

# **Organizational capabilities in a global science-based industry: Some heavy electrical manufacturers in the western world, 1878-1990**

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## **Abstract**

The heavy electrical manufacturing industry grew out of the scientific findings in electromagnetics in the mid-1800s. Thomas Alva Edison in the U.S. established *Edison General Electric* in 1889. George Westinghouse founded the *Westinghouse Electric Company* (Westinghouse). *Edison General Electric* merged with *Thomson-Houston Electrical Company* in 1892 and *General Electric* (GE) was formed. In Europe, Germany became the center for electrical manufacturing. *Siemens & Halske* was founded in 1847, exploiting Werner Siemens' inventions for developing the pointer telegraph. The company also invented and refined the dynamo, enabling it to compete in heavy electrical engineering. Emil Rathenau formed the company subsequently known as the *Allgemeine Elektrizitäts-Gesellschaft* (AEG). Through licenses AEG used technology developed by Edison for German and European market. These four companies grew into four industrial giants on international basis. In addition, there were many "national champions" in electrical engineering throughout Europe. In Switzerland *Oerlikon* and *Brown Boveri* (BBC) were early technological leaders, paralleled in Sweden by *Allmänna Svenska Elektricitetsaktiebolaget* (ASEA). *General Electric Corporation* (GEC), *English Electric*, and *Allied Electric Industries* (AEI) grew stronger in Great Britain. In France, the major manufacturers were *Compagnie Générale d'Electricité* (CGE) and *Alstom*. The formation and evolution of organizational capabilities in these companies are outlined and how they affected competitive outcomes and organizational survival. The analysis relates to Chandler's (1990) "three pronged investments" in production facilities, marketing and distribution networks, and management. However, there are specificities of science-based industries that needs to be accounted for. Therefore, the

analytical framework for explaining the development of the electrical manufacturers in the Western world is reformulated to cover management-based, technology-based, and market-based activities. The analysis show how those firms that were able to coherently thrive in these three activities outcompeted those firms that were less able to do so.