was partly engaged in services (installation, maintenance of telegraph lines and cables), and it might well be that systematic, bureaucratic non-governmental management was first developed in service enterprises, not in pure production establishments.

²⁵ Werner Siemens, partly as a consequence of the tense labor market, the limited exchangeability, and the confidential positions of his salaried employees, partly on a traditional basis, followed the principle of not laying off one of his salaried employees "as long as he is not guilty of anything, even if we don't have anything for him to do" (to William Siemens May 14, 1858, SAA BB).

²⁶ For details see J. Kocka, "Industrielle Angestelltenschaft in frühindustrieller Zeit," in O. Büsch (ed.), *Untersuchungen zur Geschichte der frühen Industrialisierung vornehmlich im Wirtschaftsraum Berlin-Brandenburg* (Berlin, 1971).

communication. Werner Siemens liked to improvise, and he did not always obey the rules of delegated responsibility and authority, even though he endorsed them in principle. The relatively small size and rapidly changing nature of the young enterprise set limits to the repetitiveness of its operations, to the generalization of its processes, and to the institutionalization of its functions. Moreover, the integration of the enterprise into a competitive market economy, its orientation towards measurable achievements and profits with the resulting financial incentives for employees and competitive elements among them, all marked a clear difference between capitalistic enterprises and governmental bureaucracies.²⁷

As far as bureaucratic patterns were adopted, they in general contributed to the success of the business.²⁸ In the early German factories, bureaucratic controls stressing accuracy, punctuality, and regularity tended to check the more traditional, irregular, and slow performance of the still prevailing artisan-type first-generation factory workers, and thus helped to increase the efficiency of the shop.²⁹ Furthermore, the bureaucratic impact manifested itself in the civil-service ideology of the salaried employees, and thus served the success of the enterprise. Especially since sufficient instruments of direct control (sophisticated accounting techniques, progressed division of labor, easy communication over long distances) did not exist,³⁰ the civil servant ethos of employees was in the interest of management. This ethos implied "integrity, a sense of duty, unselfish diligence, public spirit, an unbending sense of justice, and unpretentious loyalty."³¹ If more than mere rhetoric, such attitudes and self-images of the early employees fulfilled a function which, during the early industrialization in Britain, was partly performed by professional ethics. They checked the widespread un-

²⁷ For some remarks on the financial incentives used at Siemens, see Werner to Carl Siemens June 16, 1868 and November 29, 1869, in Matschoss, *Werner Siemens*, 292 and SAA BB; Burhenne, *Werner Siemens*, 64 ff.; for the role of financial incentives in early German management in general see J. Kocka, "Management und Angestellte im Unternehmen der industriellen Revolution," R. Braun and W. Fischer (eds.) *Industrielle Revolution* (Cologne, 1971).

²⁸ There were some minor disadvantages, however. A certain slowness and formality in the treatment of customers was included, but the most important customers were large, partly bureaucratic organizations themselves (government agencies, railroads), and did not mind too much. Also, the bureaucratic orientation of certain employees may have reduced their innovative ability and initiative. On the other hand, with a society largely convinced of bureaucratic values and virtues, a bureaucratic image could even become an asset in terms of public relations.

²⁹ While the former officer and civil servant, W. Meyer, was the strongest advocate of bureaucratic regulations, the men in the shop, the foremen, and the artisan Halske (co-founder) tried to resist his attempts of systematization. See W. Meyer to W. Siemens October 13, 1856 and W. Siemens to W. Meyer October 18, 1856 (SAA 2/Lh 849).

³⁰ See F. Redlich's remarks in D. Gilchrist (ed.), *Economic Change in the Civil War Era* (Greenville, Del., 1965), 158 f. Redlich stresses progress in the development of communication and transportation as a condition of more centralized forms of control.

³¹ O. Hintze, "Der Beamtenstand," *Soziologie und Geschichte* (Göttingen, 1964), 77.

reliabilities and fraudulent activities of poorly controlled employees whose loyalty was decisive for many early companies.³² Moreover, their civil service self-images made it impossible for the white collar employees to consider joining hands with protesting wage earners. They clearly identified themselves with management and regarded the blue collar force as different and inferior. In later years at least, management maintained some of the white collar privileges because that helped to provide for stability and loyalty.³³

GROWTH AND MANAGEMENT CRISIS

While this combination of family-oriented and bureaucratic management techniques (as well as increasing reliance on financial incentives) contributed to the company's overall success during the first two and a half decades of its existence, the same combination hindered its further growth in the 1870's and 1880's. What had been an asset became a liability under changing conditions.

In 1882 Siemens employed about 1,000 persons in Germany alone, and by 1890 the number had grown to 3,000 persons. New products and new markets were developed. Most important were the introduction of the telephone and the new power current branch (generators, motors, electric lights, street cars, industrial equipment, etc.). These changes brought rapid growth and extensive diversification, which substantially changed the technological and commercial requirements for the firm.

In the course of these spectacular changes the number of electrical manufacturers increased quickly, and Siemens' traditional leadership was challenged. By 1890, Siemens was only the second largest German electrical company in terms of turnover and capital stock. It had fallen behind Emil Rathenau's new and aggressive Allgemeine Elektrizitäts-Gesellschaft (AEG), which had been founded on the basis of Edison's patents in 1883-1887, and which specialized exclusively in power current projects.³⁴ Among the causes of this relative decline of the Siemens company, managerial weaknesses seem to have been paramount.

In contrast to the earlier period, and quite similar to what has

³² For the British alternative see Pollard, *The Genesis*, 129 ff.

³³ See Kocka, *Unternehmensverwaltung*, 303-311, 507-513.

³⁴ P. Dunsheath, *A History of Electrical Engineering* (London, 1962); G. Siemens, *History*, I; F. Finer, *Emil Rathenau und das elektrische Zeitalter* (Leipzig, 1918); K. Helfferich, *Georg von Siemens*, 3 vols. (Berlin, 1921-23), II, 120. In 1890, the capital stock of the AEG amounted to 20,000,000 marks, of S&H to 14,000,000. There were eighty-one electrical manufacturers with 1,157 employees in Germany in 1875; by 1895 the figures had increased respectively to 1,326 and 28,321. See H. Gutenberg, "Die Aktiengesellschaften der Elektrizitätsindustrie" (phil. Diss., Berlin, 1912), 2.

been reported about French family enterprises,³⁵ the family-related goals and techniques of the owner-entrepreneur became dysfunctional for the further growth of the company. In a growing establishment, Werner Siemens increasingly came to realize that his personal, family-related, spontaneous leadership, which had been so useful in previous years, became inadequate. His direct and personal contact with his salaried employees had been a conscious element of his personnel management techniques. Now he deplored his weakening memory and the fact that he knew personally only half of his eighty *Beamte*.³⁶ Growing anonymity, the introduction of new technology, the diversification of the production program, the new competition, and the consequent complication of the internal management overburdened the aging owner. In 1882 he wrote his brother that "there are innumerable matters to be promoted technically and scientifically, and it gets increasingly difficult to keep the different branches of the business apart so that a harmonic management is made possible. This situation cannot continue much longer."³⁷

In spite of several attempts at reorganization, Werner Siemens never succeeded in delegating enough responsibilities and in creating a systematic organization at the top. In accordance with his early experiences, he reserved more decisions and responsibilities for himself and his closest aides than they could handle.³⁸ Strong, active, dynamic leadership was incompatible with a personal, spontaneous style in a quickly expanding enterprise.³⁹ Siemens proposed "to simplify our business, which has already become too complicated, and thus make it more manageable for our successors," that is for his (and his brother's) sons.⁴⁰ Such a policy would also make the use of larger amounts of outside capital (and thus the acceptance of outside influences) superfluous.

³⁵ See D. S. Landes, "French Entrepreneurship and Industrial Growth in the Nineteenth Century," *Journal of Economic History*, IX (1949), 52 ff. See also D. S. Landes, "French Business and the Businessman," in H. G. J. Aitken (ed.), *Explorations in Enterprise* (Cambridge, Mass., 1965), 185 ff.; J. R. Pitts, "Continuity and Change in Bourgeois France," *In Search of France*, 261.

³⁶ Werner to Carl Siemens, February 6, 1882 (SAA BB).

³⁷ Werner to Carl Siemens, February 20, 1882 (SAA BB). See also W. Siemens' letters from June 10, 1874, November 26, 1877, December 14, 1878, January 3, 1879, August 27, 1880, February 12, 1881, in Matschoss, *Werner Siemens*, 448, 544 f., 593, 597, 671, 686.

³⁸ For his continued feeling of being overworked see his letters from May 5, 1882, January 22, 1884, October 29, 1886, December 22, 1883, in Matschoss, *Werner Siemens*, 732, 804 f., 806 f., SAA BB.

³⁹ See the recollections of the engineer Grabe, who was hired in the 1880's (SAA 12/Lk 801, p. 2). Criticism of this personal "one-man-regime" was raised by contemporary authors, which points to the fact that this was a difficulty not restricted to Siemens. See L. Sinzheimer, *Über die Grenzen der Weiterbildung des fabrikmässigen Grossbetriebes in Deutschland* (Stuttgart, 1893), 252.

⁴⁰ Werner to Carl Siemens, March 16, 1883, in Matschoss, *Werner Siemens*, 774.

Siemens' reluctance to enlarge and to complicate his business was the most important reason why Emil Rathenau was able to build up a threatening rival company in less than ten years. The commercial application of new technology, especially the systematic electrification of the cities, required large amounts of capital, which was not available without the assistance of banks and the stock market. It also required new organizational devices in the form of semi-independent corporations which would promote, finance, install, sell, and service huge electrification projects, and which would act as intermediaries between the producing firm and the customers.⁴¹ In such corporations, production companies and consortiums of banks worked together, sharing costs, profits, and power. Close relations between banks and manufacturing enterprises developed in Germany.

Werner Siemens could not accept this aspect of the large-scale organizations which were starting to develop in the early 1880's. Because he refused to share power with outsiders, he decided not to create his own installation and service branch to handle the promising power current projects. Rather, he left these activities largely to the younger, less tradition-oriented Emil Rathenau and the banks supporting him. He agreed to a contract which left most marketing and service operations to Rathenau and reserved the production work for Siemens & Halske. This arrangement did not work, and finally Siemens came to realize that he had virtually supported the growth of a company which became his most powerful rival.⁴²

The family-based recruitment of the top managers, which had previously contributed to the success of Siemens & Halske, intensified and prolonged the management crisis of the 1880's. A logical consequence of Siemens' family orientation was his unquestioned belief that his sons would take over once he retired. When the first son appeared to be unsuited for such a position and the second fell seriously ill, Werner Siemens felt it necessary to stay active longer than he originally desired. He also refused to hire qualified outsiders for top positions because he distrusted the "strangers" and did not believe that an outsider could manage even a part of his complicated, personally shaped *Geschäft*. He did not bother

⁴¹ For a good description of this system as far as the AEG was concerned see Pinner, *Emil Rathenau*, 186 ff.; see also Helfferich, *Georg von Siemens*, II, 111 ff.; mainly for the years after 1890, but with special reference to the role of the banks: R. Liefmann, *Beteiligungs- und Finanzierungsgesellschaften* (Jena, 1913), 81 ff., 358 ff., 456 ff.; O. Jeidels, *Das Verhältnis der Grossbanken zur Industrie* (Leipzig, 1905), 230 ff.

⁴² For details of the first years of Rathenau's German Edison Company (since 1887: AEG): Helfferich, *Georg von Siemens*, II, 38-93; Pinner, *Emil Rathenau*, 80-180; 50 *Jahre AEG* (Berlin, 1956), 11 ff.

with systematic internal training of promising junior executives (except in the case of his sons who circulated from one department to the other), but instead relied, as long as possible, on his old employees with whom he was familiar enough to practice his personal and direct management style.⁴³

Such family-oriented management had become less necessary and partly obsolete: more managerial talents were available and could have been hired, new techniques of control had been developed and could have been applied.⁴⁴ Furthermore, family-oriented management became less effective under changing conditions of growth; insofar as it was relied upon, a vacuum of leadership was the consequence.⁴⁵

The semi-bureaucratic character of the Siemens company continued in the 1870's and 1880's. Though not so clearly as in the case of the family orientation, some of the bureaucratic traditions of this enterprise under changing circumstances also became somewhat dysfunctional. The growth of competition and the changing market increased the risk involved in all bureaucratic handling of customers.⁴⁶ Innovation was no longer a task for Werner Siemens and one or two friends; it had become a collective process. Under these circumstances, a rigid adherence to the institutionalized distribution of responsibilities and authorities slowed down and discouraged the innovative process.

Organizational "bottle necks" appeared, and possibly fruitful ideas and initiatives were rejected by the person "in charge" because they were offered by an employee whose function was somewhat different in terms of the formal order of the office.⁴⁷ Some departments tried to be self-sufficient, serving their own interests rather than those of the whole enterprise. An extreme tendency to stick to the formalized channels of communication and an extensive use of

⁴³ See for the sons: Conrad, *Arnold Siemens zum Gedächtnis* (Berlin, 1918); A. Roth, *Wilhelm von Siemens* (Berlin/Leipzig, 1922); Werner to Carl Siemens, November 4, 1884, in Matschoss, *Werner Siemens*, 830; and May 10, 1886 (SAA BB) for W. Siemens' hope that he would soon be replaced by his sons; December 15 and 22, 1881, February 6, 1882 (SAA BB) for his refusal to hire an outsider.

⁴⁴ The successful reform led by Werner Siemens' successor in 1890-1895 seems to support both contentions.

⁴⁵ A case in point was the already mentioned conflict between the Berlin and the London Siemens companies in the 1880's. A lack of coordination resulted from the waning personal influences of the Siemens brothers as heads of the branches, especially in London, which led to increased power of employees not determined by brotherly loyalty. Not before new coordination techniques were applied (capital exchange, specified contracts, and finally a central office in Berlin which decided the distribution of market spheres between the branches of the concern), did these frictions disappear.

⁴⁶ See R. Maass, *Die auswärtigen Geschäftsstellen der Siemens-Werke und ihre Vorgesichte* (München, 1958), 19 f., 31 for the practice of communicating with customers by means of mechanically multiplied forms according to visible standard procedures, and for the time-consuming routine of the mail department.

⁴⁷ See the recollections of Grabe (SAA 12/Lk 801, p. 9) for a case in point.

written "orders" and "propositions," again in a bureaucratic style, often between persons who had desks on the same floor, contrasted sharply with the reported practices in a contemporary American electrical manufacturing enterprise in which written rules were rare and looked upon as a "necessary evil."⁴⁸

These signs of rigid bureaucratization on the middle management levels were compatible with and even reinforced by the overall lack of coordination due to the inadequate leadership. A pattern of partial bureaucratization without overall planning developed, which often was detrimental to bold, quick, and efficient decisions and operations.⁴⁹

THE MULTI-DIVISIONAL ENTERPRISE

In 1890 Werner von Siemens (he had been ennobled in 1888) retired, and his son Wilhelm took over. This change of leadership marked the beginning of an extremely successful period of growth in which the "Haus Siemens" succeeded in catching up with its main rival.⁵⁰ The rate of growth accelerated, especially after 1895. By 1913 the German Siemens enterprises employed more than 57,000 persons in contrast to 3,000 in 1890. The employment figure of the international concern as a whole was 81,795 in 1913 compared to 5,545 in 1890.⁵¹ The turnover (the British and Russian branches excluded) increased from 16,500,000 marks (1890) to 31,000,000 (1895-1896), to 92,000,000 (1903-1904), and finally to 415,000,000 marks in 1913-1914. The power current products and projects made up the bulk of these sums, after 1903-1904 for about three quarters.⁵²

Confronted with growing and aggressive competitors and an increasing demand for capital which could not be satisfied on a purely family basis, the Siemens family was compelled to transform their enterprise into a joint-stock company in 1897 and to grant some influence to the Deutsche Bank. The depression of 1900-1902

⁴⁸ John T. Broderick, *Forty Years with General Electric* (Albany, N.Y., 1929), 62.

⁴⁹ For a detailed analysis of this pattern: Kocka, *Unternehmensverwaltung*, 291-97. This combination of a systematic, formalized middle management structure and informal, traditional leadership techniques is certainly not a peculiarity of German enterprises of the nineteenth century, but characterized and still characterizes to a certain extent large-scale organizations in general. There are some indications, however, that this pattern was particularly manifest in the German case: German entrepreneurs early and thoroughly accepted bureaucratic methods for nearly all parts of the industrial enterprise but they rejected them as long as possible for their own sphere of action at the top. See also H. Hartmann, *Authority and Organization in German Management* (Princeton, N.J., 1959), 51-63, 260 ff.

⁵⁰ Already in 1897, both AEG and S&H held a capital of 35,000,000 marks.

⁵¹ Employment figures according to SAA 29/Le 931, 1.

⁵² Figures according to E. Waller *et al.*, "Studien zur Finanzgeschichte des Hauses Siemens" (SAA 38/8/57), III, 58; IV, pt. 1, 83.

hit the electric industry hard and caused a general merger movement, driving Siemens to join forces with the staggering Schuckert company. The power current side was separated from Siemens & Halske and merged with the Schuckert plants (which specialized in power current products only) into an independent company, the Siemens-Schuckertwerke GmbH (SSW) in 1903. Siemens & Halske, in which the Siemens family retained a very substantial majority of capital stock, continued the production and sale of low-tension current articles and served as the holding company for SSW. Siemens & Halske had a nominal capital of 35,000,000 marks in 1897, 54,000,000 in 1900, and 63,000,000 in 1908. SSW had a capital of 90,000,000 marks, a slight majority of which was held by Siemens & Halske.⁵³ Besides these capital connections, interlocking appointments and contracts provided links between both corporations.

Tendencies towards vertical integration were clearly visible. On the one hand, some factories producing raw material and semi-finished goods (rubber, wires, china, and paper) were acquired. On the other hand, a very elaborate network of sales departments and offices was established all over the country and abroad, staffed with salaried personnel and centrally controlled from Berlin. This sales organization seems to have followed an example set by the AEG, along the lines developed simultaneously by (Edison) General Electric in the United States.⁵⁴ Vertical integration was accompanied by extensive diversification of the production and sales program. This complicated empire was governed from Siemensstadt at the outskirts of Berlin, where a new administrative building at the eve of the war housed the general office, the top managers' offices, and nearly 3,000 office employees.

This process of expansion and diversification was linked to a profound reorganization, which modified the traditional mixture of family and bureaucratic traditions of this company. As in the case of many other companies the replacement of the founder — Henry

⁵³ From 1898 to 1914 S&H, supported by a group of banks under the leadership of the Deutsche Bank, issued bonds amounting to 50,000,000 marks. Total investments used for the expansion of SSW from 1903 to 1918 are estimated at about 510,000,000 marks. A little more than half of this sum was taken from the corporation's retained earnings, the rest from bonds, loans, and credits. See E. L. Jordan, "Die Wirtschaftspolitik des Hauses Siemens," (Diss., Königsberg, 1922/23), 28 ff.; Waller, *Studien* (SAA 38/8/57), IV, pt. 1, 73 ff., 111.

⁵⁴ Felix Deutsch started to establish such field offices in 1885. See Pinner, *Emil Rathenau*, 126 ff. Wilhelm von Siemens built his first one in 1890, thus starting to replace the previous system based on rather independent commissioners and representatives. The same year Edison General Electric started a similar reorganization, but seems to have given more autonomy to the district managers than in the case of Siemens. See H. C. Passer, "Electrical Manufacturing Around 1900," *Journal of Economic History*, XII (1953), 380 ff. These parallel developments resulted from the same technological and market characteristics of electrical manufacturing products. See *ibid.*, 392.

Ford, Cyrus McCormick, and William Dow are some American cases in point — facilitated the reform. Wilhelm von Siemens began to hire a considerable number of technical, scientific, and commercial experts from other enterprises and from academic life, thus replacing long-serving employees and suspending the bureaucratic principle of seniority. It was he who, for the first time, created a central office with a small, qualified staff. Most information reached him only through this office, which took part in the preparation and formulation of general policy according to written rules and regulations, although some vagueness (and conflict) remained about the extent of its powers.⁵⁵ Siemens also adopted certain systematic administrative techniques (for instance, weekly reports from the divisions and departments) as well as a new system of departmental budgets, and he tried to strengthen the administrative uniformity and cooperation between the single units.

The old family traditions did not completely disappear, but they were very much weakened by the expansion and systematic reorganization of the enterprise. As far as they survived (mainly on the top management level), they were no longer dysfunctional, but even contributed to the flexibility and strength of the management. Once Wilhelm von Siemens had decided to go ahead with reorganization, and once he adopted systematic, anti-traditional leadership techniques, he could (and did) use his family relations as an additional source of legitimation and strength to bring change. As the son of a most celebrated industrialist, and as the unquestioned spokesman for the family which owned a controlling interest, he exerted tremendous influence in both corporations. He combined powerful positions in both boards of directors with the chairmanship in the executive board of Siemens & Halske and a more informal, but strong influence in the management of SSW. He not only provided an important link between both corporations but also served as an unspecialized "generalist." He thus successfully achieved changes which a man endorsed by the banks had previously failed to make because of the resistance and jealousy of the unit heads and the reluctance of the Siemens family to accept him.⁵⁶ It was due to Wilhelm's immense authority that the thorough reforms of the top management structure, which chal-

⁵⁵ This office served partly as Wilhelm's staff, but also claimed some authority over the unit heads. See the standing rules of the "Zentralstelle" from October 25, 1890 and Wilhelm's related comments from November 5, 1894 (SAA 68/Li 65).

⁵⁶ Compare the standing orders of 1898 and 1903 (SAA 33/Ld 603, I) for the increasing power of Wilhelm von Siemens. The former civil servant Tonio Bödiker had been endorsed by the banks and appointed first chairman of the executive board of S&H in 1898. He left this position in 1903.

lenged the inertia and domain of some powerful senior officials, could be carried through without too many conflicts.⁵⁷

To a certain extent, the traditional bureaucratic tendencies of the Siemens concern were strengthened by the expansion and reorganization of the 1890's. Not only did the top management adopt a more systematic approach and subject itself to impersonal, general rules. Also on the middle management levels, within the huge white collar departments and in the management of the shop, bureaucratic tendencies became more manifest than ever before. The sales departments and field offices, while behaving flexibly in the market, worked according to most detailed, centrally issued regulations. They were organized like public administrations, and most of the activities performed in them were highly specialized and routinized.⁵⁸ By 1910, Siemens & Halske introduced a revised shop organization. The planning and control of the factory work now took place in new planning offices in advance, clearly separated from the operations in the shop. The standardization of products and operations progressed. A painstaking system of written prescriptions and controls, using forms and cards of different colors to an unprecedented extent, was supposed to rationalize the production process.⁵⁹

The number of salaried employees increased both in absolute and in relative terms. The ratio of non-manual to manual workers was 1:11.3 in 1865, 1:7.1 in 1890, and 1:3.5 in 1912. In many respects the status of the 12,500 Siemens salaried employees (1912) had become more similar than before to the status of employees in public bureaucracies. Most of them (except those at the top) received salaries in which achievement criteria played a smaller and seniority a larger role than in previous years. They were treated according to general rules about recruitment, remuneration, promotion, fringe benefits, and controls. Generalized qualifications (degrees from technical, commercial, and general schools) had

⁵⁷ It should be stressed that, contrary to what is usually argued, surviving family traditions can contribute to managerial success even in huge enterprises. In the case of Siemens they also seem to have served the interests of management in terms of labor policy. In contrast to the AEG, the Siemens management after 1905 succeeded in reviving and strengthening certain modified paternalistic traditions which helped to check the increasing challenge of organized labor. See Kocka, *Unternehmensverwaltung*, 347-363.

⁵⁸ Forty-seven per cent of all 7,176 white collar salaried employees of SSW (1912) worked in such sales offices. See the autobiographical description of the work in such an office by H. Dominik, *Vom Schraubstock zum Schreibtisch* (Berlin, 1942), 55 ff. See also Maass, *Die auswärtigen Geschäftsstellen*. Departments and offices received voluminous organization manuals which regulated their set-up and operations in detail. See SAA 32/Lb 978 and 32/Ls 109.

⁵⁹ For the reforms of the Siemens production process see SAA 11/Lb 733 (instructions of December 1910). A similar system existed in the Berlin-Anhaltische Maschinenbau-AG. See *Technik und Wirtschaft*, IV (1911), 214 ff.

gained emphasis in the process of recruitment. Most of them performed highly specialized, routinized functions within a rigid network of regulations, in hierarchically structured departments and offices.⁶⁰

Such changes indicated increasing bureaucratization, which resulted from many different factors: from the mere expansion of the enterprise as such; from the technological refinement and the accuracy required by expensive and complicated machinery; from the increased application of science and the correlated importance of qualifications acquired in schools; and from the requirements of more sophisticated accounting and sales methods. Although influences from outside public bureaucracies continued to play some role, this development around the turn of the century was largely the product of changes occurring within the enterprise. While up to 1890 the bureaucratic features of the Siemens management had largely resulted from outside influences, they were now reinforced by an internally generated process of industrial bureaucratization, so typical of all large-scale industry.⁶¹

There remained, however, many limits to the bureaucratization of the Siemens management. On the top management level informal, personal factors continued to play a role.⁶² Non-hierarchical patterns of cooperation between departments were consciously stressed. As employees of a private corporation the white collar workers still differed from public civil servants in many respects.⁶³ In addition, the new leadership, while systematizing top management, deliberately moved to check the bureaucratic tendencies by introducing decentralized patterns into the organizational structure of the enterprise.

To replace the previous overall standing order, framed in 1882

⁶⁰ Kocka, *Unternehmensverwaltung*, 466-513 for a detailed analysis of the status of the Siemens white collar employees. The best pre-war treatment of white collar employees as a social group is E. Lederer, *Die Privatangestellten in der modernen Wirtschaftsentwicklung* (Tübingen, 1912).

⁶¹ See R. Bendix, *Work and Authority* (London, 1956), 198-253; A. W. Gouldner, *Patterns of Industrial Bureaucracy* (Glencoe, Ill., 1954); H. P. Bahrdt, *Industriebürokratie* (Stuttgart, 1958); P. F. Blau, *The Dynamics of Bureaucracy* (Chicago, 1963); M. Crozier, *The Bureaucratic Phenomenon* (Chicago, 1964); H. Bossetzky, "Bürokratische Organisationsformen in Behörden und Industrieverwaltungen," in R. Mayntz (ed.), *Bürokratische Organisation* (Köln/Berlin, 1968), 179-188.

⁶² Still, changes in top personnel could cause changes in the "formal" distribution of responsibilities. Siemens' power resulted largely from sources (capital property, family traditions) which were external to the bureaucratic organization. This power enabled him to circumvent the bureaucratic distribution of responsibilities and authority. Many important decision making processes took place through informal channels (correspondence between Wilhelm and bank representatives, social meetings, informal conferences without records), not at all prescribed by the formal structure.

⁶³ For example, they did not enjoy tenure, but most of them had to fear lay-offs in a business recession more than in previous years. Ultimately all these limits of industrial bureaucratization resulted from the market dependence and achievement orientation of the capitalist enterprise in which private property continued to play an important role.

in vague terms and tailored for a central, omnipresent, dynamic, entrepreneur,⁶⁴ Wilhelm von Siemens introduced a new code which was not only more specific, but also extended the functions and authorities of the heads of the plants and departments.⁶⁵ This decentralization was partly motivated by Wilhelm's expressed desire to hire first-class experts and administrators from outside who would only accept job offers if they were granted a high degree of autonomy.⁶⁶ No doubt the heterogeneity, complexity, and size of the company were other factors determining these deliberate organizational moves. Unlike corporations resulting from mergers (like General Electric), organization-building at Siemens required systematic and planned decentralization, delegation of authority, as well as the creation of counter-balancing tools for control and efficient central decisions.⁶⁷ The product of these deliberate changes was a new organizational pattern which successfully combined systematic orderliness and centralized policy making with flexible decentralization in a highly diversified, multi-divisional firm. Only the main features of this pattern can be sketched in this article.

A DECENTRALIZED STRUCTURE

The two Berlin-centered companies were composed of twelve units, six in each firm.⁶⁸ On the low-tension current side (S&H), all but one unit had a production department, a technical and planning department, a sales department, an accounting and administrative department (*Kaufmännische Abteilung*) and a central office (*Direktion*) as well.⁶⁹ In other words, Siemens & Halske was

⁶⁴ For this first overall standing order (*Geschäftsordnung*) from April 1884 see SAA 33/603, I. Before that, written standing rules had only referred to the shop and to single departments (first to the technical department in 1872). Krupp issued an overall standing order (*Generalregulativ*) already in 1872. For that see E. Schröder, "Alfred Krupps Generalregulativ," in *Tradition*, I (1956), 35-37.

⁶⁵ Until then they had been bound together by "collective procura" and regular conferences. Both were abandoned now. See the standing rules from October 25, 1890 in SAA 68/Li 65.

⁶⁶ See Wilhelm's notes from December 5, 1906, p. 2 (SAA 4/Lb 832).

⁶⁷ For the opposite trend in many American corporations, especially since the mergers of the 1890's, see A. D. Chandler, *Strategy and Structure* (Cambridge, Mass., 1962), 31 ff.; Passer, "Electrical Manufacturing," 380 ff.

⁶⁸ The following figures in brackets refer to the employment level in 1912. Not included are the field sales offices, the loosely affiliated (semi)raw material production units, and the power station. Siemens & Halske (S&H): *Wernerwerk* (7,751) for most low-tension current products; *Glühlampenwerk* (3,832) for light bulbs, etc.; *Gebrüder Siemens & Co.* (1,498) for carbons, alcohol measurement apparatus, heaters; *Blockwerk* (1,018) for railroad measurement devices; *Bahnabteilung* (963) specializing in the construction of the Berlin S-Bahn (subway); the Vienna unit (1,510) for low-tension current products. SSW: Charlottenburg plant including *Dynamowerk* (11,224) and the Nürnberg plant (9,070) for the production of power current articles; cable plant (2,868); car plant (649) for a short-lived attempt to build electrical cars; two projection and sales departments (2,801 and 1,224).

⁶⁹ See the organization chart of the *Wernerwerk* from 1912 in SAA 33/Ld 393. The *Bahnabteilung* was less developed.

not organized along functional, but along product (or regional) lines. Though far less independent than multi-functional units in a loose alliance or federation (such as Standard Oil in the 1870's and early 1880's)⁷⁰ these divisions were equipped for much more autonomous behavior than the vertically integrated, centralized, functionally departmentalized organizations which were so typical for the most developed large-scale corporations in the United States before 1920.⁷¹ Due to technological differences and peculiar requirements on the power current side, each of the units of SSW had only four of these five departments. They lacked either the production or the sales department.⁷² Nevertheless, they were relatively autonomous units in the corporation's internal price system, which incorporated non-bureaucratic market elements into this essentially non-market organization and provided limited competition between the plants and departments. The units, whose success or failure was visible on departmental accounts in terms of gains and losses according to centrally set prices, treated one another to a limited extent as if they were independent competitors. The system made it easier to locate inefficiencies and also added achievement inducements.⁷³

On the other hand, an elaborate and systematic administration was established which provided for central control, decision making, and administrative supervision at the top. Top managers were free to concentrate on basic policy, the allocation of capital equipment and personnel, external relations, legal topics, patents, overall organization, and labor management. Two executive boards (*Vorstände*) met regularly in which most of the unit heads, as well as top officers with functionally defined activities, were included. Two differentiated general offices existed which participated in the formulation and administration of the companies' overall policies. Regular reports, statistics, charts, and a high degree of administrative standardization permitted effective surveys and controls. An

⁷⁰ See R. W. Hidy, "The Standard Oil Company (New Jersey)," *Journal of Economic History*, XII (1952), 411-24, esp. 415 ff.

⁷¹ For early examples of this organization type see Alfred D. Chandler, "The Beginnings of 'Big Business' in American Industry," *Business History Review*, XXXIII (Spring, 1959), and *Strategy and Structure*, 38 ff.

⁷² Power current projects (like a power plant) were planned, calculated, constructed, installed, sold, and serviced by huge non-producing white collar departments (combining technical and commercial staff), which thus intermediated between the plants (each of which, for the most part, only produced parts of each complex project) and the customers. The plants "sold" their products to these projection and sales departments only, and did not need any sales department of their own.

⁷³ For the internal price system see SAA 33/Lh 292, 1; for a criticism of resulting centrifugal effects: A. Berliner's exposé from November 10, 1902 (SAA 4/Lk 20), 1, 6, 7, 15. For the similar internal price system of the AEG see J. Huret, "Die A.E.G.," *Organisation*, X (1908), 608 f.

increasing number of central staff departments fulfilled several functions either for one company or for both companies together. They specialized systematically on activities necessary for the supervision, coordination, and standardization of the whole. Such departments existed for the coordination of construction, research and development, for the purchase of raw materials, for the supervision of the sales field offices, for the organization of overseas exports, for legal, economic, and public relations, and for central accounting. Finally a flexible system of top committees was developed, in which various board members and other top officers came together irregularly.

In essence, though not in a pure form and with some restrictions (especially on the power current side) the Siemens concern had thus developed the specific decentralization pattern of the highly diversified, multi-divisional enterprise ten to twenty years before du Pont and General Motors first adopted it in the United States during the early 1920's.⁷⁴

The large electrical manufacturing companies were probably in the vanguard in terms of systematic organization and management, due to several factors: their stress on a scientific technology and their strong inclination towards recruiting well-trained personnel (to a great extent from academic institutions); their application of large amounts of fixed capital and very technologically complex machinery; and a large percentage of non-manual work. In addition to these factors the vigorous competition around 1900 seems to have induced the surviving electrical giants to develop an unsurpassed degree of organizational rationality.⁷⁵ Furthermore, Siemens was in a special situation. As the pioneering enterprise in the field it took pride in its early achievements and stressed that it had always applied itself to the entire range of electrical manufacturing. The Siemens concern thus differed from all its German competitors as well as from General Electric and Westinghouse, which mainly concentrated on the power current side.⁷⁶ This elaborate pattern

⁷⁴ The pioneering achievement of these two corporations who introduced this pattern widely used by highly diversified firms up to the present, has frequently been stressed. See A. D. Chandler, "Management Decentralization," *Business History Review*, XXX (June, 1956); Chandler, *Strategy and Structure*, 9 ff., 42 ff., and 52-162 for two case studies on DuPont and General Motors; Chandler, "The Structure of American Industry in the Twentieth Century," *Business History Review*, XLIII (Autumn, 1969), 277 f.; E. Dale, *The Great Organizers* (New York, 1960), ch. 3.

⁷⁵ W. Sombart, *Die deutsche Volkswirtschaft im 19. Jahrhundert und im Anfang des 20. Jahrhunderts*, 8th ed. (Darmstadt, 1954), 315 early noted the (in many respects) pioneering character of the electrotechnical enterprises.

⁷⁶ Westinghouse and General Electric, for example, did not cover the field of communications equipment and installation, an area which was of great importance with S&H. See H. Passer, *The Electrical Manufacturers 1875-1900* (Cambridge, Mass., 1953), 363 f.; G. Siemens, *History*, I, 252-282.

of diversification — apart from other internal factors, which are hard to separate — seems to have induced the Siemens management to develop very early the complex organizational device described above.

CONCLUSION

As a result of the specific conditions of German industrialization, bureaucratic patterns strongly influenced the development of industrial management. They were largely induced from outside the industrial sector and contributed to the managerial success of early manufacturing firms. Similarly favorable was the early impact of family traditions. When the enterprise grew and the requirements of production and market changed, however, this particular combination of family-related and bureaucratic traditions became dysfunctional. Reorganization after 1890 altered the traditional bureaucratic tendencies of the Siemens concern and reduced the importance of the family traditions. Under the new technological and commercial conditions bureaucratization continued as a result of changes inside the industrial enterprise rather than as a result of outside influences. In so far as they survived, family traditions could once again contribute to the success of the company because they made reorganization easier. After the skillful modernization of the firm, the historic, traditional patterns of bureaucracy could be used in a situation in which bureaucratic management was indispensable. If bureaucratic organizations had not preceded the rise of the multifunctional firm, they would have, it seems, been developed when it appeared.⁷⁷ While being modified and adjusted, existing industrial bureaucracies could be utilized by German large-scale enterprises within this new period of growth. This seems to be in marked contrast with American big business, which did not develop elaborate bureaucratic structures (except in the railroads) until the 1890's. In Germany existing structures could be applied, but had to be adjusted to new strategies and operations.⁷⁸ Within these structures, the need for systematic management, for increasingly professional personnel with formal training from outside schools, for accuracy and rational organization could more easily be met.

⁷⁷ This is what happened in the U.S. See J. A. Litterer, "Systematic Management: Design for Organizational Recoupling in American Manufacturing Firms," *Business History Review*, XXXVII (Winter, 1963).

⁷⁸ For the concepts see Chandler, *Strategy and Structure*, 7-17, and 36-41 for the development of large systematic structures in American industry since the 1890's.

In contrast, contemporary British industry was much less systematic and bureaucratic and suffered from management deficiencies which have often been blamed for its relative decline late in the nineteenth and early in the twentieth century.⁷⁹ A close comparison might show that during the late nineteenth century American enterprises lagged behind comparable ones in Germany in so far as systematic, orderly and efficient overall management was concerned.⁸⁰ In the light of such tentative comparisons, it may be suggested that the specific bureaucratic traditions of German industrialization, which facilitated the development of efficient, rationalized management, contributed to the successful expansion of German industry in the two decades before World War I.⁸¹

⁷⁹ See A. Marshall, *Industry and Trade* (London, 1919), 129 ff.; A. L. Levine, *Industrial Retardation in Britain 1880-1914* (New York, 1967), 57-78.

⁸⁰ Before systematic comparisons can be completed the evidence for this hypothesis remains weak. But consider the rather unsystematic state of affairs at Standard Oil of New Jersey in the 1880's and later described in R. W. and M. E. Hidy, *Pioneering in Big Business 1882-1911* (New York, 1955), 68 ff., 327 ff. *Ex negativo* the criticisms and demands raised in the American management literature since the 1880's seem to point to a rather improvised, unsystematic, sometimes chaotic reality in the enterprises. In contrast, the demands in the German parallel literature were different and had much less response. See J. A. Litterer, "Systematic Management," 461-476; Leland H. Jenks, "Early Phases of the Management Movement," *Administrative Science Quarterly*, V (1960), 421-447; for the development of the German management literature since the 1870's see J. Kocka, "Industrielles Management," *Vierteljahrsschrift f. Sozial- und Wirtschaftsgeschichte*, LXI (1969), 332-372.

⁸¹ Stressing some economic advantages of the bureaucratic conditions of German industrialization, this article has not considered their possible "social costs." What has favored economic growth may have hampered the liberal democratization of society and state, but this problem cannot be discussed here.