

Strategic Management of Technological Innovation

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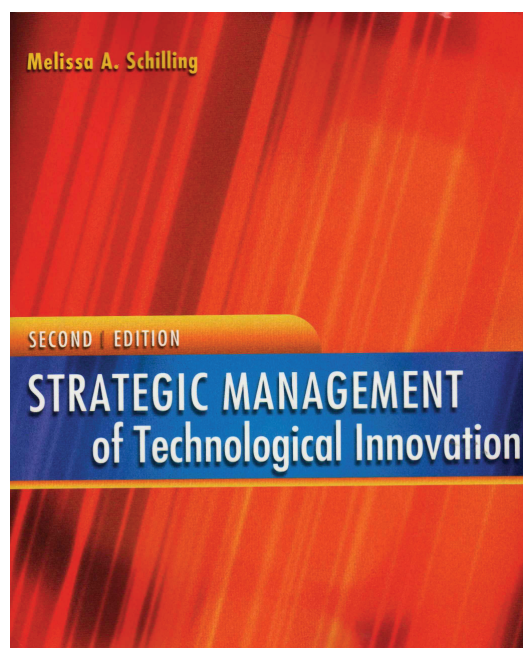
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The objective of the book *Strategic Management of Technological Innovation* is to approach the technological innovation process from the perspective of strategic management. The process is analyzed on the basis of the competition dynamics of innovation in the industry, the formulation of innovation strategies by the companies and concludes with the challenges posed to its implementation.

What distinguishes this book is the excellent didactic presentation of the subjects; the preoccupation of relating them to real-world situations of very well known companies; the research briefs presenting abstracts of studies into this subject and finally the indications of classical literature about each of the topics. The examples opening the chapters wake the curiosity of the reader and are excellent didactic instruments for a better understanding of the main concepts and abstract processes involved in the phenomenon innovation. Each chapter still includes discussions about the real-world studies and the theoretical concepts; a summary of the main questions approached in the chapter; well-elaborated and elucidative figures; and the definition of the main concepts in the margin of the text. An important strategy used by the author is presenting in the beginning of



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each of the three parts composing the book and in the introduction the figure that represents the structure of the book, making it easier for the reader to follow the author's argumentations.

The author, Melissa Schilling, graduated in business administration from the University of Colorado and received her Ph. D in strategic management from the University of Washington. She was professor of the Universities of Boston and Washington and is presently an associate professor at the Stern School of Business of the New York University, teaching courses in strategic management and technology and innovation management. In 2000, she received the award for excellence in research from the University of Boston and was indicated for the award for the best article of the Academy of Management Conference; Her main research lines are: technological innovation and production of knowledge for which she received a research grant from the National Science Foundation for the period 2003-2008. She published a series of papers in international journals besides her author- and co-authorship in book chapters. Her publications about technological innovation focus on the development processes of new products, especially in the videogame industry. In the field of production of knowledge, she studies learning curves, cognitive insights and creativity. The author has also publications about architecture of modular products a about the use of modular organizational forms. The book here reviewed is her main publication and was very well accepted. It is now in its second edition and was already translated to Italian and Spanish.

The book is composed of thirteen chapters and the introduction, divided into three parts. The main ideas approached in advance in the introduction are the importance of technological innovation, the impact of technological innovation upon society and the relevance of the innovation strategy in the industry. As refers to the first point, the author shows the importance of technological innovation in the context of the globalized markets, where the international competition pressures the firms to constantly innovate for being able to keep their position in the market and to defend their profits. The second point deals with the positive and negative impacts of technological innovation upon the society. The great increase in the per capita Gross Domestic Product in the developed countries over the period 1971-2003, in part attributed to the impact of technological innovation, is presented as a positive point. Examples for negative points or negative externalities as they are called in the economic literature are: pollution, erosion, destruction of natural habitats and even moral dilemmas (the case of genetics for example). Still with respect to the same topic, the author emphasizes the participation of government and industry in the financing of research and development (R&D) As to the third point, the author approaches the relevance of the technological innovation strategy in face of the characteristics of the innovation process such as high cost, long maturation period of the investment and uncertainty. From the viewpoint of the author, the innovation process resembles a funnel, where

a great number of ideas "enter" but only few products ready for the market "come out". The classical example for this image is the pharmaceutical industry.

In the first part of the book – composed by chapters 2 to 5 – it is shown how each industry develops the technological innovation process and how some of the innovations come to dominate. Chapter two describes the sources of innovation, the types and designs of innovation, the norms of conduct and the dominant design and, finally, the right moment for the firm to put the innovation on the market. The center of the innovative system is the firm and innovation should be understood as the practice of implementing ideas. Thus, different forms of combining creative ideas with resources and knowledge means transforming creativity into innovation. Among the sources of innovation are: R&D in the firm, relations with users and suppliers, competitors or complementary products, governmental and university research funds, NGOs and innovation networks (like innovation clusters and spillovers). The creativity can be organizational (coming from inside the organization) or individual.

Chapter 3 brings a review of innovation types and designs, for example the industry Honda and the development of the hybrid cars. The following types of innovations are presented: process versus product innovation, radical innovation versus incremental innovation, architecture innovation versus component innovation, innovations reinforcing the competences of previous innovations. Continuing, the author presents the technology S curve as a prospective tool for technological improvement and diffusion as well as its limitations and finalizes with the technological cycle.

Chapter 4 shows us how a design of a product or process becomes dominant in an industry and how the owner of this design obtains the dominion over the market and eliminates his competitors. The chapter discusses how the dominant designs emerge and the advantages of the learning effect and of the network externalities they propitiate, allowing them conquer the market and becoming the only (or principal) design. After having conquered the market, the design takes advantage of the path dependency, in other words, after some time the market and the persons get used to a certain design and changing this would be extremely expensive. In the second part of this chapter the author approaches the multiple dimensions of value: the autonomous value of the technology and the value of the network externalities.

This part ends with chapter 5 discussing the impacts of the moment the company enters a determinate market; the possible advantages and disadvantages of being the first to enter this market; the factors that influence this decision and the strategies for making the best choice of when to enter the market.

In the second part of the book, composed by chapters 6 to 9, the author approaches the formulation of the strategy of technological innovation by the companies, including the definition of a strategic orientation, selection of the innovation project, cooperation strategies

and protection of the innovation. Chapter 6 reviews the basic tools for strategic analyses used by the managers for evaluating the position of the firm and for defining strategies for the future. Questions such as the sources of sustainability of the competitive advantages, the identification of competences and capacities of the firm and the definition of the strategic objectives are approached. The basic idea is that a company can only formulate a coherent strategy for future technological innovation after having evaluated very carefully its present position.

Chapter 7 examines the variety of qualitative and quantitative methods for selecting innovation projects. In the first case, the author mentions discontinued cash flow (present value and internal rate of return) and real options (evaluation of options for investments in non-financial assets). The second case deals with the aggregated planning framework of the project and the Q-sort method. Finalizing, a combination between qualitative and quantitative methods is presented for a joint analysis of the projects based on both methods.

Chapter 8 presents the types of cooperation (partnerships) most usually adopted in the development of technological innovations, the advantages of partnerships and the advantages of acting alone, the methods for choosing partnerships and partners and the monitoring of the partnerships. Among the principal forms of partnerships are the strategic alliances, joint ventures, licensing, outsourcing and the collective research organizations.

Chapter 9 approaches the question of appropriability of the innovation (forms of tacit or codified knowledge and level of complexity of the knowledge) and the options and mechanisms the companies have for protecting the returns of their innovative efforts. Mechanisms such as patent rights, copyrights, trademarks and commercial secrets are analyzed. Another point discussed is the effectiveness and the use of each of these mechanisms in different industries and the complex series of tradeoffs that a company should consider in its defense strategies, such as: completely proprietary versus completely open systems and the advantages of protection and diffusion of technology as forms of appropriation of innovative efforts.

In the third and last part of the book, composed by chapters 10 to 13, the author deals with the implementation of the technological innovation strategy by the companies. The question problematized in chapter 10 is “what would be the organizational form of the

company most favorable for innovating, generating new products, developing processes and managing and developing teams?” The first organizational aspect approached is the size of the firm, the advantages and disadvantages of great and small companies. It is analyzed how the companies can equilibrate the benefits and the trade-offs of flexibility, scale economies, standardizing, centralization, and how the knowledge about the local market influences the innovation rate of the company leading, at least in part, to a trend to decentralize the R&D activities.

Chapter 11 discusses the best practices in the management of product development. The development of new products is approached on the basis of questions like adequation to the needs of the client, control of the cost of the development and minimization of the development cycle. The author analyses sequential product development versus simultaneous product development, the involvement of consumers and suppliers in the product development process, the tools for improving the process – such as *Stage-Gate Process*, *Quality Function Deployment* and *CAD/CAM* – and the tools for evaluating the performance of the new products

Chapter 12 approaches the product development teams. The construction of the team, its structure and its management are discussed. Questions with regard to size and composition of the team are discussed, the existent kinds of teams and the management profiles.

Finally, chapter 13 examines the implementation of the innovation development strategy and how traditional points in the day-to-day life of the industry can influence the implementation of the strategy. Items examined are among others: time of entrance of the technology, licensing and compatibilities, taxes and tariffs, distribution and logistics and marketing.

As the reader will observe, in addition to its tremendous didactic quality, this book is a complete guide of the concepts and questions involving technological innovation. Doubtlessly it would be a great textbook for courses in industrial technology and innovation management. The greatest challenge for professors and students in these disciplines in Brazilian teaching institutions will be adopting innovation practices very distant from the Brazilian industrial technological innovation reality. Even so, this book will for sure serve as an encouragement for advancing in a field in which we are far from being competitive. 