

Cartelization of the German Chemical Industry, 1918-1925

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Introduction

In order better to understand cartelization in the German chemical industry, it is necessary to define certain terms as they are used in the following discussion. First, a cartel was a loose agreement for cooperation between two or more companies that continued to keep their own identity and separate operations and ownership. The cartel might cover several different aspects of industrial cooperation, but the usual practice was to create a different structure for each agreement. The purposes of these alliances included the preservation of an undisputed home market for each member of an international cartel, the division of domestic or export markets, the elimination of destructive price-cutting competition, the exchange of patents and technical knowledge, the standardization or regulation of production, the joint purchase of materials, the consolidation of capital resources, and the undertaking of long-term research. The cartel itself owned little property but, instead, was designed to coordinate the purchasing, production, or distribution activities of the allied firms. By contrast, a trust was an actual merger in which the constituent parts lost their identity and independence.¹

Second, the German chemical industry needs some clarification as it produced a multitude of products in the postwar period. These included aniline and mineral dyestuffs; nitrates for explosives and fertilizers; heavy chemicals such as soda, carbide, and oxalic and formic acids; motor spirits such as methanol, butyl alcohol, and motalin; lubricating and volatile oils; perfumes and cosmetics; aluminium, copper, molybdenum, wolfram, and other metals; photochemicals; artificial fibres like rayon; industrial solvents; artificial horn and bone; synthetic resins; varnishes and lacquers; artificial precious stones; tanning materials; glue; gelatine and celluloid; liquefied gases; incandescent materials; acetates; pharmaceuticals such as aspirin, Atabrine, Salvarsan,

¹ ALFRED PLUMMER, *International Combines in Modern Industry* (London, 1934), pp. 3, 15-16; DAVID ABRAHAM, *The Collapse of the Weimar Republic* (Princeton, 1981), pp. 120-121.

Novocain, methadone, and sulfa drugs; and eventually synthetic rubber and oil.²

Despite the variety of these commodities, concentration and large concerns had been characteristic of the German industry from the beginning. In Britain in 1856, W. H. Perkin discovered and named the synthetic colour mauvein, made from coal tar. The British reacted slowly to this development, however, and it was a German colleague of Perkin, who returned to his native country and established dye manufacturing there. The Germans continued researching to discover more dyes and other products. A score of chemical firms emerged to supply the needs of the world's burgeoning textile industry. The demands of research, capital investment, and volume sales kept the chemical concerns large in size and few in number. Of the one hundred largest German companies, in 1887 twelve were in chemicals; by 1907 this had increased to seventeen. Consolidation continued until by 1913 the entire industry was dominated by only six firms. These were BASF (*Badische Anilin und Soda-Fabrik* of Ludwigshaven), Bayer (*Farbenaabriken vorm. Friedrich Bayer & Co.* of Leverkusen), Hoechst (*Farbwerke vorm. Meister Lucius und Bruening* of Hoechst am Main), Agfa (*Aktiengesellschaft fuer Anilinfabriken* of Berlin), Cassella (Leopold Cassella & Co. of Frankfurt), and Kalle (Kalle & Co. of Biebrich). These concerns continued to grow and diversify. In 1886 Bayer produced 200 different types of dyestuffs, but by 1911 the company manufactured 1,736 dyestuff products and 120 pharmaceutical and photochemical preparations. The required capital increases forced the change of the personal or family enterprises into *aktiengesellschaften*, or joint-stock companies.³

By the turn of the century these German firms dominated the chemical production of the entire world. The dyestuffs, photochemical, and pharmaceutical needs of the United States and Great Britain were met by importing eighty to ninety percent of the annual consumption of these goods from Germany. Many other nations were even more dependent on German chemicals. The Germans continued to expand into other products and control new markets as well. The advancements of German scientists, the registration of foreign patents, and the establishment of factories abroad all deterred non-German competitors.⁴

² ROBERT A. BRADY, *The Rationalization Movement in German Industry* (Berkeley, 1933), pp. 231-234; HERMANN LEVY, *Industrial Germany* (New York, 1966), p. 66.

³ JOSEPH BORKIN, *The Crime and Punishment of I.G. Farben* (New York, 1978), pp. 4-5; JOHN MORGAN REES, *Trusts in British Industry* (London, 1922), pp. 158-159; Juergen Kocha and Hannes Siegrist, "Die hundert groessten deutschen Industrieunternehmen", in Norbert Horn and Juergen Kocha, eds., *Recht und Entwicklung der Grossunternehmen im 19 und fruehen 20 Jahrhundert* (Goettingen, 1979), pp. 74-76, 111.

⁴ *The New York Times*, May 26, 1919, p. 15 col. 6 (hereafter cited as NYT); LEO

The German firms competed fiercely among themselves, however, to control larger shares of the world's lucrative chemical markets. Destructive price-cutting competition was ruining the entire industry. The need for action was finally recognized by Carl Duisberg, a chemist and the general manager of Bayer. Duisberg had travelled to the United States and seen the power of the American trusts. He was influenced also by the German coal and coke syndicate, the steel trust, and the partial combination of Hoechst, Cassella and Kalle in 1904. In the same year, Duisberg directed the formation of an *interessen gemeinschaft* (community of interest) among Bayer, BASF, and Agfa. The agreements within these two chemical cartels were designed to reduce competition and share profits. Only dyestuffs were directly subject to the cartels' control, and this product division was often called the "dye trust." Otherwise each concern kept control of its own policies, facilities, and activities. Pharmaceuticals, photochemicals and other products were developed and marketed separately. BASF was the most daring and innovative, and it spent large sums of money on long-term research to develop special processes and products. Duisberg wanted to go even further by creating greater cooperation between the two cartels and by establishing a system for industry-wide planning; however, the individual firms were apprehensive about losing too much control.⁵

Nevertheless, the various concerns did form other agreements. Technical interdependency helped to consolidate various branches of the industry, and the firms realized that they would all benefit by sharing their patents and information. Also, the cartels wanted to break the domination of the banks. Finally, the German government encouraged and even promoted cartelization. Although German patent and other industrial laws were worded similar to those in Britain, the interpretation of the former was much more favourable to business and industry. The Germans had gone from a semifeudal mercantilist state to one dominated by large-scale capitalistic enterprises without the intermediate step of a laissez-faire system. The Prussians and Germans had, from the beginning of their industrialization, opposed 'Manchester economics'. These tendencies were accelerated after the economic crisis of 1873, the German return to protectionism in 1879, and the emergence of the Social Democratic and labour movements. The government practically imposed the cartelization of the potash and coal industries while supporting similar efforts in steel and the railroads.⁶

GREBLER and WILHELM WINKLER, *The Cost of the World War to Germany and to Austria-Hungary* (New Haven, 1940), pp. 15, 21.

⁵ BORKIN, *op. cit.*, pp. 5-9; Gustav von Bruening, "'Erwaegungen' zu Carl Duisbergs Denkschrift 'Die Vereinigung der deutschen Farbenfabriken,'" *Tradition*, IX (November 1, 1964), pp. 2-5.

⁶ ABRAHAM, *op. cit.*, pp. 119-120; BRADY, *op. cit.*, pp. 52-55; HARALD HERMANN, "Verbandskonzentration und Grossunternehmen", in NORBERT HORN and JUERGEN KOCHA, eds., *Recht und Entwicklung* (Goettingen, 1979), pp. 666-673.

The exigencies created by World War One greatly accelerated the cartelization of German industries, especially in chemicals. The War Raw Materials Office was established in 1914, and it had a special chemical division headed by Fritz Haber. Haber had developed in 1909 a process for the fixation of nitrogen from the air. This element could be used to make the ammonia and nitrates used in fertilizers and explosives. After the Battle of the Marne in 1914, the Germans realized the war would not be over as quickly as they had previously expected. With only a six-month supply of nitrates, and with the British blockade preventing the delivery of any more saltpetre from Chile, the Germans would be unable to manufacture munitions unless they could develop an industrial process for supplying synthetic nitrogen. The chemical engineer Carl Bosch was entrusted with this project that became an all-out effort by government, industry, and science. The programme was a prototype for the Manhattan project in the cooperation created and the money, manpower, and material utilized. The extraordinary and unprecedented project was a success that temporarily saved Germany from defeat and later made Bosch the first engineer to receive a Nobel Prize.⁷

The nitrate programme and other cooperative efforts furthered consolidation in the chemical industry. The dyestuffs companies, military advisors, and scientists from the Kaiser Wilhelm Institute worked together to produce and utilize poison gases. After the German reverses at the Battle of the Somme and the rise of foreign competition in 1916, Duisberg led the formation of one large cartel by BASF, Bayer, Hoechst, Agfa, Kalle, Cassella, Weiler ter Meer, and the Griesheim Chemical Works. This organization received government support in expanding facilities, releasing workers from military duty, and receiving sufficient quantities of coal to supply the tremendous amounts of energy required for nitrogen and aluminum production. Research continued, and a synthetic rubber was developed, although it was not suitable for tyres. Overall, the industrialists and scientists cooperated with the German government more willingly and efficiently than in any of the allied nations. In the process the cartel expanded, standardized its operations, and more than doubled its profits.⁸

Yet other events were disastrous for the German chemical industry. During the war it lost its foreign contacts, markets, patents, and property. The monopolies in dyestuffs, aspirin, and other products were broken by the rise of strong chemical industries in the United States and Great Britain. Smaller companies emerged in Japan, Switzerland, Italy, France, and elsewhere. The American and British governments were both subsidizing and promoting their fledgling enterprises. Foreign concerns consolidated also, as in the case of the merger of British Dyes with Messrs. Levinstein to form the British

⁷ BORKIN, *op. cit.*, pp. 12-18.

⁸ BORKIN, *op. cit.*, pp. 19-21, 25-27; BRADY, *op. cit.*, p. 56; Grebler and Winkler, *op. cit.*, pp. 31-32, 47-48, 69-70.

Dyestuffs Corporation. The French, Italians, and Belgians were prepared to go to great lengths to prevent the re-emergence of a dominant German chemical industry. Despite their successes and advances, the Germans were definitely worse off than before the war.⁹

Aspects of and reasons for postwar cartelization

Concentration continued in all major German industries. In 1905 there had been 353 cartels; by 1925 there were between fifteen hundred and three thousand, depending on how the agreements are categorized. By 1923 there were ninety-one chemical cartels, and they went far beyond the prewar, loose-knit organizations.¹⁰ The extent of these cooperative efforts varied depending upon the nature of the agreement and the reasons for its implementation. The motivating factors for increased cartelization in the German chemical industry included patent disputes, research projects, economic conditions, politics, labour relations, the rationalization movement, and foreign competition. Problems with patents arose because of the seizure of German property in enemy territories during the war. In Britain, German patents for aspirin and certain dyestuffs were seized and used by government-sponsored companies that were reluctant to relinquish their rights after the war. In the United States, the Alien Property Custodian seized all German trademarks, patents, and formulae and sold them to the Chemical Foundation. This association of manufactures sold and licensed the thousands of confiscated processes to individual American firms. The patents had been deliberately misleading, with certain key steps missing altogether. Moreover, the Americans did not have the technical knowledge or experience in industrial application to duplicate the processes they did understand. Nevertheless, they had made considerable progress during the war since the Germans could no longer utilize these procedures to sell products in the United States. The cartel thus found it imperative to pool what patents it had left and coordinate efforts to regain old rights and develop new processes. The Germans received little or no compensation for their losses, although some of the disputes were in the courts for years.¹¹

The cartel managed better in developing new processes. German research was more advanced than anyone else's. It took the Americans nine years just

⁹ E.L. WOODWARD and ROHAN BUTLER, eds., *Documents on British Foreign Policy, 1919-1939*, First Series, 1919, V., pp. 400-401, Record of a meeting of the Committee on Organization of the Reparation Commission (hereafter cited as *BFP*); Rees, *op. cit.*, pp. 160-161, 175; Brady, *op. cit.*, pp. 236-237.

¹⁰ LEVY, *op. cit.*, pp. 15-19.

¹¹ REES, *op. cit.*, p. 175; *NYT*, March 28, 1919, p. 17, col. 2; *NYT*, July 3, 1922, p. 6, col. 7; *NYT*, July 15, 1923, p. 8, col. 1.

to discover that among the patents seized during the war were processes for manufacturing synthetic methanol, silk, cotton, and wood. By this time the German had developed new procedures for making all these products. In 1925 the German cartels began selling synthetic methanol on the American market for thirty cents per gallon. Other companies that used wood distillation could not afford to sell below fifty cents per gallon. Six of the seven largest American wood alcohol enterprises went out of business. Even when the Americans belatedly found the confiscated patents, they could not apply the processes industrially. With a completely inferior system of research, the industries in the United States were forced to buy German secrets or get high protective tariffs in order to stay in business.¹²

The financial demands of long-term research encouraged further cooperation and consolidation. The research in various fields was concentrated in a few well-equipped, specialized, and modernized laboratories in Ludwigshaven, Leverkusen, Frankfurt am Main, and Hoechst. Smaller or redundant facilities were reduced or eliminated. Only the pooled resources of the entire industry could have undertaken such ambitious projects. Buildings were erected and furnished with costly equipment. Teams of trained chemists were employed to develop theoretical solutions, laboratory reactions, and finally profitable industrial applications. Daring projects were financed by the results from short-term programme. Research was conducted to establish the best uses for fertilizers and other products. Independent discoveries were purchased and enhanced. The system required planning, perseverance, and patience.¹³

The Germans benefited also from the intellectual environment. The graduates of the *Realschule* and *Gymnasien* brought superior preparation to the respected German universities. In these institutions scientific thought had become unified from the previously diverse and strongly independent fields of biology, chemistry, mathematics, and physics. Industrial and chemical engineering developed in an interdisciplinary atmosphere that saw a basic unity in all organic, inorganic, psychological, and even social phenomena. Science was advanced not only for its own sake, but also for practical purposes. This atmosphere spawned a succession of Nobel laureates, including Paul Ehrlich (Salvarsan), Fritz Haber (fixation of nitrogen), Carl Bosch (industrial application, synthetic fuel), and Gerhard Domagk (sulfa drugs).¹⁴

The system produced impressive results that kept the German chemical industry competitive even under adverse conditions. New pharmaceuticals, food preservatives, disinfectants, dermatological remedies, insecticides, industrial intermediates, and dyes were discovered. The cartel developed tetralin

¹² *NYT*, April 11, 1925, p. 7, col. 1; *NYT*, April 29, 1925, p. 25, col. 4; *NYT*, October 9, 1925, p. 29, col. 1.

¹³ BRADY, *op. cit.*, p. 238; LEVY, *op. cit.*, pp. 68-70.

¹⁴ BORKIN, *op. cit.*, pp. 1-2; BRADY, *op. cit.*, p. 8.

(a fuel), dekalin (used in varnishes), isopropyl alcohol (used in cosmetics and mouth lotions), and hexalin (used in soap or as a substitute for amyl acetate). Processes of catalytic hydrogenation were implemented. Discoveries included new products and processes for making old ones more cheaply or quickly. The most ambitious programme was the one to synthesize oil from coal. Bosch, elected chairman of the board of BASF for his work during the war, pushed this project despite its costs and slow progress. After several years of using American money (from banks and Standard Oil of New Jersey) and German research, the project was a success. Frank Howard, head of Standard Oil's research and development division, was completely overwhelmed by what he saw in a tour of the German facilities.¹⁵ Walter Teagle, President of Standard Oil, was just as impressed. He said that he "had not known what research meant until I saw it; we were babies compared to what they were doing".¹⁶

The dependence on foreign capital was significant in postwar Germany, but this was only one of many economic problems. The German economy was wrecked by the war and the subsequent loss of 90 percent of its foreign investments, 13 percent of the population, 14.3 percent of the arable land, 74.5 percent of the iron ore, 68.5 percent of zinc foundries, 26.6 percent of the blast furnaces, and large portions of the merchant marine, locomotives, and rolling stock in the nation. The reparations demands of the Treaty of Versailles exacerbated the already unstable economy. For the chemical industry, reparations in kind kept the plants operating, but at little profit. The 10.8 million tons of dyestuffs delivered in the first year was second in volume only to the 17.8 million tons of coal. These products went to the United States, Great Britain, France, Italy, Belgium, and Japan. Ammonium sulphate, ammonium nitrate, and various pharmaceuticals were delivered in large quantities as well. The British and Americans urged that these deliveries be stopped because of the adverse effect on their domestic chemical industries. With or without these reparations, the German economy was in a sorry state.¹⁷

The chemical industry was better able to withstand the postwar economic crises because of its consolidation. Smaller firms suffered more with the inflation. They were less export-oriented and not capable of expansion. Also, they could not afford to meet labour's demands for higher wages. The large concerns could expand, repay their loans, compensate their employees, and still make generous profits. Overall, the cartel gained as it freed itself from the banks and regained markets because of the low value of the mark. There were

¹⁵ BORKIN, *op. cit.*, p. 47; *NYT*, June 26, 1921, II, p. 10, col. 8.

¹⁶ *NYT*, May 23, 1945, p. 21, col. 5.

¹⁷ *BFP*, 1919, V., pp. 505-507, Record of a meeting... of the Reparation Commission; BRADY, *op. cit.*, pp. XIV-XIX; *NYT*, July 10, 1919, p. 1, col. 5; *NYT*, January 23, 1921, p. 7 col. 3; *NYT*, November 27, 1921, p. 3, col. 5; *NYT*, September 24, 1924, p. 31, col. 2.

severe fluctuations in the economy, however, and these were often difficult to survive. The cartel again had the advantage of size. It could forgo profits and endure hardships longer than small firms in any industry. The most trying experience was during the occupation of the Ruhr, when the French seized control of the chemical plants at Oppau, Ludwigshaven, and Hoechst and confiscated over two hundred million francs worth of dyes and nitrates. In this case, the injured members of the cartel were supported by the other firms until normal conditions were restored.¹⁸

Most of these economic problems were entangled in politics, another factor that furthered cartelization in the chemical industry. Although German industrialists had been divided and antagonistic for decades, the seeds of unity had been sown with the cooperative efforts of the war. By February 1919, the rival industrial organizations founded the National Association of German Industry (*Reichverband der deutschen Industrie* or RDI), with its headquarters in Berlin. The RDI was an association of twenty-six trade groups, four hundred national cartels, fifty-eight regional and seventy local organizations, and seventy chambers of industry and commerce. The more than one thousand individual members and firms vested the central power of the RDI in a president and a thirty-six-member board that met monthly. The goals of this group were to cultivate the support of government officials involved in shaping national policy, to manipulate public opinion through the media, and to oppose experiments in bolshevism or socialization. The RDI regularly funded all non-leftist political groups in order to have influence in any centre-of-right-based coalition.¹⁹

Originally, the RDI was dominated by the old heavy industries like coal, shipping, iron and steel. This faction was reluctant to support the democratic Weimar government, which the old industrialists wanted to destroy. RDI attempted to deal directly with the French, British, and American governments, but all three refused to bypass the German republic. Only the Soviets were willing to negotiate with the industrialists; but fundamental problems on private property rights blocked the proposed agreements. Some secret deals were made between German and French industrialists, but the Allied governments refused even the most placatory offers by German magnates for conversations about reparations and other economic issues. By the early 1920's, however, the newer, export-oriented, chemical and metal-finishing industries,

¹⁸ CRAIG PATTON, "Strikes in the German and British Chemical Industries", in Gerald D. Feldman, et. al., eds., *Die Erfahrung der Inflation im Internationalen Zusammenhang und Vergleich* (Berlin and New York, 1984), pp. 307-312, 334; ABRAHAM, *op. cit.*, pp. 125-128; BORKIN, *op. cit.*, p. 41; *NYT*, May 16, 1923, p. 1, col. 4; *NYT*, June 3, 1923, p. 7, col. 6.

¹⁹ *BFP*, 1922, XX, pp. 585-589, LORD D'ABERNON (Berlin) to the Marquess Curzon of Kedleston; GERARD BRAUNTHAL, *The Federation of German Industry in Politics* (Ithaca, New York, 1965), pp. 8-10; ABRAHAM, *op. cit.*, pp. 122-124.

along with the electrical cartel, began to exert more influence. The RDI's policies gradually shifted to cooperation with the government, which could be influenced easily by the industrialists. By the time Duisberg became the RDI president and Bosch had a board seat in 1925, the transformation was complete.²⁰

One of the new tactics was to put *Reichstag* deputies on the board of directors of certain corporations. By 1928, sixty-eight deputies held 275 such posts. The RDI influenced the government not to experiment with direct ownership of industrial or commercial enterprises. In 1923 the Weimar Republic passed an anti-cartel law, but the RDI sought a narrow interpretation of what agreements could be dissolved. The courts bowed to pressure and bribery. They ruled that only cartels made in bad faith to threaten the public interest were affected by the law. The Weimar government was too weak to oppose industries that were doing well and helping the nation's economy. The RDI, dominated by the export-oriented industries, began to push for the elimination of tariffs and the establishment of most-favoured-nation treaties. Industrialists participated with government representatives in international dialogues instead of trying to circumvent normal channels. The German magnates gained influence in the decisions for reparations and government loans. Finally, the RDI urged the government to promote industrial expansion and concentration.²¹

The German industrialists were divided also over labour relations. The old industries continued to look for alliances with the landed elite to suppress the workers. The export-oriented industries received more foreign payments and could afford to pay higher wages in inflationary times. The chemical industry had unique labour problems that must be considered separately. The 39,400 industrial accidents in the chemical industry in 1923 were not out of proportion to the number of employees. The type and degree of injuries, however, were startling. The accidents included 6,018 maimings from chemical equipment, 2,287 severe burns from caustic acids, 1,188 burns by steam and hot fluids, 185 burns from direct flames, 723 miscellaneous burns, 495 poisonings, 298 explosions, and 511 cases of industrial disease. Complaints about such hazards were common. When the BASF synthetic nitrate plant at Oppau exploded in September 1921, tensions were high throughout the industry. The explosion completely demolished the plant, killed over six hundred workers,

²⁰ *BFP*, 1921, XV, pp. 760-768, British Secretary's Notes of a Meeting between Mr. Lloyd George and M. Briand; *BFP*, 1922, XX, pp. 365-366, Record by Mr. Lampson of a conversation with M. Roger Cambon; *BFP*, 1924, XXVI, pp. 592-593, Lord D'Abernon (Berlin) to Mr. MacDonal; Braunthal, *op. cit.*, pp. 10-13.

²¹ *BFP*, 1922, XX, p. 364, Lord D'Abernon (Berlin) to the Marquess Curzon of Kedleston; WARNER F. BRUCK, *Social and Economic History of Germany* (New York, 1962), pp. 196-197; Levy, *op. cit.*, p. 137; *NYT*, April 26, 1924, p. 3, col. 6; *NYT*, November 24, 1924, p. 27, col. 3.

and injured over two thousand more. Workers at the Hoechst aniline works in Berlin responded by forming a soviet, seizing the factories, and raising the red flag with Soviet emblem. Such political protests were uncommon, however, because German workers did not oppose big business on principle. The socialists viewed the cartels as structures that would evolve into government ownership. Most strikes were caused by food shortages or low wages.²²

The chemical cartel greatly alleviated the losses from these strikes. Companies could farm out their contracts to other concerns and still participate in profit-sharing. The firms in the cartel weathered long strikes better than small companies. Nevertheless, cartel policy emphasized the prevention of disputes. Since wages amounted to only fifteen percent of the industry's fixed costs, the cartel could pay more than labour-intensive enterprises. German chemical workers were among the best paid in the nation. Only the metal-finishing industry could offer comparable rates. In November, 1924, chemical workers received from fifty two to sixty six *pfennigs* per hour, plus ten *pfennigs* per shift per dependent. These wages were ten to twenty percent higher than those in most other industries. In addition, the concentrated plants and combined capital of the cartel made it possible to provide other amenities. Greater safety measures were implemented for handling chemicals and combating poisons. Better lighting, heating, ventilation, and training conditions were created. Affordable housing was built, and about ten percent of the workers took advantage of this option. Lunch rooms, restaurants, and casinos were available during meal breaks. Gymnasiums, bathtubs, showers, athletic fields, libraries, reading rooms, and facilities to hold lectures, movies, concerts, and theatrical productions were made available to the employees. Training and limited medical care were offered to workers and their families. The optional social expenditures of the cartel in 1929 amounted to thirty-one million marks, or 14.2 percent of the annual over their employees.²³

The enhancement of management-labour relations was promoted further by the rationalization movement. Rationalization was a theory opposed to Manchester economics and supportive of planning, order, and control in industry. Interrelationships among the economic, political, social, and cultural elements were necessary. The conflicts of capital v. labour, industry v. agriculture, and producers v. consumers were to be eliminated. Science had always been important in German industry, but rationalization emphasized technology and knowledge as one of the few assets not taxed or deprived by the Treaty of Versailles. Sound economic planning was required. Combination and cartelization were needed to provide the funds, plants, equipment, and personnel for scientific research and development.²⁴

²² BORKIN, *op. cit.*, p. 36; BRADY, *op. cit.*, p. 239; PATTON, *op. cit.*, pp. 305-306, 319; *NYT*, September 28, 1921, p. 21, col. 7.

²³ ABRAHAM, *op. cit.*, pp. 144-149; BRADY, *op. cit.*, 239-240; PATTON, *op. cit.*, pp. 322-323, 327-328; *NYT*, January 11, 1925, XI, p. 16, col. 1.

²⁴ BRADY, *op. cit.*, pp. VIII, 5-6, 19; ABRAHAM, *op. cit.*, pp. 129-130.

Cartels made possible standardization, plant specialization, and scientific management. No other country in the postwar years made so much progress in standardization as Germany. This inter-industry effort included cooperation among over five thousand firms to develop scientific and socially-minded standards for the entire nation. Increased efficiency and reduced costs were expected. Production was concentrated in highly specialized plants. Aniline dyes, once made at eight different locations, were concentrated in one works. Idanthrene dyes were made only at Ludwigshaven, and wool and silk dyes were centralized at Hoechst. This geographic concentration corresponded with the location of transportation, energy, raw materials, and allied industries. The soda industry needed plentiful supplies of rock salt, limestone, and coal. Superphosphate production was centered in districts with cheap water transportation for the bulky raw materials used. The need for cheap power led to the concentration near lignite fields.

Fertilizers were produced near the domestic markets in central Germany. The aniline dye plants were close to the source of important by-products of the coke ovens. Because of technical interdependencies, many pharmaceuticals, photochemicals, lacquers, explosives, and heavy chemicals were produced in the same area.²⁵

Scientific management called for applications beyond those of individual enterprises. Innovations were made in factory and office organization, management principles, scientific budgeting, and personnel selection, organization, and training. The organizational style adopted first by the dye trust and then by the chemical industry was that of managerial decentralization. The final authority for all decisions remained with the central management, but routine factory problems were handled by one of the subsidiary management groups. Each of these divisions had complete functional authority within the rules developed by the central management. The production, distribution, or other special staffs could specialize on a narrow range of functions and yet still be closely connected to the larger enterprise. The cartel systematically applied these principles in order to retain a high level of individual and group responsibility. The overall structure could coordinate large projects and still be flexible and responsive to change. The decentralized elements were not permitted to fall into destructive competition. Without exception, all trade and processing secrets were pooled. Duplicate plant facilities were eliminated. Production schedules were reorganized. Research laboratories were combined. Overall, rationalization provided a theory for the practical aspects of cartelization.²⁶

Despite the impact of all of the preceding factors, the greatest impetus for cartelization in the postwar chemical industry came from foreign competition.

²⁵ BRADY, *op. cit.*, pp. 21-32, 232-233, 237; *NYT*, February 26, 1922, VIII, p. 26, col. 4.

²⁶ BRADY, *op. cit.*, pp. 60-64, 236-238.

No other German industry was so dependent on international trade. The chemical cartel in the 1920's accounted for an average of two percent of Germany's imports and ten to eleven percent of her exports. This last statistic is crucial. When revolution and unrest in China deprived the German dye trust of one of its largest markets for indigo colours, BASF had to close an entire plant. Moreover, many markets were just as dependent on these German products. As soon as the blockade had been lifted, Mexico sought and purchased from Germany over one million marks worth of pharmaceuticals. Throughout the war and embargo on German chemicals, certain dyes were smuggled out of Italy, Belgium, Holland, France, Switzerland, and even Great Britain. During the embargo and later Ruhr occupation, some dyes that only the Germans could make (like brilliant orange) sold for twenty-five to thirty times their normal value of one thousand dollars per barrel.²⁷

Nevertheless, the Germans faced fierce competition in most markets from the American, British, Swiss, and other foreign chemical industries developed and expanded during the war. The British were producing high quality synthetic drugs, perfumes, photochemicals, analytical reagents, and dyestuffs. The United States and Great Britain were anxious to develop and protect their new chemical industries. Both nations continually delayed the distribution of the confiscated German dyestuffs, especially since the option prices for these goods were about nine-tenth the market level of similar Anglo-American dyes. The United States feared large re-exportations of inexpensive option dyes that could flood the market and harm the American industry. The world demand for dyestuffs was unprecedented after the war, however, because the textile industries had been practically starved of good colours for years. New markets in India and Asia were opening, but the British could not even produce enough for domestic needs. The Germans had large stocks and great industrial capacity. The dye trust was clamouring for renewed trade.²⁸

The German cartel attempted to regain its old monopoly status, and the new competitors reacted. The British noticed that the Germans were engaging in unfair trading practices. The cartel was bribing and otherwise influencing officials. Confiscated goods were misrepresented. Import licenses were illegally obtained. Chemicals were smuggled through Holland and Switzerland. France feared the research capabilities of German industry would be used to develop new weapons. Italy accused the Germans of withholding secrets and production statistics that were to be divulged according to the Treaty of Versailles. The Swiss suffered from the "dumping" of chemical products. That is, the Germans charged exorbitant prices for goods not found locally in

²⁷ BRADY, *op. cit.*, p. 236; *NYT*, August 18, 1919, p. 11, col. 5; *NYT*, July 8, 1923, VII, p. 6, col. 1; *NYT*, October 30, 1924, p. 32, col. 2.

²⁸ *BFP*, 1919, V, pp. 505-507, Record of a meeting... of the Reparation Commission; Rees, *op. cit.*, p. 175; *NYT*, June 6, 1920, p. 3, col. 3.

Switzerland while the prices on competitive items were ridiculously low. The low value of the mark made such dumping possible elsewhere as well. Finally, the German cartel was reported to be producing inferior products and selling them under American and British labels in order to discredit these new industries. All these charges were true, although most could not be proved at the time.²⁹

Many nations were not only denouncing the Germans but also taking measures against them. One remedy was a protective tariff. Since over one-third of the German chemical production was exported, prohibitive tariff rates were deadly. Duties on sulphide of sodium, a compound used in various pharmaceuticals, were imposed by France (27%), Japan (30%), Britain (33%), the United States (40%), Italy (41%), Poland (68%), Czechoslovakia (142%), Chile (201%), and Spain (212%), among others. In some cases embargos were placed on some or all German chemical products. The Allies used their occupying forces to intimidate factory managers and employees into revealing technical knowledge and trade secrets. Professors, chemists, engineers, and industrialists toured the German facilities; escorting soldiers demanded that all details of the plant, equipment, and processes be explained. Stocks were often confiscated as a penalty for resistance. Furthermore, charges of war guilt and evil conspiracy were levelled at the Germans in order to discredit them in world opinion. When Fritz Haber was awarded the Nobel Prize in chemistry for his synthesis of ammonia for use in fertilizers, the French expressed great indignation and outrage. Two Frenchmen publicly refused to accept their awards so long as Haber kept his.³⁰ British and American public opinion was sympathetic to the French. *The New York Times* wrote:

So, though Dr. Haber undoubtedly has many scientific achievements to his credit besides his work in poison gas, and though the Swedes who made the award had probably no invidious intention, general sympathy will be felt with the Frenchmen who did not care to be honored in such company. One may wonder, indeed, why the Nobel Prize for idealistic and imaginative literature was not given to the man who wrote General Ludendorff's daily communiques.³¹

The German chemical industry experienced the greatest competition from the United States. The American industry prospered during the war. Government support, a steady supply of capital, and captured German patents and equipment all aided expansion. Progress was slow but steady, and the results in dyestuffs were especially promising. Certain vat dyes, pharmaceuticals, acids, and acid anhydrides were still not ready for profitable mass production.

²⁹ *BFP*, 1919, V, pp. 960-963, Record of a meeting... of the Reparation Commission; *BFP*, 1920, IX, pp. 573-579, Lord Kilmarnock (Berlin) to Earl Curzon, Urgent; *NYT*, December 21, 1919, p. 7, col. 5.

³⁰ *BORKIN*, *op. cit.*, pp. 34-35; *BRADY*, *op. cit.*, p. 250; *NYT*, July 10, 1919, p. 27, col. 8; *NYT*, January 27, 1920, p. 14, col. 5.

³¹ *NYT*, January 27, 1920, p. 14, col. 5.

Prices were the same from 1918 to 1919, but the quality of American products improved. The 1919 United States dyestuff production was sixty-three million pounds. This amounted to an increase of eight percent over 1918 output and thirty-eight percent over prewar imports. As excess amounts of certain dyes were produced, an export trade begun. Most of the American products went to China, Japan, and South America. Pigments, paints, varnishes, certain pharmaceuticals, medicinals, some coal-tar dyes, and fertilizer materials like ammonium sulphate and phosphate rock were exported. By the time the German cartel tried to regain its old business, the United States had become a serious competitor.³²

The United States government was interested in protecting the American chemical industries. Dyestuffs were seen as particularly vital to national security. The value of a chemical industry in a major war effort was apparent during World War One. Sulphur black was a dye used commonly to colour socks. If the last step of the dye's production was altered, one could make picric acid, one of the two great shell-fillers used in the war. Dye plants could easily be converted to making trinitrotoluene (TNT). The facilities could produce large quantities of poison gases suitable for military use. Some of the reactions in Congress were outright hyperbole. One Senate report concluded that "Germany's colossal dye industry gives her an indestructible armament which will make her formidable, even if she loses every gun, howitzer, rifle, machine gun, and tank in the empire."³³ Public opinion supported such exaggerated claims. About three billion dollars in annual American manufactures were dependent on coal-tar production. Textiles, paper, leather, inks, paint, varnishes, and other products could be endangered without a supply of chemicals. The value of pharmaceuticals and medicinals was recognized, as was the role of synthetic nitrates in making munitions and fertilizers. Unfortunately for the United States, however, the role of research and development was underestimated and even ignored.³⁴

Congress responded to the urgent requests of the American chemical manufacturers with protective legislation. Embargos were placed to prevent the importation of German chemicals that could be produced in the United States. Tariffs were considered insufficient because of the low value of the mark and the German practice of dumping. The duties on the few products licensed for importation were extremely high in order to discourage their use on a large scale. German interests argued that such severe measures made it impossible to make reparations payments. Some American consumers of paints, inks, medicines, dyes, heavy chemicals, and other products com-

³² *NYT*, January 3, 1921, p. 29, col. 2; *NYT*, January 27, 1924, I, p. 7, col. 1; *NYT*, February 3, 1924, II, p. 15, col. 7.

³³ *NYT*, May 23, 1921, p. 22, col. 2.

³⁴ *NYT*, April 4, 1919, p. 20, col. 1; *NYT*, March 11, 1921, p. 27, col. 1; *NYT*, March 13, 1921, II, p. 1, col. 3; *NYT*, May 23, 1921, p. 22, col. 2.

plained that prices for chemicals had dramatically increased. The Rossler-Hasslacher Chemical Company of New Jersey was making nine hundred percent profits on its monopoly in cyanide, used in extracting gold from its ore and fumigating citrus fruits trees. The chemical lobby had strong influence, however, as well as the sympathy of protectionists and isolationists in Washington. The Payne-Aldrich tariff included prohibitive rates on over 340 chemical products.³⁵

With such backing, the strength of the American chemical industry grew dramatically. Markets in South America, Asia, and even parts of Europe were opened. The Germans could not re-establish their prewar monopoly. American firms went so far as to ban all exhibits of German products at annual expositions in the United States. The breakthrough in phthalic anhydride opened up over three hundred chemical products, including synthetic indigo, for the Americans. The price per pound of this chemical went from seven dollars to only forty-five cents. Over eight hundred of the seized German patents had been developed and applied by 1920, but many more were still unsolved. The du Pont Corporation bribed four German chemists of Bayer to smuggle equipment and plans out of the country. The scientists, Drs. Joseph Flaschlaender, Otto Runge, Max Englemann, and Heinrich Jordan, were promised annual salaries of twenty-five thousand dollars for five years if they would reveal German secrets to the du Ponts. While the trunk of stolen formulae and equipment was intercepted in Holland, the four chemists eventually made their way to the United States.³⁶

As far as the German cartel was concerned, this act was a declaration of industrial war. Seeing a serious threat to their very existence, the German companies formed even closer associations in order to counter these attacks. Cartelization had previously been a way to increase profits. After the war, Bosch, Duisberg, and other leaders in the industry said increased collective action was necessary for survival. Moreover, the competition from British and Americans drove the German cartel to unprecedented measures in organization and planning. When this process culminated with the formation of I. G. Farben in 1925, the Germans had gone far beyond the cartel.

Beyond the cartel

There were several forms of cooperation that went further than typical cartelization. Vertical consolidation, trustification along product lines, and in-

³⁵ *Foreign Relations of the United States, the Lansing Papers, 1914-1920*, I, pp. 667-668, 675-676, The Ambassador in Germany to the Secretary of State; *NYT*, May 12, 1921, p. 1, col. 3; *NYT*, December 31, 1921, p. 12, col. 8; *NYT*, May 2, 1922, p. 21, col. 4; *NYT*, May 4, 1922, p. 21, col. 8.

³⁶ BORKIN, *op. cit.*, pp. 38-40; *NYT*, July 2, 1920, p. 19, col. 4; *NYT*, September 25, 1920, p. 22, col. 3; *NYT*, February 21, 1921, p. 15, col. 4.

ternational agreements were the three most important aspects of this process until 1925. Horizontal consolidation was the process of merging and cartelizing concerns in the same industry. Vertical combinations, by contrast, were agreements made between firms in different industries. John Rockefeller engaged in this practice in the United States, while the best German model was Hugo Stinnes. Stinnes began with coal mines. He realized the money he could save if he had his own transportation, and thus went into shipping. He then bought the steel mills that he was supplying with coal and that were producing the steel for his ships. Additional kinds of coal were needed in these steel plants, and the appropriate mines were purchased. By the time Stinnes was finished, he owned pulp mills, paper factories, electrical and gas companies, hotels, sixty-four newspapers, and other real estate, all in addition to the industries previously mentioned. The potential chain of interdependent industries was practically limitless.³⁷

The chemical cartel started its vertical acquisitions in the coal industries. First, many chemical processes required large amounts of fuel, and the cheapest usable from was lignite. Second, coal-tar and other by-products were essential in making ammonia, industrial lubricants, benzol compounds, most dyestuffs, and many pharmaceuticals. Finally, coal was used in the experiments to make synthetic rubber and fuel. The cartel purchased mine and refining plants. Coke ovens were converted so that the by-products could be refined immediately and with less expense. Experiments were conducted in dry distillation and hydrogenation. The cartel began marketing naphthalene, anthracene, creosote, pitch, and other tars. Steel mills were incorporated, almost as an afterthought, to utilize the energy. The cartel gained a forty-five percent interest in the *Rheinische Stahlwerke* of Essen and ninety-one percent in the *Gewerkschaft Auguste Victoria*. Lignite mines and collieries near Bitzenfeld were purchased and consolidated. This trend continued until, by 1933, the cartel mined 16.4 million tons of coal.³⁸

Other enterprises were similarly acquired and adapted. The methods of cartelization and rationalization were applied to new concerns as well. The cartel maintained control in industries that its chemicals had started. Synthetic fibres and dyestuffs led to involvement in rayon and other textiles. Synthetic ammonia and nitrates were the impetus to incorporate most of the fertilizer and munitions industries. Pharmaceuticals suggested expansion into medical supplies and services. Photochemicals led to photographic equipment and film. The research abilities of the scientists were used to improve the methods and products of these newly-acquired concerns. The electro-chemical and metallurgical industries formed close agreements with the chemical cartel. The great breadth of the chemical industry facilitated this tremendous diversifica-

³⁷ BRUCK, *op. cit.*, pp. 180-181; *NYT*, June 13, 1920, VII, p. 1, col. 2.

³⁸ BRADY, *op. cit.*, pp. 90-93; LEVY, *op. cit.*, pp. 70-72.

tion. Increased plant specialization and capitalization resulted.³⁹

Another result of postwar pressures was the formation of trusts along product lines. The dyestuff agreements had been called "trusts" before the war; but the individual firms formed even closer association better to withstand reparations payments in kind, unstable economic conditions, and foreign competition. Through cooperative efforts the German dyemakers were able to conceal their activities from the Allied and Associated Powers. Even though about ninety percent of the dye plants were in occupied territory, the Germans managed surreptitiously to produce and export thousands of tons of dyestuffs. The German trust used friction among their ex-enemies to make secret deals with each nation in turn. The Americans bought high-priced dyes in exchange for non-dumping agreements and export restrictions. The French, Italians, and Belgians each purchased dyes without reporting the acquisitions to other allied nations or the Reparations Commission. The Swiss agreed to disguise German dye traffic through the country if the Germans halted their dumping. The Dutch disguised similar illegal trade. The trust's abilities to fix prices, produce a variety of dyes, bribe officials, and dump on foreign markets made it extremely effective. The Allies knew something was wrong when the same trust that did not fill its reparations quota had increased its dividends in 1921 from twelve to thirty percent. Nevertheless, none of the nations cared to reveal its own clandestine deals with the Germans.⁴⁰

Trusts were formed also in potash, nitrates, rayon, pharmaceuticals, and other products. The potash trust re-established its world monopoly through agreements with the French, who controlled the ex-German operations in Alsace and Lorraine. Through funding from the chemical cartel, this trust squeezed out all foreign competition. Only one of several major American producers survived the trust's postwar dumping. The United States Department of Commerce was especially concerned about the potential effects on agriculture because of the dependence on both potash and nitrates for synthetic fertilizers. Another concern was that the banks in the United States were funding the consolidation of these German trusts. Nitrates, pharmaceuticals, and rayon were less dominated by the Germans because of the participation of strong industries from a number of other nations. These trusts often disagreed and fell into competition. The problem of overproduction could not be solved among the constituent members. For the Germans in these trusts,

³⁹ BRADY, *op. cit.*, pp. 240-242; LEVY, *op. cit.*, p. 67-69.

⁴⁰ *Foreign Relations of the United States*, 1920, II, pp. 459-461, 463-464, 466-467, 468-469, The Commission to Negotiate Peace to the Secretary of State (hereafter cited as *FR*); *FR*, 1920, II, pp. 461-463, 464-465, 469-472, Secretary of State to the Commission to Negotiate Peace; *FR*, 1920, II, pp. 472-473, 478-479, The Ambassador in France (Wallace) to the Secretary of State; BORKIN, *op. cit.*, pp. 38-40; *NYT*, July 14, 1919, p. 4, col. 4; *NYT*, December 7, 1920, p. 17, col. 4; *NYT*, June 12, 1922, p. 26, col. 3.

the greatest advantages were the consolidation and regulation of the domestic markets.⁴¹

Eventually, the German chemical cartel negotiated directly for all international agreements that involved German chemical companies of any kind. The maze of cartel agreements included Kuhlmann of France, Imperial Chemical Industries and Messrs. Courtaulds of Great Britain, Montecatini and the *Società Viscosa* of Italy, *Aussiger Verein* of Czechoslovakia, Boruta of Poland, Mitsui of Japan, and Standard Oil (New Jersey), du Pont and Dow Chemical of the United States. The Germans could usually negotiate for a controlling interest in these agreements because of the cartel's consolidated assets, superior technological developments, and control of the best industrial chemical patents in the world. The Germans expanded their foreign holdings to new patents, warehouses, distributing companies, and factories. German-controlled holding companies often complicated arrangements, almost always to the cartel's advantage. The property and control of the German cartel eventually extended to France, Italy, Switzerland, Belgium, Holland, Poland, Austria, Czechoslovakia, Rumania, Spain, Great Britain, Canada, the United States, Mexico, Brazil, China, and Japan.⁴²

The French were the first to make postwar arrangements with the German cartel, and did so at considerable advantage. The French threatened to dismantle all the German dyestuffs plants as part of the disarmament clauses of the Treaty of Versailles. This suggestion prompted secret negotiations between BASF chairman Bosch and Joseph Frossard, the man in charge of the confiscated chemical plants in France. Since the French did not have the technical knowledge to run these facilities, the two sides had room to negotiate. The Germans supplied the formulae and knowledge the French needed in exchange for half the French profits for forty-five years. The French then modified their disarmament demands to exclude the dye works. This understanding was unilaterally abrogated by the French during the Ruhr occupation. The Germans could not prevent this in the delicate political situation. By 1926, however, the cartel conducted a hostile takeover of the Kuhlmann concern, the largest French dye manufacturer. It took special action by the French War Ministry, legislation by the Chamber of Deputies, and large loans by the Kuhlmann company to stop this attempt. When the Germans threatened another secret takeover through their Dutch and Swiss agents, the French offered to negotiate. Another understanding was reached that reinsti-

⁴¹ *FR*, 1920, II, pp. 483-486, The Secretary of State to the Ambassador in France (Wallace); *FR*, 1926, II, 205-207, Memorandum by the Economic Adviser, Department of State (Young); *FR*, 1926, II, pp. 207-208, The Secretary of Commerce (Hoover) to the Secretary of State; PLUMMER, *op. cit.*, pp. 85-86; LEVY, *op. cit.*, p. 70; *NYT*, December 21, 1919, p. 7, col. 5; *NYT*, August 21, 1921, IX, p. 20, col. 7; *NYT*, June 14, 1925, II, p. 13, col. 8.

⁴² BORKIN, *op. cit.*, p. 1; LEVY, *op. cit.*, p. 89; PLUMMER, *op. cit.*, pp. 29-31.

tuted the old agreement, with the added stipulation that the French would not produce more than they needed for domestic consumption.⁴³

A similar agreement was made in 1922 by Dr. Carl von Weinberg, a principal in the dye trust and chemical cartel, with the Italian Bianchi firm. In this case the Germans received fifty-one percent control and profits and a share of the Italian markets as well. Arrangements with British firms went along these lines but included other facets as well. Temporary understandings were finalized in 1924 when the German cartel revealed certain secret processes to the British Dyestuffs Corporation in exchange for half the company's profits, a share of the British colonial markets, and British agreements not to export dyestuffs beyond her empire. Separate arrangements were made for trade with the Soviet Union. When the Imperial Chemical Industries was formed in Britain, the agreement was extended to include price-fixing and other measures against the Americans. Further negotiations resolved questions on pharmaceuticals and other chemical products as well.⁴⁴

Russo-German agreements were attempted as early as 1919, although the results of the discussions are unclear. The unidentified but reliable British "Informant X" reported on various aspects of German industry, including secret arrangements between the German chemical cartel and the Soviet Union. According to this source, the Germans provided skilled technical chemists to work in the Russian plants. No information was exchanged. The Germans provided also needed medical stores and other chemicals. In exchange, the Soviets did not nationalize the privately-owned chemical plants at Kiev, Kharkov, Rostov, Petrograd, and Moskow. Regardless of this report's accuracy, other negotiations did take place. The chemical cartel was not influential in the Rapallo negotiations because the heavy industrialists who dominated the RDI controlled the conversations. These iron, steel, and coal magnates wanted to exploit the Russian markets without interference from the West. They saw Russia as a lucrative colony for raw materials and markets. The chemical cartel had no qualms about the revised *Mittleuropa* plans, but needed foreign capital and Western markets as well. Most of the negotiations with the Soviets broke down over issues of private property and Russian fears of unrestrained German exploitation. The cartel conducted its own separate negotiations, and in 1924 these resulted in contracts to supply the Soviets with dyes and other products.⁴⁵

⁴³ BORKIN, *op. cit.*, pp. 30-33, 42-44; *NYT*, August 3, 1926, p. 5, col. 3.

⁴⁴ *BFP*, 1920, X, pp. 199-202, Lord Kilmarnock (Berlin) to Sir W. Clark; *NYT*, May 27, 1922, p. 12, col. 7; *NYT*, February 25, 1924, p. 25, col. 2.

⁴⁵ *BFP*, 1920, IX, pp. 128-129, Lord Kilmarnock (Berlin) to Earl Curzon; *BFP*, 1922, XX, pp. 682-685, Lord Kilmarnock (Berlin) to Earl Curzon; Robert Himmer, "Rathenau, Russia, and Rapallo", *Central European History*, IX (1976), pp. 149-160; *NYT*, October 6, 1924, p. 31, col. 2.

Competition in the United States was initially too fierce to promote any kind of agreement or even negotiations. By 1924, however, the Germans had managed to recover many of the patents seized in the war. Through the purchase of the Grasselli Chemical Company of Cleveland and Wilmington, the German cartel had regained all the old Bayer patents, other formulae, and four million dollars worth of important facilities in the United States. Ironically, this and other acquisitions were financed through American banks. Du Pont, Dow, and other American chemical companies had to be wary of cooperation that could bring prosecution under the Sherman anti-trust law. Nonetheless, they did everything they could to limit the German penetration. By the late 1920's, however, the Americans had no choice but to enter into market-division agreements with the Germans. The American I. G. Chemical Corporation was established in April, 1929, to foster and finance the development of the chemical and allied industries in the United States and elsewhere. Agfa and American Ansco formed the Agfa Ansco Corporation with the sole right to manufacture and sell in the United States all photographic products developed by the German cartel. Standard Oil of New Jersey was impressed by the German postwar recovery and scientific progress. In exchange for the international, non-German rights to the Bergius synthetic oil process, Standard financed the expensive research on this project and transferred two percent of its entire stock (valued at thirty-five million dollars) to the German cartel. In addition, Standard gave the Germans exclusive international rights to all the chemical processes and patents (including those for synthetic rubber) developed by either partner.⁴⁶

The Germans were usually able to negotiate from an advantage. Their advances in research kept them ahead of the foreign competition. Also, the consolidated financial strength of the various firms could match even the largest foreign chemical companies. Yet Bosch and Duisberg urged that the cartel be taken even further. They wanted to form a unified corporation that would completely consolidate all the industrial activities and financial strength of the constituent enterprises. Only then could the grand strategies and endeavours of Bosch be implemented. Despite some apprehension over authoritarianism by Bosch, Duisberg, and others, agreement to merge the eight largest firms was reached in 1924. The process was formally completed on December 9, 1925. The new firm, *Interessen Gemeinschaft Faberindustrie Aktiengesellschaft* or I. G. Farben, was the largest corporation in Europe and the biggest chemical company in the world by any standards. The total capital of the firms was over 1.4 billion marks. Further consolidation continued. By 1928 I. G. Farben supplied 52.7 percent of the volume and 63.8 percent of the value of the world's chemical supplies. By comparison, all the American chemical companies combined accounted for 22.5 percent of the volume. The

⁴⁶ BORKIN, *op. cit.*, pp. 44-49; BRADY, *op. cit.*, p. 242; *NYT*, June 13, 1924, p. 28, col. 2; *NYT*, June 15, 1924, II, p. 13, col. 7.

British were next with 11.7 percent. The previous efforts of the cartel would be dwarfed by the accomplishments of I. G. Farben in the next two decades.⁴⁷

Conclusion

Cartelization was common in postwar German industries. Iron, steel, coal, metal-finishing, electricity, railroads, brewing, chain-stores, and other areas were influenced by rationalization, economic instability, and competition. Vertical consolidation, product trusts, and international agreements were not unique to the German chemical industry. This cartel is especially significant, however, because of the extent of its consolidation of research, planning, resources, production, distribution and profits. No other sector of the German economy could match the breadth and depth of this cartel. With the formation of I. G. Farben, the German chemical industry stood alone in the world. The chemical industries in other countries, even in the United States, lost in the competition with the Germans. The role of Manchester economics and anti-trust laws should not be underestimated in this regard. The Anglo-Americans operated under an entirely different set of assumptions about the value of competition in business and industry. The fact that the German government supported and even promoted cartelization and rationalization is telling, the anti-cartel law notwithstanding. Attitudes in Great Britain began to change in the postwar years. The British Imperial Chemical Industries was a government-sponsored monopoly, but this company had neither the means nor the ambitions of its German counterpart. While most of the world was intent on returning at least to the level of prosperity of 1913, for the Germans this meant regaining their monopoly. Superior organization and consolidated investments were necessary. Research was equally important, if not more so. The scientific and technical advantage of the Germans was probably the single most important factor in the recovery of their chemical industry.

The ultimate significance of I. G. Farben is another matter altogether. Hitler had his mass-produced synthetic oil and aviation fuel by 1939. The United States, largely due to the Standard Oil-I. G. Farben deals, could not produce synthetic rubber in 1941. The events under the Nazis can be attributed to the ultimate corruption of absolute power. There is no other explanation for the eagerness to utilize slave labour, cruel medical experiments, and the other horrors of I. G. Auschwitz. Carl Bosch realized during the war the purposes to which his handiwork was being used. He died a despondent and broken man. This is a chapter in history that warrants separate consideration. Nevertheless, these later events were made possible by the developments of 1918-1925.

⁴⁷ BORKIN, *op. cit.*, pp. 42-44; LEVY, *op. cit.*, pp. 64-65, 73; Wolfram Fischer, "Dezentralisation oder Zentralisation...", in NORBERT HORN and JUERGEN KOCHA, eds., *Recht und Entwicklung der Grossunternehmen* (Goettingen, 1979), pp. 476-483; NYT, October 12, 1925, p. 34, col. 1.

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