
Jochen Streb. *Staatliche Technologiepolitik und branchenübergreifender Wissenstransfer: Über die Ursachen der internationalen Innovationserfolge der deutschen Kunststoffindustrie im 20. Jahrhundert*. Berlin: Akademie Verlag, 2003. 242 pp. ISBN 3-05-003873-X, €69.80 (cloth).

In the period since World War II, the plastics industry has ranked internationally among the most competitive branches of the West German manufacturing industries. Since this success cannot be attributed to a comparative advantage from production costs, other factors must be taken into account. Jochen Streb highlights governmental technology policy and inter-industry knowledge exchange as such factors. The author aims to improve our understanding of the industrial innovation process and to identify opportunities for the enhancement of the innovative potential of German industries.

The volume falls into two parts. The first part contains a short introduction that sketches out the organization and arguments of the book and a broad overview of the industrial innovation process. Streb begins with the concept of innovation capital (as a subset of human and social capital) that relates to a firm's knowledge stock useable for the development of economically successful products and processes. He discusses in great detail the importance of innovation capital for the different phases of the innovation process and stresses its path-dependent character. All this is illustrated by many examples chosen from a wide variety of industries. While the purpose of this part, which accounts for nearly half the volume, is to provide a theoretical framework for subsequent chapters, this reviewer doubts that readers familiar with the economics of industrial innovation will learn anything new.

More interesting is the second part of the book. It contains three chapters, two of which already have been published as journal articles, followed by a short conclusion. Largely based on the work of Peter Morris, chapter 3 compares the development of the German and U.S. synthetic rubber industries during World War II. In order to initiate large-scale production of BUNA S (a substitute for natural rubber), the state governments of both countries had to give sales guarantees. Under the U.S. synthetic rubber program, producers were offered cost-plus contracts, whereas the Germans installed a fixed-price system to regulate transactions with the monopolistic corporation I.G. Farben. Streb argues that due to the cost-plus contracts, the incentives for the U.S. producers to decrease production costs were comparatively low. Moreover, since producers were obliged to share patents and knowledge, they showed little interest to start new

R&D projects on synthetic rubber, but instead invested in the general improvement of their research facilities. In contrast, the German fixed-price system allowed for higher profit margins through the reduction of production costs. Along with patent protection this system stimulated innovations and led to an innovation capital on which the German plastics industry could build in the postwar period.

After discussing the importance of governmental technology policy, the author focuses on knowledge transfer and inter-industry networks as a source of competitive advantage. In chapter 4, he develops a game theoretical model to analyze the conditions under which knowledge transfer between upstream and downstream industries (i.e., plastics producers and fabricators) will take place. Probing this model with a case study of the plastics raw material division of the German chemical firm BASF, Streb highlights the bundling of products and innovative knowledge as a successful strategy of the German plastics producers for competing with foreign low price suppliers. Of course, this strategy was not new among the German chemical firms. As Streb mentions, the synthetic dye stuff industry already had established strong customer relationships before World War I by tying together products and innovative knowledge for the textile industry.

Chapter 5 provides a case study of the German firm Freudenberg & Co., which developed from a specialized tannery into a diversified plastics fabricator in the course of the twentieth century. Drawing on the archival records of the firm, Streb shows that Freudenberg quite successfully acquired innovative knowledge through networks with information brokers such as academic scientists as well as other firms. Freudenberg used this knowledge for the development of new products that allowed for a diversification into new markets in the technological and economic neighborhood of its established products. Streb therefore interprets Freudenberg's strategy as an example of Schumpeterian diversification.

The conclusion lists some recommendations for state and industry decision makers and underlines the importance of knowledge transfer for the success of the German plastics industry. Considering the ambitious task of the author, this reviewer was left disappointed. While the volume sheds light on some aspects of inter-industry knowledge exchange, for a book-length study its contribution to our understanding of the industrial innovation process in general, and the chemical or plastics industry in particular, is too limited.

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