

**Knowledge and Competitive Advantage: The Coevolution of Firms, Technology, and National Institutions**, by Johann Peter Murmann. Cambridge: Cambridge University Press, 2003.

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Johann Peter Murmann's excellent book, based on his Ph.D. thesis, investigates the evolution of the synthetic dye industry, from a national industry perspective (U.K., Germany, France, and U.S. dye industry), technology perspective (invention of new synthetic dyes), and national institutional perspective (educational systems and patent laws), from 1856 until World War I. It is a response to the call of many scholars to develop coevolutionary models (Kaufmann, 1995; Lewin & Volberda, 1999; Nelson, 1995) and takes a significant step forward in articulating a powerful coevolutionary theory that links industrial, technological, and institutional dynamics. Not surprisingly, the book received the 2004 Schumpeter Prize.

The central question—or the puzzle, as Murmann refers to it—is the shift in industrial leadership from Britain and France to Germany, while these first two countries had more raw material (coal tar) and a large home market. The origins of the synthetic dye industry go back to William Henry Perkin, when he invented the first synthetic dye in London in 1856—namely, aniline purple dye. Perkin commercialized his technology and, along with British and French entrepreneurs, launched the synthetic dye industry. However, the U.K. firms were not able to sustain their leadership, and by 1870 German firms had a 50 percent market share, controlling 85 percent of the world market by the turn of the century. Why did the Germans come to dominate the market? And why is it that particular German firms became very successful (e.g., Bayer, BASF, and Hoechst) while most other German firms (e.g., Jäger) failed?

In resolving this puzzle, Murmann eschews single silo theories (cf. Lewin & Volberda, 1999; Volberda & Lewin, 2003), such as resource-based theory (university training of chemists, formal R&D labs of German firms), resource dependence theory (better industrial-academic-government networks of German firms), institutional

theories (patent practices, trade associations, and university training in Germany), population ecology theories (higher birth and death rates in the German dye industry), evolutionary theories (high-volume, low-cost production routines of German dye firms), or learning and dynamic capabilities theories (dynamic capabilities and absorptive capacity of German dye firms to develop a broad portfolio of synthetic dyes). With some of these theoretical lenses, such as dynamic capabilities and learning perspectives, scholars have attempted to further elaborate the role of managerial intentionality within German dye firms. With other theoretical lenses, such as population ecology, institutionalism, and, to some extent, evolutionary theories, scholars have discounted the ability of dye firms to self-consciously renew themselves significantly or repeatedly.

However, adaptation and selection are not wholly opposed forces; rather, they are fundamentally interrelated. In line with recent empirical studies in the music industry (Huygens, Baden-Fuller, Van den Bosch, & Volberda, 2001) and financial services industry (Flier, Van den Bosch, & Volberda, 2003), Murmann applies a macro coevolutionary approach in this book with the assumption that industry leadership in the dye industry was not an outcome of managerial adaptation or environmental selection but, rather, the joint outcome of intentionality and environmental effects.

Chapter 1 is essentially a summary of the book but, more important, sets out the essentials of coevolutionary research. Chapter 2 is an institutional analysis of the national industries and answers the question as to why the U.K., German, and U.S. dye industries followed different developmental paths. The educational and training systems, the rapid formation of professional and trade associations, the organic chemistry knowledge network between academics and industrialists, the efficient organization of production on the shop floor, and the lack of patent laws before 1877 in Germany all contributed to a very favorable selection environment for the German dye industry. The causation proposed in Chapter 2 runs from the institutional environment to firms.

However, not every German firm in the synthetic dye industry was a success. Birth, death, and failure rates of synthetic dye firms in Germany were much higher compared to the United

Kingdom and the United States. In Chapter 3, therefore, Murmann changes the level of analysis from the national industry to the individual firm; a matched comparison of a winner and loser in each of the three countries (Bayer and Jäger in Germany, Levinstein and BS&S in the United Kingdom, Schoellkopf and American Aniline in the United States) shows that the winners in all three countries had strong ties to the centers of organic chemistry knowledge and became world leaders because they invested their profits in building capabilities in marketing, production, R&D, and administration. Nevertheless, of these winners, the German firms were most successful and dominant.

Chapter 4 describes in great detail how German firms were more successful than British and American firms in their lobbying efforts to upgrade educational institutions and to change patent laws and practices for competitive advantage. The causation here runs from individual firms to national institutions. These favorable institutions (endogenous events, not exogenous events) were shaped and built by the purposeful actions of firms (managerial intentionality).

In Chapter 5—in my view, the best chapter—Murmann assesses the adequacy of existing theories in accounting for Germany's long dominance of the synthetic dye industry. He develops an institutional theory of competitive advantage that explains how Germany moved from laggard to uncontested leader. In this chapter Murmann describes the simultaneous evolution of the synthetic dye technology (the invention of various synthetic dye variants and selection and retention based on technical efficiency across the United Kingdom, Germany, France, and the United States), the different national institutions (the relative importance of research and teaching in organic chemistry in the U.K., German, and U.S. university populations, as well as the path-dependent patent systems), and national firm populations.

However, the fundamental question remains. Was it simply parallel development or coadaptation of these industrial, technological, and institutional evolutions, or was it really coevolution? According to Volberda and Lewin (2003), coevolutionary studies should specify actors in terms of replicators (e.g., routines, capabilities) and interactors (e.g., individuals, units, organizations); processes in terms of variation,

selection, and retention; and outcomes that result in a change of the emergent composition of a population over time. Murmann supports these principles by stating that these firm, university, patent practices and technology populations coevolve if, and only if, they all have a significant causal impact on each other's ability to persist.

The book provides evidence of cross-flows among the alleged coevolving systems—namely, the national populations of dye firms, the population of dyes in existence, and the national populations of universities. Most attention, however, is focused on the multidirectional causalities between firms and institutions—namely, universities and patent practices. Murmann shows that the transfer of synthetic organic chemists between firms and universities in Germany allowed this reciprocal influence to take place. Moreover, these multidirectional causalities were facilitated by university professors, who offered their expertise and reputations to synthetic dye firms in the realm of patent laws and practices.

There are always further remarks to be made. Most of the coevolutionary dynamics discussed by Murmann involve interactions among the three national dye industries and their national university populations, while the dynamics between dye industries and dye technology and between dye technologies and institutions receive much less attention. Furthermore, the study of the synthetic dye industry exclusively focuses on the macro coevolution of firms, technology, and institutions. Of equal importance is the micro coevolution that occurs within the multiunit firm considering coevolution of intra-firm routines, dynamic capabilities, and competencies in an intrafirm competitive context. Although the author touches on these issues in Chapter 3, when he describes individual firm histories, the development of unique R&D, marketing, organizing, and high-volume production capabilities in large multiunit chemical firms also requires a more micro coevolutionary perspective.

Finally, after reading this valuable book, the question remains: What is the role of management in this coevolutionary story? In other words, how much room is there for managerial intentionality in influencing firm adaptation independent of institutional and technological selection? The author, as claimed in Chapter 5, favors new institutional perspectives and ac-

cordingly views the role of management as very limited and indirect (cf. Murmann, Aldrich, Levinthal, & Winter, 2003). A CEO, Murmann observes on page 229, should see himself or herself as the Chief Evolutionary Officer, responsible for ensuring that the firm engages in a sufficient amount of experimentation with products and organizational practices to increase the odds that it will be better aligned with the competitive environment.

All in all, Murmann's book, on the one hand, is unique in its breadth and depth of coevolutionary analysis. It seems to fulfill most of the requirements of coevolutionary research (Lewin & Volberda, 1999; Volberda & Lewin, 2003). On the other hand, coevolutionary research is hard work and requires new empirical approaches. Together with Ernst Homburg, Murmann constructed a database of virtually all synthetic dye firms in the world from 1857 to 1914 (see Appendix II of the book). He studied at least three national dye industries and six individual firm histories. Moreover, he collected data on academic disciplines in five countries and studied biographies of leading industrialists and chemists. For many scholars, these methodological hurdles are important barriers for coevolutionary research. Nonetheless, I cannot agree more with the author with regard to further support and development of the theory of coevolution and trying it out in new arenas.

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***Personality and Organizations***, edited by Benjamin Schneider and D. Brent Smith. Mahwah, NJ: Lawrence Erlbaum Associates, 2004.

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*Personality and Organizations* summarizes, critiques, and integrates twenty-five years of research and theory on the role of personality in organizational contexts. The book also includes insightful recommendations for specific types of future research that are most likely to advance our understanding of personality in work organizations. Thus, it should be an excellent resource for scholars and Ph.D. students.

The book contains six sections and fifteen chapters by a variety of well-known scholars in the industrial/organizational psychology and organizational behavior fields. A strength of the volume is the overview at the beginning of each section. Each overview is concise and yet provides useful information on the content of each chapter in the section. These overviews should be a helpful guide for readers because they provide more detailed information than can be inferred from chapter titles. The overviews also describe the purpose behind the section.

Section I (Introducing Personality at Work) contains two chapters. The first chapter (Hogan) is an excellent historical overview of contemporary personality theory, which helps to put current research in perspective. Hogan provides careful definitions of key terms and uses them consistently. The chapter is well structured and includes individual, team, and organizational levels of analysis.

The second chapter (Furnham) is a descriptive summary of personality research in Europe, with an emphasis on comparing similarities and differences between U.S. and European approaches. Thus, it provides an introductory over-

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