

FGF Studies in Small Business and Entrepreneurship

Editors-in-Chief

Joern H. Block

University of Trier, Heide, Germany

Andreas Kuckertz

University of Hohenheim, Stuttgart, Germany

Editorial Board

Dietmar Grichnik

University of St. Gallen, St. Gallen, Switzerland

Friederike Welter

University of Siegen, Siegen, Germany

Peter Witt

University of Wuppertal, Wuppertal, Germany

More information about this series at <http://www.springer.com/series/13382>

André Presse • Orestis Terzidis
Editors

Technology Entrepreneurship

Insights in New Technology-Based Firms,
Research Spin-Offs and Corporate
Environments

 Springer

Editors

André Presse
University of Bolzano
Bozen, Italy

Orestis Terzidis
Karlsruhe Institute of Technology
Karlsruhe, Germany

ISSN 2364-6918 ISSN 2364-6926 (electronic)
FGF Studies in Small Business and Entrepreneurship
ISBN 978-3-319-73508-5 ISBN 978-3-319-73509-2 (eBook)
<https://doi.org/10.1007/978-3-319-73509-2>

Library of Congress Control Number: 2018937663

© Springer International Publishing AG, part of Springer Nature 2018

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Printed on acid-free paper

This Springer imprint is published by the registered company Springer International Publishing AG part of Springer Nature.

The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Foreword

The quality of life that is taken for granted in developed countries has not simply come about. It is the result of decades and, in certain cases, centuries of focus on inclusive development and creating products that created the greatest value and institutionalising the skills and knowledge into teachable competences. The greater value, or perception of value, was reflected in the higher amounts that customers were willing to pay for goods or services. This value in turn resulted in a virtuous cycle of improving quality of life. With time, this created societies that began to focus on the higher levels of the value chain, since these provided ever-increasing revenue per hour of effort. The increased productivity and quality of life also came at a price. It became clear that growth had limits, in the resources but even more in the environment. Our atmosphere is too small to absorb all the greenhouse gases, and our oceans are limited if it comes to pollution. The constraints in many cases led to new regulations, but again hard work in innovation was necessary to square the circle and allow for sustainable growth.

Over the past few decades, the world has become interconnected as never before. Goods and services found markets around the world, as ever more countries opened their markets to international trade and commerce. This further spurred the specialisation that had earlier given rise to products with higher perceived value, since the number of consumers who had the wherewithal to purchase them increased.

Commoditisation of manufacturing capabilities made the world more flat and smaller, since specialisation could be automated if the demand was high enough. This resulted in the West outsourcing to Japan, then South Korea and Taiwan, and ultimately to China. The result of this was that product manufacturing went to the cheapest location in the world. There was a belated realisation that with the outsourcing of manufacturing, the *raison d'être* of manufacturing that could be done in lower-cost countries was not adequate to sustain the wealthier Western economies.

The only way to sustain the existing quality of life was by way of innovation that countered commoditisation with higher perceived value. This innovation had to find its way from technology research and development to established companies as well

as startups. It is this technology transfer and commercialisation, its impact, challenges and bottlenecks that the authors have captured.

The efforts by the authors in capturing the relevance of, and challenges in, sustainable technology management in this context are both topical and highly relevant. Technology management is relevant in established firms since over time, all existing technology can become replicable, resulting in price-based competition. With developing countries having the lowest cost of manufacture, companies in developed countries cannot compete on cost. A focus on technology management can enable established companies to continue competing on value, resulting in a value-driven, rather cost-based, competitive advantage. The topic is also on the agenda for universities and research centres: the traditional mission of research and teaching is complemented in many institutions by the third pillar of innovation.

The different perspectives of entrepreneurship from researchers from across the globe provide fascinating insights on what afflicts startups and reasons why technologies succeed, or more importantly, fail, en route to commercialisation.

Technology startups fail because of many reasons. Chief among them include low-value recognition from customers, delivery failure resulting from underestimating the logistics of manufacturing and delivery, the inability to monetise since competing solutions are 'free' like e-mail or simply the inability to identify and focus on beachhead customers.

The authors have elegantly encapsulated the challenges that young technology firms face, have theorised on business models for technology ventures and have showcased how to convert value to sustained revenue, which ultimately ensures scale and profitability. Intellectual property (IP), which includes patents and trademarks, is an important method to provide competitive advantage, which ultimately results in impressive profits. The impact of student densities on IP creation and subsequent venture capital availability, which is a critical requirement for successful entrepreneurship, has also been discussed.

In particular, the authors have evaluated new technology-based firms (NTBFs) across Europe and analysed the impact of grants. The negative implications of state grants, in contrast to private funding, are that grants are often not 'smart', where they open doors to the market or prepare the ground for the next round of funding. These are critical to the subsequent success of NTBFs. Another impact of grants and other forms of state funding is that NTBFs continue to do more of the same; instead of focusing on go-to-market strategy that results in quick and replicable revenue and reaching scale, they focus on technology. These startups use the funds to do what they're already good at, rather than developing the business and sales channels.

In spite of the limitations of state funds and grants, it is undeniable that this funding is much needed and can have a huge positive impact at a time when there is a paucity of other funding sources due to the early stage of the NTBFs. The greatest impact of such funding is that it enables NTBFs to align closely to markets, so that their solutions become more driven by market pull rather than technology push. These have been extensively discussed and provide a valuable perspective, not only to NTBFs but also as cornerstones to state policymakers, to maximise impact of state funding.

Since the authors are primarily academicians from premier institutions in Europe, their perspective on important elements such as the impact of the eminent role that entrepreneurship programs play in universities is driven by objective analysis of large and comprehensive data sets. Indeed, this is distilled from their involvement in such programmes, providing a unique insight into the role that these programmes play. Further, and more importantly, these authors are actively involved in supporting entrepreneurship much before the startup comes into being—they help evolve the thinking of the would-be entrepreneurs. The book reflects several of their learnings as they continue to hand-hold and drive the future of entrepreneurship and competitive advantage of Europe.

Entrepreneur-in-Residence, Chair of Entrepreneurship
ETH Zurich
Zurich, Switzerland
October 2017

Anil Sethi

Acknowledgments

The editors want to thank all those who made this book possible. Apart from the authors, we want to cordially thank our Senior Editor from Springer, Dr. Prashanth Mahagaonkar, as well as Volha Shaparava and M. Rajasekar who advised and supported us in the edition and production of the book.

Contents

Part I Business Models, Business Architecture and Business Planning of NTBFs	
The Semantics of Entrepreneurial Learning in New Technology-Based Firms	3
Marc König, Christina Ungerer, and Guido Baltes	
Architecture of Technology Ventures: A Business Model Perspective . . .	21
Arash Najmaei	
The Role of Business Models in the Development of New Technology-Based Firms	49
Oleksiy Osiyevskyy, Mark Chernenko, and Vladyslav Biloshapka	
Part II Managing NTBFs	
Identifying and Categorizing Risks of New Product Development in a Small Technology-Driven Company	71
Ivan Rakonjac and Vesna Spasojević Brkić	
The Application of the Effective Innovation Leadership Model in ICT Practice	99
Sabrina Schork	
A Unified Model of the Technology Push Process and Its Application in a Workshop Setting	111
Orestis Terzidis and Leonid Vogel	
Part III Factors Influencing NTBFs	
Women-Led Startups and Their Contribution to Job Creation	139
Katherina Kuschel, Juan-Pablo Labra, and Gonzalo Díaz	

What Drives the Intellectual Property Output of High-Tech Firms? Regional- and Firm-Level Factors 157
Christian Masiak, Christian Fisch, and Jörn H. Block

New Technology-Based Firms and Grants: Too Much of a Good Thing? 177
Nicolas Pary and Olivier Witmeur

The Development of ICT Industry in Belarus: Impact of Educational and State-Support Policies 201
Aksana Yarashynskaya

Part IV Academic Entrepreneurship

Defining Academic Spinoffs and Entrepreneurial University 211
Maksim Belitski and Hanna Aginskaya

The Impact of Entrepreneurship Governance and Institutional Frameworks on Knowledge-Based Spin-Offs 225
Reza Asghari and Britta Kokemper

Bridging the Gap Between Invention and Innovation: The Role of University-Based Start-Up Programs and Private Cooperation 241
Andreas Liening, Jan-Martin Geiger, and Ronald Kriedel

Part V Interaction Between Established Firms and NTBFs

How Technology Travels from Old to New Firms: The Role of Employees’ Entrepreneurship in Technology Ventures 263
Matteo Landoni and dt ogilvie

Cooperating with Start-ups as a Strategy: Towards Corporate Entrepreneurship and Innovation 283
Stephan Jung

Index 299

List of Contributors

Hanna Aginskaya School of Management, University of Sao Paulo, Sao Paulo, Brazil

Belarusian Economic Research and Outreach Centre, Minsk, Belarus

Reza Asghari Technical University of Braunschweig, Braunschweig, Germany

Guido Baltes Lake Constance University, Konstanz, Germany

Maksim Belitski Henley Business School, University of Reading, Reading, England

Vladyslav Biloshapka Kyiv National Economic University named after Vadym Hetman, Kyiv, Ukraine

Jörn H. Block Faculty of Management, Trier University, Trier, Germany

Erasmus Institute of Management (ERIM), Erasmus University Rotterdam, Rotterdam, The Netherlands

Mark Chernenko Kyiv National Economic University named after Vadym Hetman, Kyiv, Ukraine

Gonzalo Díaz Universidad Nacional Andrés Bello, Santiago, Chile

Christian Fisch Faculty of Management, Trier University, Trier, Germany

Erasmus Institute of Management (ERIM), Erasmus University Rotterdam, Rotterdam, The Netherlands

Jan-Martin Geiger Faculty of Business and Economics, TU Dortmund University, Dortmund, Germany

Stephan Jung WeXelerate GmbH, Vienna, Austria

Marc König Lake Constance University, Konstanz, Germany

Britta Kokemper Technical University of Braunschweig, Braunschweig, Germany

Ronald Kriedel Faculty of Business and Economics, TU Dortmund University, Dortmund, Germany

Katherina Kuschel Lazaridis School of Business and Economics, Wilfrid Laurier University, Waterloo, ON, Canada

Universidad Tecnológica Metropolitana, Santiago, Chile

Juan-Pablo Labra Universidad Nacional Andrés Bello, Santiago, Chile

Matteo Landoni Icrim Center of Research, Università Cattolica del Sacro Cuore, Milan, Italy

Andreas Liening Faculty of Business and Economics, TU Dortmund University, Dortmund, Germany

Christian Masiak Faculty of Management, Trier University, Trier, Germany

Arash Najmaei Sydney, Australia

dt ogilvie Saunders College of Business, Rochester Institute of Technology, Rochester, NY, USA

Oleksiy Osiyevskyy Entrepreneurship & Innovation, Haskayne School of Business, University of Calgary, Calgary, Canada

Nicolas Pary iCite Research Center, Solvay Brussels School of Economics and Management, Université libre de Bruxelles, Brussels, Belgium

Ivan Rakonjac Faculty of Project and Innovation Management, Educons University, Belgrade, Serbia

Sabrina Schork HYVE - The Innovation Company, Munich, Bavaria, Germany

Vesna Spasojević Brkić Faculty of Mechanical Engineering, University of Belgrade, Belgrade, Serbia

Orestis Terzidis Karlsruhe Institute of Technology, Karlsruhe, Germany

Christina Ungerer Lake Constance University, Konstanz, Germany

Leonid Vogel Karlsruhe Institute of Technology, Karlsruhe, Germany

Olivier Witmeur iCite Research Center, Solvay Brussels School of Economics and Management, Université libre de Bruxelles, Brussels, Belgium

Aksana Yarashynskaya Jonkoping International Business School, CEnSE, Jonkoping, Sweden