

International Handbook Series on Entrepreneurship

Holger Patzelt  
Thomas Brenner  
*Editors*

# Handbook of Bioentrepreneurship



Springer

# Handbook of Bioentrepreneurship

# International Handbook Series on Entrepreneurship

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## VOLUME 4

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### SERIES FORWARD

Interest in entrepreneurship has surged in the last decade. Scholars across a broad spectrum of fields and disciplines have responded by generating new research approaches uncovering a wealth of new findings and insights about entrepreneurship. This new research spans not just a diverse set of fields, such as management, finance, psychology, economics, sociology, and geography but also a wide range of countries reflecting the fact that entrepreneurship is a global phenomenon. The exceptionally cross-disciplinary nature of entrepreneurship has made it difficult for scholars in any one particular field to become aware of and understand the leading contributions and insights emerging in other disciplines. The purpose of this series is to compile a series of handbooks, each devoted to a particular issue in the entrepreneurship. Each handbook will draw upon the leading international scholars from the entire range of disciplines contributing to entrepreneurship to articulate the state of knowledge about a particular topic. The contribution should identify the fundamental questions, which are being posed, the methodological approaches, types of data bases used for empirical analyses, the most important empirical regularities to emerge in the literature, major policy conclusions, and the most promising research direction. Thus, each handbook will reflect the interdisciplinary nature of entrepreneurship that has proven to be elusive to discipline-based scholars. A goal of the *International Handbook Series on Entrepreneurship* is not only to provide a state-of-the-art coverage of what has been learned about entrepreneurship, but that when viewed in its entirety, entrepreneurship is emerging as a bona fide academic discipline.

The particular topics in the Series will be drawn from discussions with the leading scholars. Each handbook will be directed and compiled by a Handbook Editor. (S)he will work closely with the Series Editors to ensure that the contents and contributions are appropriate, and that there is consistency with the other volumes in the Series.

*The titles published in this series are listed at the end of this volume.*

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# Handbook of Bioentrepreneurship

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# 1 Introduction to the Handbook of Bioentrepreneurship

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Biotechnology is one of *the* most booming industries at the beginning of the twenty-first century. According to the 2006 Annual Biotechnology Report of Ernst & Young (one of the leading industry observers), the world's publicly traded biotech companies had revenues greater than US \$70 billion in 2006, representing growth rates of 22% in Canada, 14% in the USA, and 14% in Europe, as compared with those in 2005. Moreover, biotech companies raised more than US \$27 billion at the global capital markets, an annual growth of 42%. The average premium pharmaceutical incumbents paid for acquiring biotech firms with values more than US \$500 million was 60%. Biotech firms had 36 new drugs approved in the USA alone. Glen Giovannetti, Ernst & Young's Global Biotechnology Leader, concludes: "The industry in the US has never been stronger and we're seeing its success story spreading to other parts of the world – particularly Europe" (Ernst & Young 2007).

These numbers are even more impressive when we consider that the biotech industry is only 30 years old. Genentech, which is often referred to as the first modern biotech firm, was founded in 1976 in California. Genentech used recombinant DNA technology, a radically new biotechnological technique to genetically modify living organisms, to produce human insulin, which, after market introduction by its pharmaceutical partner Eli Lilly in 1982, formed the basis of Genentech's overwhelming economic success. Motivated by this success, people founded thousands of bioentrepreneurial ventures in the USA in the 1980s. The European biotech industry is even younger than the US sector because governmental regulations, missing societal acceptance, and an insufficiently developed capital market made it difficult for bioentrepreneurs in most countries to start a new firm before the 1990s. Thus, most biotech firms are still entrepreneurial ventures. For example, although the US sector is the most developed biotech industry worldwide, less than one quarter of all the 1,400 US biotech firms are traded at the stock markets. In Europe, only about 100 of more

than 1,800 biotech firms are publicly traded, and the average firm employees are less than 60 people (Ernst & Young 2003a, 2003b).

Although the development of the US industry and the individual firms such as Genentech demonstrate that biotechnology can be an extremely successful business, starting a biotech venture is among the most complex entrepreneurial tasks. Biotechnology firms are characterized by high knowledge intensity, long product development cycles, high technological and market uncertainties, and an extraordinary need for capital. For example, the development of biopharmaceutical drugs takes, on an average, more than 12 years and several hundreds of millions of US dollars (DiMasi et al. 2003; Kellog and Charnes 2000), and only one of 5,000 initial drug candidates reaches market launch (Evans and Varaiya 2003). Thus, particularly in the case of drug development, biotechnology is an extremely risky and money-consuming business, and many bioentrepreneurial firms fail before they bring any product to the market. Indeed, most existing biotech ventures do not earn any profits yet, and the sector as a whole is still not profitable (Ernst & Young 2007).

The extraordinary success potential on one hand and the high failure rates of bioentrepreneurial firms on the other hand make biotechnology a fascinating field of study for academic research, and the sector has attracted considerable scholarly attention. For example, management researchers have analyzed the success factors and strategies of bioentrepreneurial ventures; sociologists have studied the extensive web of collaborations between biotech firms, universities, and incumbent companies; and scholars from the disciplines of economics and political sciences have identified regional and political factors that promote or hinder the development of a local biotech industry. Indeed, biotechnology appears to be one of the most researched industries over the last decade. For instance, a Business Source Premier search for publications that match the word *biotechnology* and appeared in scholarly, peer-reviewed journals yielded more than 3,200 articles. While these articles have advanced our understanding of bioentrepreneurship at the firm, industry, and regional level considerably, the pure amount of research that has been conducted to date demonstrates that, particularly for scholars new to the field of bioentrepreneurship, it is difficult to gain an overview and understanding of what has been researched and within which discipline, where the field stands, and what the challenges are for the going forward researchers focusing on this fascinating industry.

Based on these observations, the purpose of the *Handbook of Bioentrepreneurship* is twofold. First, it provides an overview of the current state of the academic field. It was our goal to bring leading bioentrepreneurship researchers from various disciplines together and have them review and summarize past research in their fields. Second, based on these reviews, the scholars identify important gaps in our knowledge and suggest avenues how these gaps may be filled in by future bioentrepreneurship research. Thus, this book is not so much a guide for practitioners, but is mainly addressed to academic researchers. Since the efficient generation of new knowledge requires building on existing knowledge (Kuhn 1974), we expect that the book will not only help to inform those who have a general interest in academic bioentrepreneurship research, but will also serve as