



## BOOK REVIEWS

This issue of JIBS offers reviews of two books that analyse the dynamic interaction between the business environments and business strategies in very different ways. The institutional underpinnings for business strategies are a major research topic for comparative management, aiming to explain why in different contexts firms pursue different strategies, and with different implications for performance. J Peter Murman in *'Knowledge and Competitive Advantage'* takes a historical perspective focusing on the co-evolutionary processes between national innovation systems, business strategies, and performance. This book thus adds to the industry-level longitudinal research reviewed in JIBS no. 4/2003, Tom Murtha *et al.*'s *'Managing New Industry Creation'* and David McKendrick *et al.*'s *'From Silicon Valley to Singapore'*.

A more contemporary research focus is chosen by Doh and Teegen in *'Globalization and NGOs'*. They bring together an esteemed group of scholars to investigate a new phenomenon in the international business arena: non-governmental organizations (NGOs). Multinational enterprises are used to deal with other businesses, or with governmental authorities. The emergence of NGOs acting both nationally and internationally challenges MNEs' established ways of interacting with other organizations because NGOs have different sources of legitimacy, and means of influencing business. Thus, they also challenge the theoretical models developed in international business research.

Klaus E Meyer  
JIBS Book Review Editor

# Knowledge and competitive advantage, the coevolution of firms, technology and national institutions

Johann Peter Murmann  
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Reviewed by: Stefanie Ann  
Lenway and Thomas P Murtha

Carlson School of Management, University of  
Minnesota, 321 19th Ave. South, Minneapolis,  
MN 55455, USA  
E-mail: slenway@csom.umn.edu and  
tmurtha@csom.umn.edu

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Johann Peter Murmann's new book, *Knowledge and Competitive Advantage*, provides a fascinating account of the birth and adolescence of the synthetic dye industry in the late 19th and early 20th Centuries prior to World War I. Global strategy scholars will find fundamental lessons about building competitive advantage in this meticulous analysis of the dynamics that led to German firms' ascendance over British, French, and American rivals. All International Business scholars can learn from Murmann's evolutionary models of organizational mechanisms that generate variety, structure selection, and promote retention of organizational forms as well as discoveries of molecule combinations for popular fabric dyes. The author describes 19th Century co-evolutionary relationships among technologies, firm strategies, national institutions, and policies that resonate as evocations and harbingers of the forces shaping contemporary industries. Although readers might surmise that these historic dynamics among companies headquartered in different countries have much in common with current developments, Murmann's analysis



exemplifies how our tools for understanding them have improved. Consequently, we can glean much new understanding from his recounting of old events.

Many industries in history have exhibited the dynamic of country-to-country leadership migration. One contemporary example, the flat panel display (FPD) industry, came into existence over 100 years after the emergence of the synthetic dye industry, which Johan Peter Murmann chronicles in this book. RCA researchers demonstrated the liquid crystal display in the US in 1968. High-volume production emerged first in Japan in the 1990s, spurred on by a multinational community of producers, equipment manufacturers, and materials makers, who worked together to consolidate a large-format production paradigm. After a few years of Japan's dominance, Korean manufacturers took the lead. These firms increased production efficiencies by pushing equipment and materials to their failure points, learning in the process how to advance the manufacturing technology to its next phase. Currently, manufacturers in Taiwan have seized leadership in unit sales for some categories of LCDs, although not in sales value.

Why and under what conditions do the seminal ideas behind some industries migrate from their countries of origin to take root in second or third countries that rapidly eclipse the founder? Why do some firms survive while others die in this process? J Peter Murmann tackles these questions in this path-breaking study. The synthetic dye industry may have been among the earliest to arise from intellectual origins in one country, but first commercializes at economic scale in another.

William H Perkin accidentally invented the synthetic dye industry in England in 1856, when he found that his experiments to synthesize quinine produced an aniline purple dye that turned fabrics a brilliant mauve color. Perkin quickly devised a way to produce this dye, which became extremely fashionable in France. Social commentators at the time expected Britain to remain the leading synthetic dye manufacturer. But British leadership lasted for only 8 years.

Murmann set out to explain why British firms' share of the global synthetic dye market had declined to 3.1% by 1913, despite their access to the most competitively priced raw materials (coal tar) and the largest domestic market. Once established, the German firms had hired organic chemists to develop new dye molecules and chemical engineers to wring costs out of the production

process. These strategies enabled them to grow rapidly, dominating the world market with 85% share at their peak within the historic period Murmann covers, 1850–1914. US firms barely factored, topping out at 1.9% market share. Instead of investigating how German firms achieved such low production costs along with significantly broader product lines, US and British firms' managers lobbied for protective government measures to create a level playing field. (In contemporary times, one can imagine the dominant German firms attracting complaints of 'unfair' competition by pricing below cost-of-production, when in fact firms outside of Germany would have no clue about the efficiencies that had been achieved there.)

Murmann's explanation hinges on an evolutionary perspective on producers' life cycles in Britain, Germany, and the United States, with particular attention to the co-evolution of firms and national innovation systems, including the political, social, and legal environments that lend (or fail to lend) support to the firms' achievements. In his research on the German national innovation system, Murmann examined the contributions of national patent regimes, public university research programs, and universities' organic chemistry laboratories' social networks, which linked key researchers to countries' firms, as well as internationally with other researchers. Science and the institutionalization of scientific research in German dye firms were critical to their success. Organic chemistry provided the underlying science for the creation of new dyes. Chemical engineering provided the understanding of physical relationships necessary to continually reduce manufacturing costs.

Murmann's meticulous discussion of the evolutionary approach is valuable in itself for its level of detail, encompassing the analysis of how firms and social institutions generate variation, select from alternatives, retain specific activities, and replicate them. Isolating evolutionary dynamics in the synthetic dye industry required Murmann and an associate, Ernst Homberg, to compile a database of all such firms that existed in the world from 1850 to 1914. This database tracked: (1) the location of head offices and plants; (2) the key managers; (3) the staff headcount broken out by workers and chemists; and (4) if relevant, the date of firm death. Murmann complemented this database with a network analysis of the relationships among the key organic chemists and the firms.

Evolutionary analysis of this database revealed important results. According to Murmann's analy-

sis, the strength of the German industry stemmed not only from high absolute numbers of firm births but also deaths. By 1914, 116 dye firms had entered the industry in Germany, 47 in Britain, and 35 in the United States (p. 42). In all, 91 of these firms failed in Germany, 36 in Britain, and 25 in the US. He argues that the high numbers of business models generated in Germany helped to provide the German industry with more variants from which to select. These business models, in turn, generated many organizational innovations from which the market could select, as well as many variants of activities that firms could select and replicate as routines. Specific organizational innovations that explained the German firms' success included hiring university-trained organic chemists, establishing a professional R&D function, and creating global marketing networks. Murmann also observed that firms that did not develop global marketing networks tended to fail. Examples of routines that helped to sustain lead firms' competitive advantages included delegating elements of professional R&D organizations to systematically evaluate the commercial viability of dyes generated from new combinations of molecules.

Murmann's longitudinal analysis isolated a number of components of the institutional playing field that would not have shown up in an industry snapshot. In particular, he found that a lack of patent law strengthened German producers' competitive advantages, by subjecting them to intense domestic competition. By the time the government implemented the all-Germany patent regime in 1877, firms had established routines by which chemical engineers rapidly improved manufacturing processes, as strategies to drive costs down to remain ahead of imitators. The author further argues that the strength of the German university system, especially in the field of organic chemistry, provided German synthetic dye manufacturers with a superior understanding of the formation of dye molecules and how these molecules bonded with fabrics. Organic chemistry provided essential training for chemists who populated the firms' R&D labs.

Murmann's account of national innovation systems' contributions to knowledge creation and competitive success rendered a portrait that resembled 21st century business phenomena more closely than it matched our preconceptions of 19th century industry evolution. As an exception to this generalization, however, it is not clear to us that contemporary industry emergence can be as com-

pletely understood using a model that defines organizational populations within countries as units of analysis.

Murmann's analysis highlights the critical role of novelty within countries as a source of firm-level competitive advantages. Viewed from a country frame-of-reference, this translates into a preference for large numbers of entrants, given that the author views individual firms as novelty generators. We would suggest, however, that this argument reaches limitations when confronted with industries that, from inception, require large capital investments, immense scale and access to sophisticated technological building blocks that do not exist within the boundaries of single firms and countries.

During the 1990s, a similar concern with novelty motivated the US government's strategy to encourage US firms to build flat panel display production facilities within the country, and/or to establish manufacturing equipment and materials businesses to service these plants. Government programs subsidized many new entrants, working in several alternative display technologies, with the idea of maximizing variations from which the market would eventually select. But the market was global, not domestic. Furthermore, the technologies necessary to create a viable high-volume FPD manufacturing platform were scattered across the world, among a number of countries' companies and institutions. Consequently, any government program that aimed to create an industry comprising of a population of firms circumscribed by national ownership and territory was bound to fail.

Novelty and knowledge will continue to propel industries of the present into the future. J Peter Murmann's panoramic rendering of the growth of the synthetic dye industry combines a sophisticated use of theory with meticulous empirical research to produce a masterful account of how an industry evolved through nationally distinct knowledge creation processes. The history revealed many parallels with contemporary knowledge-based industries such as FPDs. Consequently, we cannot help wondering whether the relative isolation of knowledge creation processes within national industrial environments that characterized Murmann's analysis arose as a consequence of historical circumstances or imposed assumption. If the latter, then perhaps something may be added to this book's considerable body of comparative insights, by broadening the analysis to incorporate a richer appreciation of how firms and institutions interacted cross-nationally. If the former, then it



would be of considerable general interest to learn whether and, if so, how the industry has evolved to

leverage novelty cross-nationally in the years since 1914.

### References

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To investigate why nations gain competitive advantage in particular industries and the implications for company strategy and national economies, I conducted a four-year study of ten important trading nations: Denmark, Germany, Italy, Japan, Korea, Singapore, Sweden, Switzerland, the United Kingdom, and the United States. I was assisted by a team of more than 30 researchers, most of whom were natives of and based in the nation they studied. The researchers all used the same methodology. Three nations—the United States, Japan, and Germany—are the world’s leading industrial powers. The other nati... A firm's knowledge assets are an important intangible source of competitive advantage. For firm knowledge to provide competitive advantage, it must be generated, codified, and diffused to others inside of the organization. In the end, real advantage can be created by the management's ability to unify corporate-wide technologies and production skills into competencies that capacitate individual businesses to adapt quickly to changing opportunities.[24]. To sustain leadership in a chosen core competency area, companies should seek to maximize their competency factors in the core products like being important in positioning its values, distinctive (differentiated), superior, communicable (visibility), unique, affordable, and profitable. Sustainable competitive advantage is a business asset or ability that provides a superior value to customers and a long term position over competitors. The sustainable competitive advantage is difficult to duplicate or exceed by competitors and it lasts for many years. A unique value proposition can ensure more sales, higher customer loyalty, and greater staff retention than competitors. Some of the most famous chatbots are Pop Geo – National Geographic Chatbot, SnapTravel, Wall Street Journal Chatbot, Whole Foods’ Facebook Messenger Bot, BabyCentre UK Bot, Hottel Marriot’s ChatBotler, Cheapflights Chat, and many others. 22. Use Artificial Intelligence (AI). With the new BI solution, they can track operational effectiveness on a national scale. 46. Create Strategic Partnerships.