Financing the Electric Industry Worldwide: Strategy and Structure of the Swiss Electric Holding Companies, 1895-1945

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The enthusiasm aroused by Thomas A. Edison's demonstration of incandescent lighting at the 1881 International Exposition in Paris propelled the spread of the electric industry on the Continent, where both metropolises and smaller cities quickly became infected with the disease of "modernization." During the pioneering phase of the industry's development, from the early 1880s to the 1890s, the initiatives taken did not require enormous amounts of capital. Banks large and small, engineers, and capitalists merged their efforts in taking the first steps toward European electrification [22, pp. 47-78].

In the early years, the Compagnie Continentale Edison of Paris was the only coherent and organized source for the diffusion of patents and expertise. Two German entrepreneurs--Emil Rathenau, who founded the Deutsche Edison Gesellschaft, reorganized in 1887 as the Allgemeine Elektrizitäts-Gesellschaft (AEG), and Werner von Siemens--immediately entered into licensing agreements with the Compagnie Continentale Edison. In exchange for royalty payments, Edison entrusted the future of his invention in Germany to these men, as he did in Italy to the engineer Giuseppe Colombo, the inspiration of the Società Generale Italiana di Elettricità Edison. In England, Germany, Switzerland, and the Scandinavian countries, where public economic initiative had strong roots, local institutions--the German *Länder*, the Swiss cantons, and other public authorities--joined and at times substituted for private capitalists in the electric industry's early development, often relying on the experience and financial support of the gas companies, which were already under public management in all these countries [22; 15; 9; 33; 34]. In Germany and to a lesser extent in Switzerland and Austria-Hungary, however, the initiative in establishing electric companies was taken primarily by the large manufacturers of electrical equipment. In particular, the great German electrical equipment producers used their financial and technological capabilities to develop the electric power industry during the ten years following Edison's presentation in Paris. AEG and Siemens not only built machinery for the power plants, but they also established their own companies for the production and distribution of electricity in an effort to expand their markets and to create a privileged and sure outlet for their products. The Swiss firm Brown Boveri followed the same path from the time it was established in 1891.

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That year, an important technological event signaled the end of the first phase of development in the electric industry--the first transmission of electric current over a long distance, achieved in Lauffen, Germany. The new technology expanded the possibilities for using electric energy in more remote areas and on a larger scale, but it created new financial obstacles as well. Practically, the new phase of expansion meant an increase in the use of water power for the production of energy, a resource that in Europe was available particularly in Switzerland, Italy, Norway, Spain, and, to a lesser extent, Germany and the Austro-Hungarian Empire [25; 32; 30; 2, pp. 201-40]. The exploitation of hydraulic resources required a considerable increase in the size of investments. Dams and plants had to be built in thinly populated, inaccessible regions, and the networks constructed had to cover large areas. Moreover, hydroelectric projects presented complex and difficult problems in organization and management that needed to be solved without the guide of precedent, while the unique circumstances of each project limited the possibilities for standardization and systematization. These factors increased costs enormously [22; 15, pp. 21-87; 11, pp 799-801].

The expanding market for electricity also brought new kinds of complications to the companies involved in this field, particularly the electrical equipment manufacturers. Direct involvement in the management of electric companies thus became excessively complicated, because the activity of producing and distributing energy required an elaborate bureaucratic structure, which the great electrical equipment manufacturers were not able to develop without incurring burdensome costs [23, pp. 15-19; 19, pp. 46-47; 28, pp. 178-80]. Thus, two variables, one financial, but clearly of technological origin, and the other organizational, pushed the German and Swiss electrical equipment giants toward a change in strategy, as each producer tried to maintain and expand the "protected" market that it had built.

All the major equipment manufacturers hit upon the same solution almost simultaneously: the establishment of holding companies to specialize in financing and managing the electric companies. With the trusts that had been organized to finance railway companies serving as a model, the great German and Swiss manufacturers were soon followed by their French and Belgian counterparts, each founding their own financial holding companies between 1895 and 1896. The new holding companies were incorporated in Switzerland, which, as a neutral country with sophisticated financial system and advantageous fiscal legislation, offered numerous advantages to limited-liability or joint-stock companies [21, p. 343].

In 1895, AEG founded the Bank für elektrische Unternehmungen, better known as Elektrobank. Some of the major German mixed banks (Deutsche Bank, Berliner Handelsgesellschaft, Nationalbank für Deutschland) also took part, as well as the Credit Suisse (whose president would later become the president of Elektrobank), the Banque de Paris et des Pays Bas (Paribas), the Banca Commerciale Italiana, the Swiss Eidgenossische Bank, and two important German private banking houses, Jacob Landau and Delbrück. The initial capital was fixed at 30 million Swiss francs and reached 75 million by the outbreak of the First World War [7, pp. 95-96; 17; 29, pp. 303-32; 21, pp. 344-49].

During the same year Brown Boveri also founded a financial trust, the Motor für angewandte Elektrizität (better known simply as Motor), with the participation of a single Swiss bank--one of the oldest and best-known banking houses in the country, Leu & Co. of Zurich--and a number of German partners (Boveri, one of the two founders of the manufacturing company, was a German citizen): the Allgemeine Deutsche Kreditanstalt, the Metallgesellschaft, and the Mumm family, owner of the famous Champagne brand. Motor's initial capital was only 3 million Swiss francs, but as its activities grew and with the entrance of the Union des Banques Suisses among its shareholders, by 1914 it reached a capitalization of 30 million francs [35, p. 136; 26, pp. 181-82].

In 1896 Siemens created the Schweizerische Gesellschaft für elektrische Industrie (Indelec) with the collaboration of a number of Swiss banks from Basel (the third financial market of Switzerland after Zurich and Geneva)--Dreyfus, Riggenbach, and Basler Handelsbank, whose president was nominated president of the new company--and the Epine Fatio of Geneva, Leu & Co., and a group of German banks including the Rheinische Kreditanstalt, the Warschauer, and the Rosenthal banking house. Initially Indelec's capital was fixed at 10 million francs, but only three years later it had reached 20 million, a level sustained until World War I [18, pp. 30-32].

The new strategy was named *Unternehmergeschäft*, a word especially created to describe the relation between the electrical equipment producers and the financial holding companies. The financial trusts' purpose were to establish and finance, alone or, more often, in collaboration with other partners, companies for the production and distribution of electricity; they planned the projects and supervised the construction of the plants, just as a modern engineering consulting firm would, obtaining from that activity a commission of approximately 7% of the total costs of construction. The machinery and the necessary equipment to run the power plants were provided by the electrical equipment manufacturer connected to the holding company or by the manufacturer's affiliated companies. Once the electric companies were able to distribute dividends regularly, the holding companies completed their job by entering the shares on the market.

There were numerous connections among the three actors--that is, the equipment manufacturer, the holding company, and the electric operating company. Representatives of the equipment manufacturing firms as well as those of the participating banks were among the directors of the holding companies. Representatives of the holding companies sat on the boards of directors of the electric power companies that the holding companies and the banks financed. The relations between each electrical equipment enterprise and its holding company were defined by contract and bound the choices of the latter to the commercial needs of the former. However, the holding companies had quite a wide margin of autonomy from the head office, especially in their distinctly financial operations, and sometimes, as in Indelec's case, moments of tension and dispute occurred [18, pp. 32ff.; 24, pp. 463ff.; 21, p. 343].

For the first decade of operations, the holding companies had a very simple structure because their operations were primarily financial. In each case, the board of directors was composed of the representatives of the specific electrical equipment manufacturer involved and of the participating banks; the president was almost always a senior manager who followed most of the business

personally, supported by a small managerial staff. This structure changed significantly starting in 1904-5, when a technical section was added to meet the expanded needs of the project planning and supervising activities. Over time, the increasing amount of activity, together with the numerous transactions to be followed in various European countries and sometimes on other continents as well, created new responsibilities at the holding companies, which led to an increase in the number of managers. The new men were not members of the boards of directors, but represented the holding company in the managerial organizations of the companies under its control.

Until 1914, the three major Swiss electric holding companies--Elektrobank, Indelec, and Motor--had a generally similar geographical distribution of investments, focusing primarily on Germany, Italy, and Switzerland. However, certain significant differences should be noted (see Table 1). Investments in Swiss electric companies formed the majority only for the Brown Boveri group, Motor; Elektrobank, and Indelec, in contrast, invested majority of their total in Germany, where their two manufacturing companies, AEG and Siemens, were located, and in Italy, a country with enormous hydroelectric potential and a national electrical equipment industry still too young to satisfy the internal demand [16, pp. 35-61; 10, pp. 571-95]. In 1913 Brown Boveri also founded a second holding company, Columbus, with the collaboration of a number of Swiss banks and financial trusts (dominated by the Union des Banques Suisses), Italian companies (the Pirelli group, one of the major producers of electric cables, the Franco Tosi), and a group of Argentinian capitalists. The purpose of the Columbus holding company was to invest in electrification projects in South America, especially in Argentina [35, p. 140; 26, p. 193]. In 1913 Elektrobank had electric power investments in eight European countries, Motor in five, and Indelec in seven; Columbus invested only in one country, Argentina.

A common tactic of the Swiss electric holding companies was to create specific trusts, almost regional sub-holding companies, in those countries where the development of investments seemed most possible; these became useful instruments to increase the number of partners with whom to start new initiatives. Elektrobank, for example, together with the Belgian-based Société Financière de Transports et d'Industries Électriques (SOFINA), controlled by AEG, and with some French partners such as Paribas, founded the Société Centrale pour l'Industrie Électrique in France and Motor founded the Dinamo Societá per Imprese Elettriche in Italy [14, pp. 112-17; 26, pp. 193-94].

Table 1. Geographical Distribution of Investments of the Swiss Electric Holding Companies, 1913-14 (Figures given are percentages.)

	Elektrobank	Indelec	Motor	Columbus
Germany	53.0	38.6	9.2	—
Italy	18.1	38.9	25.9	—
Switzerland	8.6	—	61.2	—
France	1.8	1.4	3.2	—
Russia	—*	18.0	—	—
Spain and Portugal	4.6	—*	—	—
Denmark	—	—	0.5	—
South America	3.4	—	—	100
Others	10.5	3.1	—	—

* Percentage included under "others."
Source: Annual reports of the companies.

In all their operations, the Swiss electric holding companies never entered into competition with one another; in fact, on more than one occasion, they cooperated in launching new initiatives. This behavior was undoubtedly favored by the general and specific agreements for cooperation made by the electrical equipment companies and also by the influence of the Swiss and German banks, whose structure and policy opposed inappropriate and expensive battles for market supremacy. In an oligopolistic market such as that for electrical equipment, and in the closed circle of the international *hautes banques*, agreements were the rule, not the exception [13; 6, pp. 65-87; 20, pp. 290-93].

The sectoral distribution of investments immediately preceding World War I presents two distinct profiles, which continued to characterize the Swiss electric holding companies throughout their existence (see Table 2). One category was the large company, in this period represented only by Elektrobank, financially very solid, capable of expanding its international connections in many countries and to many other types of company in the sector, while operating with a complex and diversified strategy. The second category was composed in 1913-14 of the three smaller financial trusts, two of which (Motor and Columbus) were part of the same industrial group. Their future lay in cooperating to compete against the giant from Zurich, as they in fact did after the First World War.

Table 2. Sectoral Distribution of Investments of the Swiss Electric Holding Companies 1913-14

(Number of companies)

	Elektrobank	Moror-Columbus	Indelec
Company Type			
Electric Power	29	14	5
Transportation	4	1	1
Electrical equipment	2	1	2
Electrochemical	4	2	—
Financial trusts	8	4	—
TOTAL	47	22	8

Source: Annual reports of the companies

Between 1920 and 1921 all three Swiss electric holding companies celebrated their first twenty-five years of activity, but the international economic situation and the companies' financial situation did not allow any true celebration. The war, and especially its severe repercussions on the monetary system, had inflicted a heavy blow to companies that had invested a great part of their financial wealth in German, Italian, Austrian, and French electric enterprises. Elektrobank, Motor, and Indelec found themselves with drastically devalued portfolios. At the end of the fiscal year 1919-20, Elektrobank had a deficit of 56 million Swiss francs on 75 million capital; Indelec ran a deficit for four consecutive years (9.4 million francs in 1919, 18.0 in 1920, 31.5 in 1921, and 26.7 in 1922). There was an unsuccessful attempt, in 1920, to save the company by reducing its capital from 20 million to 4 million francs and transforming 60 million francs in bonds into preferred shares entitled to a maximum dividend of 6%. Motor found itself in 1919 with a deficit of 12.5 million francs on capital of 36 million francs.

All three holding companies then underwent a thorough financial reorganization, with very painful consequences for their many shareholders. Nevertheless, once this process was completed, these great enterprises were again able to occupy an important position in the new international context. The reorganization also radically changed their ownership structure, especially that of the holding companies created by AEG (Elektrobank) and Siemens (Indelec) [27, pp. 348-51]. Their financial restructuring was led entirely by Swiss banks (the Credit Suisse directed the pool for Elektrobank, and Basler Handelsbank for Indelec), since the two German companies were certainly not in a position to organize the large rescue operation that had been planned. In this process, Elektrobank and Indelec became almost entirely Swiss companies. The

consequences of the new situation were many and led to the definition of new strategies for both the two German electrical equipment giants and the two holding companies entrusted to the care of their new owners, the Swiss banks. Siemens' and AEG's new strategies have been thoroughly studied, but the activities of the holding companies are less well understood [20; 14, pp. 22-57]. Elektrobank and Indelec suffered from the effects of the different ownership structure, and they, and Motor and Columbus as well, had to deal with the results of the growing weight of the credit institutions in the Swiss industrial economy.

Whereas the strategy of the *Unternehmergeschäft* had failed Siemens and AEG, for Elektrobank and Indelec it presented a new opportunity: as a result of the relations that already tied the principal companies of the sector to them and to the major Swiss banks, Elektrobank and Indelec became the holding companies for nearly the entire Swiss electrical equipment sector. For the two holding companies controlled by the Brown Boveri group, the financial reconstruction process led to their fusion and to the creation of Motor-Columbus, with a capital of 60 million francs, an amount that made it the largest financial trust in the country. Motor-Columbus maintained the strategy of the *Unternehmergeschäft* at least until the second half of the 1930s [27, pp. 356-58].

Table 3. Representatives of the Swiss Banks on the Boards of Directors of the Swiss Electrical Equipment and Electric Holding Companies, 1930s

	CS	SBS	Leu	UBS	Basler Handelbank
Electrical Equipment Manufacturers					
Brown Boveri	1	1	1	1	1
Escher-Wyss	—	—	1	—	—
Sulzer	—	1	—	1	—
Oerlikon	1	—	1	—	
Electric Holding Companies					
Elektrobank	5	—	—	1	—
Motor-Columbus	2	1	1	2	—
Indelec	—	1	—	—	2

Source: Annual reports of the companies
CS= Credit Suisse SBS= Société de Banque Suisse UBS= Union des Banques Suisse

Cooperation among Swiss electric holding companies to favor the national electrical equipment industry did not prevent the Swiss share of the world market in that sector from falling in the period between the two wars, from 3.5% in 1913 to between 2.6 and 2.8% in 1938-40. This situation was the result not only of the general difficulties of the international economy between the two wars, but also of protectionism and of the devaluation of the currencies of the major international competitors of the Swiss companies (International General Electric, Westinghouse, British General Electric, and the Swedish company ASEA). At the beginning of the 1930s, the dollar, pound, Swedish krona, and, of course, the German mark were devalued, creating a situation that was only partly and belatedly counterbalanced by the devaluation of the Swiss franc in 1936 [12, p. 1734, p. 416, p. 300, p. 406; 4, p. 91; 20, pp. 289-304; 5, pp. 269-87]. However, the decline in the Swiss market share does not fully express the importance and the role of Swiss goods in the electrical sector, because Brown Boveri, the most important Swiss manufacturer, though exporting around 80% of its production, compared to 50% for the other Swiss companies in the sector, had already become an established multinational, with companies and plants in a dozen European countries and, until 1930, even in the United States [1].

The new strategy, and most of all the different ownership structure of the holding companies, had some repercussions on the geographical distribution of the investments. Whereas interest in Germany decreased except for Indelec, the weight of shares in Swiss companies increased in all three cases, although these investments were made in other financial trusts rather than in industrial enterprises. Elektrobank diversified its portfolio investments toward the United States, where shares owned by the holding companies of Zurich came to be concentrated — a choice made to take advantage of the falling share prices in the wake of the Wall Street Crash. Motor-Columbus adopted a different overall strategy, but it also concentrated on the American capital market. In 1926 Motor-Columbus was a major contributor to the establishment of the Südamerikanische Elektrizitätsgesellschaft and to the Schweizerische Amerikanische Elektrizitätsgesellschaft, both in Zurich. The latter's capital of up to 130 million francs put it at the top of the list of all Swiss joint-stock companies. During the same year, the company also participated in the creation, in Montreal, of the Foreign Light and Power Co., which brought together Swiss, Canadian, and American capital to be invested in shares of European and South American electric companies [27, p. 357]. In 1939 Elektrobank had investments in eleven European countries and in the United States, Motor-Columbus in four European countries, in two South American countries, and in Canada, and Indelec in seven European states (see Table 4).

Table 4. Geographical Distribution of Investments of the Swiss Electric Holding Companies, 1938-39 (Figures given are percentages.)

	Elektrobank	Indelec	Motor-Columbus
Switzerland	17.2	21.0	45.2
Germany	7.5	28.0*	0.4
Italy	14.6	30.7	12.2
France	13.3	11.9	0.3
United States	24.5	—	—
Spain and Portugal	6.6	—	—
South America	6.1	—	41.2
Poland	—	6.5	—
Luxembourg	—	1.9	—
Canada	—	—	0.7
Others	10.2	—	—

* together with Czechoslovakia

Source: Annual reports of the companies

Table 5. Sectoral Distribution of the shares of the Swiss Holding companies, 1938-39 (number of companies)

Company type	Elektrobank	Motor-Columbus	Indelec
Electric power	42	16	18
Transportation	1	1	—
Electrical Equipment	—	3	—
Electrochemical	—	2	—
Financial trusts	14	6	11
Total	57	28	29

Source: Annual reports of the companies

A study of the sectoral distribution of the investments of the three holding companies shows that the prewar strategy still formed the cornerstone of

activities for Motor-Columbus and its head company Brown Boveri, whereas the two other financial trusts had come to operate as all-inclusive service companies in the electrical sector between the two wars (see Table 5).

The number of shareholdings of the three holding companies continued to be unbalanced, as they were in 1913. Their policies and strategies were also quite different with regard to the relation between the value of investments and the value of short-term credits granted to the electric companies. The highest peak of the value of the shareholdings was reached in 1931 by Elektrobank and Motor-Columbus and in 1933 by Indelec, reflecting the general economic cycle and the electrical sector in particular: compared to 1924, the first year after the financial reconstruction, the increase was 217% for Motor-Columbus, 281% for Elektrobank, and 500% for Indelec. The increase in short-term credits was 93% for Motor-Columbus, 290% for Elektrobank, and "only" 200% for Indelec (which reached its peak in 1932). Compared to these peaks, in 1939 the curve was at a lower point: the shares' decrease in value was 25% for Motor-Columbus and Elektrobank and 33% for Indelec; the decrease of short-term credits was 90% for Motor-Columbus, 75% for Elektrobank, and 44% for Indelec. Table 6 shows the three different lines of conduct.

Table 6. Relation between the Principal Credit Entries (Credits/Shareholdings) in the Balances of the Swiss Electric Holding Companies (quinquennial averages)

	Motor-Columbus	Elektrobank	Indelec
1925-29	0.20	0.33	1.84
1930-34	0.25	0.29	0.94
1935-39	0.09	0.21	0.75

Source: Annual reports of the companies

Motor-Columbus, whose active balances (shares plus credits) were always decidedly superior to those of the other two holding companies (at least 50% larger, but up to 200% larger), was most easily able to reduce its proportion of short-term credits after the international economic crisis of the early 1930s, even if 95% of the total were uncovered, while it had more difficulty disposing of the shares, which remained a strong component of its strategy, still based on the *Unternehmergeschäft*. Elektrobank required more time to decrease the relation between credits and shareholdings, because the first had maintained much more importance in its transactions; however, at least a third of the credits granted during the 1930s, a period of great monetary instability, had a guarantee such as a gold clause or required repayment in Swiss francs. In the end Elektrobank was "more" a bank than Motor-Columbus, meaning that it had an outlook closer to that of the credit institutions than to that of the pre-1914 holding companies. Indelec moved along the same track as Elektrobank, showing a clear propensity for short-term risk, which between the wars in fact represented the major risk, certainly greater than that incurred by investment in industrial bonds or in developing initiatives of the electric industry. On the other hand, at an

international level the hunger for fresh money was enormous, and when the bond and stock markets were not available for additional capital, it was through short-term credits, continuously renewed, that the electric companies could expand.

These different lines of conduct seem to show that Elektrobank and Indelec changed their *Unternehmergeschäft* strategy to a so-called *Bankgeschäft* strategy. In contrast, indirect evidence that Brown Boveri and Motor-Columbus still followed the previous strategy lies in the attempt, in 1929, of International General Electric to buy a large share of holdings of the Swiss electrical equipment group and its holding company. This operation, though unsuccessful, was part of General Electric's program to expand in Europe around the end of the 1920s, and it successfully secured a large holding in AEG. In the case of the two Swiss companies, GE's goal was also to acquire an interest in Motor-Columbus's South American investments [3, pp. 315-16; 8, pp. 42-50, 27, p. 365].

The more specifically financial aspects of the electric holding companies' new strategy caught the attention of the Swiss political and monetary authorities, worried, after the stabilization of the European currencies, about the possibility of an increase in the export of capital. From 1927, the National Bank of Switzerland and the Swiss Department of Finance intervened by attempting to guarantee sure warrants for the recovery of loans; for example, they tried to tie loans to foreign enterprises to the condition that the recipients provide work to Swiss companies, thus transforming a foreign loan into the indirect financing of exports. The banks and financial holding companies accepted these recommendations only in 1932, when they signed a gentleman's agreement that required the approval of the government and the National Bank for foreign loans over 5 million francs. Three years later, after the issuing of the new Banking Bill, the amount was increased to 10 million francs, but in exchange the lenders were required to secure the authorization of the central bank; the approval of political and monetary authorities was no longer sufficient [31; 27, p. 365].

The managerial structure of the holding companies during this period certainly became more complex. The most interesting comparison is between Motor-Columbus and Elektrobank, which ultimately were the most similar in financial solidarity and variety of interests. In both cases their structures were based on departments organized according to function: from the board of directors and a small executive unit, the managing committee, comprised the central management, which controlled the administrative, financial, technical, legal, and commercial departments. At Motor-Columbus, the technical department was further divided into five branches: construction, machinery, electrical parts, electric lines, and the sale and purchase of energy. Beyond this, however, differences were evident.

At Elektrobank the managerial structure was highly differentiated, with greater levels of authority invested in the upper echelons of the hierarchy. The formalization took place starting from 1934: the board of directors, consisting of 17-18 members, was transformed, de facto, into an organ of control similar to the Supervisory Board (*Aufsichtsrat*) of the German joint-stock companies, on which the bank representatives sat. The central management was restructured and formalized; the board appointed a president and a vice-president, with the additional support of four managing directors and one assistant manager, thus

becoming the effective decision-making center of the company. It is no coincidence that after 1945 in three cases the presidents, on reaching the age of 55-60, became members of the board of directors.

At Motor-Columbus the managerial structure was always less powerful. Decisions remained centralized within the board of directors, the managing committee, and the person appointed as the president-administrator. The managing directorate remained an executive organ of limited importance, consisting of only three directors and one assistant director. This structure had its origin in the desire of the founders of Motor-Columbus (Brown Boveri, Pirelli, and their Argentinian partners) to maintain complete control of its activity. Although the representatives of the three groups had the same number of seats on its board of directors as the allied banks (nine), in the managing committee the relation was five to three in favor of the founders. Elektrobank, on the contrary, was truly the financial trust of the great Swiss banks and in particular of the Credit Suisse, which was represented by the president, vice-president, and three of the 17-18 members who formed the board; all the other seats were occupied by the major Swiss private banking houses.

Paradoxically, Motor-Columbus was the first to experiment with financial democracy in the joint-stock companies. Around the end of the 1930s, a syndicate of small shareholders was created who were very critical of the way the company had been managed after the 1929 crisis (which had severe repercussions, including a complete lack of dividends for six consecutive years) and the syndicate succeeded in electing its own representative to the board of directors of the holding company [27, pp. 365-66].

The international economic and political situation after World War II--in particular the nationalization of the electric industry in many European countries--forced the Swiss holding companies to yet another change of strategy. The diversification of investments toward civil engineering and real estate (as well as toward atomic energy) led this new phase. The results and consequences of the choices made after the Second World War are still a matter of controversy today, but that is another story.

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