Entrepreneurship, Cooperation and the Firm

In memory of Gerhard Lasch, best of all fathers, who passed away before this book was published.

Entrepreneurship, Cooperation and the Firm

The Emergence and Survival of High-Technology Ventures in Europe

Edited by

Jan Ulijn

Jean Monnet Professor of Innovation, Entrepreneurship and Culture, Eindhoven University of Technology, The Netherlands

Dominique Drillon

Associate Professor of Management, Director of the Research Department, GSCM-Montpellier Business School, France

Frank Lasch

Associate Professor of Entrepreneurship and Assistant Director of the Research Department, GSCM-Montpellier Business School, France

Edward Elgar
Cheltenham, UK • Northampton, MA, USA

Published by
Edward Elgar Publishing Limited
Glensanda House
Montpellier Parade
Cheltenham
Glos GL50 1UA
UK

Edward Elgar Publishing, Inc.
William Pratt House
9 Dewey Court
Northampton
Massachusetts 01060
USA

A catalogue record for this book
is available from the British Library

Library of Congress Cataloging in Publication Data
Entrepreneurship, cooperation and the firm : the emergence and survival of high-technology ventures in Europe / edited by Jan Ulijn, Dominique Drillon and Franck Lasch.
p. cm.
Includes bibliographical references and index.
1. High technology industries—Europe. 2. High technology industries—Europe—Management. 3. Enterpreneurship—Europe. 4. Technological innovations—Europe. I. Ulijn, J. M. II. Drillon, Dominique, 1952– III. Lasch, Frank, 1968–
HC240.9.H53E68 2007
338′04094—dc22
2006034539

ISBN 978 1 84542 709 2

Printed and bound in Great Britain by MPG Books Ltd, Bodmin, Cornwall

Contents

Contributors

Michael C. Brennan Faculty of Business and Management, Lecturer of Strategic Management, University of Ulster at Jordanstown, Newtownabbey, Northern Ireland.

Vincent Calay Researcher, Institute of Environmental Management and Land-Use Planning (IGEAT), Free University of Brussels, Belgium.

Dominique Drillon Associate Professor and Director, Research Department, GSCM-Montpellier Business School, France.

Mateja Drnovšek Assistant Professor of Entrepreneurship, Faculty of Economics, University of Ljubljana, Slovenia.

Gerhard Fink Professor, Jean Monnet Centre of Excellence, EuropaInstitut, University of Vienna, Austria.

Hans T.W. Frankort PhD Candidate in Strategy, Department of Organization and Strategy, Faculty of Economics and Business Administration, University of Maastricht, The Netherlands.

Ulrich Graute PhD, Director, Joint Technical Secretariat EU Community Initiative INTERREG III B CADSES Neighbourhood Programme, Dresden, Germany.

Aard J. Groen Scientific Director, Nikos (Dutch Institute for Knowledge Intensive Entrepreneurship), University of Twente, The Netherlands.

Jean-Luc Guyot Scientific expert, Walloon Institute of Evaluation, Future-Planning and Statistics (IWEPS), Namur, Belgium.

Johannes Halman Professor in Innovation Processes, Faculty of Engineering, University of Twente, The Netherlands.

Reinier Heerink Student of Business Administration and Technology, University of Twente, The Netherlands.

Paul Kirwan PhD Researcher, Nikos (Dutch Institute for Knowledge Intensive Entrepreneurship), University of Twente, The Netherlands.

Monika Klinar Internet Manager, Business Daily Finance, Ljubljana, Slovenia.

Patricia Kotnik Assistant Professor, Centre for Entrepreneurship Development, Faculty of Economics, University of Ljubljana, Slovenia.

Frank Lasch Associate Professor in Entrepreneurship and Assistant Director, Research Department, GSCM-Montpellier Business School, France.

Frédéric Le Roy Professor, ERFI/ISEM, University of Montpellier and GSCM-Montpellier Business School, University of Montpellier, France.

Pauric McGowan Director, Northern Ireland Centre for Entrepreneurship, University of Ulster at Jordanstown, Newtownabbey, Northern Ireland.

Valentina Nahtigal Bsc Danfos Trata LLC, Ljubljana, Slovenia.

Marko Pahor Assistant Professor of Statistics, Faculty of Economics, University of Ljubljana, Slovenia.

Janez Prašnikar Professor of Economics, Faculty of Economics, University of Ljubljana, Ljubljana, Slovenia.

Karl-Heinz Rau Professor of Business Information Systems, Faculty of Economy and Law, University of Pforzheim, Germany.

Lorraine M. Uhlaner Director, European Family Business Institute, Erasmus School of Economics, Erasmus University Rotterdam, The Netherlands.

Jan Ulijn Jean Monnet Professor of Innovation, Entrepreneurship and Culture, Department of Organization Science and Marketing, Eindhoven University of Technology, The Netherlands and Department of Aerospace Management and Operation, Delft University of Technology, The Netherlands.

Frank Umbach Data Warehouse Designer, Business Intelligence Center, O^2, Munich, Germany.

Maaja Vadi Professor, Chair of Management, Faculty of Economics and Business Administration, University of Tartu, Estonia.

Aleš Vahčič Professor of Economic Policy and Entrepreneurship and Chairman of the Department of Entrepreneurship, Faculty of Economics, University of Ljubljana, Slovenia.

Peter van der Sijde Senior Researcher, Nikos (Dutch Institute for Knowledge Intensive Entrepreneurship), University of Twente, The Netherlands.

Vareska van de Vrande PhD Candidate, Faculty of Technology Management, Eindhoven University of Technology, The Netherlands.

Gilles Van Hamme Researcher, Institute of Environmental Management and Land-Use Planning (IGEAT), Free University of Brussels, Belgium.

Rebekka Vedina PhD Candidate, Faculty of Economics and Business Administration, University of Tartu, Estonia.

Arjen Verhoeff AWVN (General Employers' Association), The Netherlands.

Moniel Verhoeven SKF Industrial Division, Marketing Research, The Netherlands and Belgium, St Quentin-en-Yvelines, France.

Ingrid A.M. Wakkee Assistant Professor, Faculty of Social Sciences, Free University of Amsterdam, The Netherlands.

Saïd Yami Associate Professor, ERFI/ISEM University of Montpellier, France.

Acknowledgements

First, we should like to acknowledge the Montpellier Business School (Groupe Sup de Co Montpellier – France, GSCM) for their generous support which made the launch of the research group SURVIE possible and hence the initiative for this book by the present editors. Headquartered in Montpellier (France), aiming at cooperation on entrepreneurship issues across multilevel cultural borders, SURVIE (Start Up Research and Valorization/Valuation of Intra- and Entrepreneurship in Europe), was created in 2004. The first meeting was held in Montpellier in March 2005. Some of the best papers presented there have been revised and included as chapters in our book. Others were added because they fitted well in the scope of our topic, in particular those by Calay et al., Johannes Halman et al., Ulrich Graute, Ingrid Wakkee et al., Janez Prašnikar et al. and Kirwan et al. Other authors, such as Gerhard Fink, joined to strengthen the professionalism of our team. We are all very grateful to their dedication and commitment to this difficult enterprise.

The production of a rigorously edited and peer-reviewed book serving beginning and experienced scholarly communities in this field and also beginning and advanced entrepreneurs and innovation managers and policy makers at the same time is, if possible, a team venture. Apart from our own intrinsic motivation and drive to finish the job, we have been extremely fortunate in having the strong support and encouragement of the following external reviewers to make this book possible: Fritz Fahrni, HSG University of St. Gallen and ETH Swiss Federal Institute of Technology, Zurich (Switzerland); Louis-Jacques Filion, Bombardier Chair of Entrepreneurship HEC, Montreal (Canada); Gerhard Fink, Wirtschaftsuniversitaet, Vienna (Austria); Victor Gilsing, Eindhoven University of Technology (The Netherlands); Gianni Guerra, Politecnico de Torino (Italy); Rajesh Kumar, Aarhus School of Business (Denmark); Herman Van den Bosch (Open University, Heerlen, The Netherlands); Wim Vanhaverbeeke, Hasselt University (Belgium) and Eindhoven University of Technology, The Netherlands; Federico Sarti, Incubator I3P, Politecnico de Torino (Italy); Jürgen Schmude, Regensburg University (Germany); George Tovstiga, Henley Management College (United Kingdom); Hans Wissema, Delft University of Technology (The

Netherlands); Joost Wouters, Eindhoven University of Technology (The Netherlands); and Saïd Yami, Montpellier I University (France).

The production of a multi-authored work is inevitably something of a tense activity over an extended period, and the editors wish to thank all the contributors for their strong commitment and Matt Pitman from Edward Elgar Publishing for his valuable support and patience in allowing yet another delay for, we hope, an ever-increasing quality. Indeed, in producing this book on cooperation, we ourselves have experienced a strong sense of cooperation.

Special thanks go to Mike Brennan, who helped us to improve the quality and contents of some of the chapters of this book.

Jan Ulijn, Dominique Drillon and Frank Lasch

Foreword

Europe stands at the crossroads. Its performance in the globalized economy has to match that of its global competitors, either in the developed world or in the high-growth emerging economies. In order to stop losing its competitive advantage, time has come to reform the European economy. We cannot and do not want to compete on low wages, or on low environmental or labour standards. Europe has to use its main asset knowledge and the potential it has to create markets for knowledge and technology-intensive goods and services. This potential can only be fully realized if we can get the framework conditions for research and innovation right and bring more coherence into all policies that operate within the knowledge triangle: education, research and innovation. The book you are about to read offers some very powerful insights into the link between entrepreneurship, industrial cooperation and the emergence of high-tech companies in Europe. It deals with the very essence of the potential that Europe can and should use in order to increase its competitiveness and retain at the same time its quality of living. The book rightly points to the link with the national economic culture that conditions the emergence of entrepreneurship. I cannot but underline that entrepreneurship represents a pre-condition for Europe's success. High-tech entrepreneurship is the very essence of a knowledge-intensive approach that Europe needs to develop. Of course, the emergence of a high-tech venture is not enough in itself. What is necessary, is to ensure that these ventures survive the initial period of their operation. Public policy has a very important role to play in this respect. It needs to provide favourable macroeconomic framework conditions and ensure a sound policy mix of various economic policies such as those in competition, industrial and fiscal areas. Only then can entrepreneurship, in particular the high-tech one, be given the necessary boost that will drive the economy upwards.

I am confident that policy makers in Europe will find this book a useful tool in designing such policies.

Janez Potočnik
EU Commissioner for Science Policy

Introduction*

Jan Ulijn, Dominique Drillon and Frank Lasch

FIRST COMMENTS

This book, *Entrepreneurship, Cooperation and the Firm*, is the result of a network of European scholars, practitioners and members of public institutions interested in the critical issues of emergence and survival of technology and knowledge-based firms. The authors are drawn from eight European countries and one from the United States. They represent 14 universities, three research or public institutions, one global firm and one incubator for high-tech start-ups. At the start of the third millennium, the European Union (EU) faces a number of critical challenges linked to its capacity to master economic, social and environmental change. Against this background, some key figures inform the reality in which entrepreneurship takes place in Europe. The 25 member states have a combined population of some 460 million people (Eurostat, 2004), exceeded only by China and India in terms of population. However, despite the EU being the most important economic region in the world with a trade surplus of €74 billion (ibid.) there are significant challenges facing the Union.

The average unemployment rate, for example, is above 9 per cent (Eurostat, 2003) involving more than 15 million people. This average masks sharp spatial disparities: the range goes from 3.5 per cent in countries like the Netherlands or Luxembourg to nearly 20 per cent in Poland. This index (as defined by the International Labour Organization), has been increasing since February 2005, after a period of stabilization and amelioration (Eurostat, 2005). Not only is the overall unemployment situation critical,

* Throughout this book many different terms are used for the same concept. 'High-technology ventures' in the title corresponds to: 'high-technology start-ups' (Chapter 1), 'high-tech ventures' (Chapter 5), 'technology or techno-start-ups' (Chapter 7) and 'high-tech start-ups' (Chapter 9). This is not only because of a need for stylistic variation in the use of synonyms, but it also fits with the reality of the jargon used with regard to this concept. We have respected the use of those synonyms, because where a particular term has been adopted the different authors generally give clear definitions with regard to their own research data, however, the reader will find complete coverage of the different terms for further study in the index. Basically those terms are mutually inclusive semantically, except 'techno-start-ups', which might also refer to low-tech companies.

but the amount of insecure employment is also rising in the EU. Job flexibility has become a pressing reality for firms and companies.

Another paradox characterizes the EU: despite the growth of GDP (6 per cent in 2004), poverty continues to be present. Using the official definition of poverty of the European Commission, some 68 million inhabitants live in conditions close to the level of poverty. A high unequal distribution of produced wealth is one economic challenge that the EU has to face, and sharp spatial disparities concerning the issue of poverty between the member states emphasizes this situation. Depending on the average income in a member state, the level of poverty varies strongly in the EU, from more than €12 000 annual income for Luxembourg to €3000 in Portugal. But poverty is multidimensional – in addition to the economic and financial aspects, another dimension needs to be considered: the difficulty of living a decent life, and having access to basic services (nutrition, health, education, accommodation and so on). Moreover, a new phenomenon is appearing: people in employment, but whose salary is insufficient to enable them to afford decent accommodation or housing.

The EU displays continuing employment losses in different industries, especially 'traditional' ones like textiles. Those jobs are often relocated internationally into other, 'periphery', regions. The concerned governments and institutions can barely conceal the extent of the phenomenon. Even if in some rare cases government action moderates the tendency of relocation, this economic challenge will be part of the EU economic situation in the coming decades. The social consequences are important, sometimes dramatic. The responsibility of the companies (managers, shareholders) is directly concerned with crucial decisions in terms of investments or relocation. Compared to 'traditional' industries, which are under a constant threat of relocation, companies with a high added value, characteristic of innovation and knowledge-based industries (high-tech ventures, aerospace engineering, biotechnologies and so on) seem better able to resist the drift to low-cost regions and remain in core economic regions of the EU.

A positive point is the new firm formation rate of the EU, which remains on a high level and underlines continuing entrepreneurial dynamics despite an unfavourable economic situation. Nevertheless, scholars agree that nearly half of the new firms disappear after five years. For an economy and society that shifts more and more towards a liberal and entrepreneurial model, research can offer a better understanding of the conditions in which emerging and new ventures start up, fail, survive or grow. Scholars agree that entrepreneurship and emergence of new organizations is not only a necessary phenomenon for the renewal of existing firms and industries, but has become a major source of job generation, especially through

small and medium-sized enterprises (SMEs). Since the Birch study (1979) the shift from large company wealth and employment creation to SME job generation dynamics has been empirically demonstrated in the US context. Entrepreneurship in the EU is increasingly associated with the emergence of very small organizations, especially in the service sector or other emerging industries such as information and communication technology (ICT), biotechnology or other innovation and knowledge-based industries. In this context, recent studies stress a number of issues that foster entrepreneurship and especially those of small organizations. Issues such as geographical proximity and cooperation are examples of current and future directions of new research for a better understanding of the process of organizational emergence, survival and growth. Innovation and synergy play a crucial role in regional development and competitiveness (Ritsilä, 1999). In particular, new forms of cooperation, such as strategic alliances, are at the heart of the scientific discussion (Audretsch, 1998; Collinson and Gregson, 2003; Nguen and Vicente, 2003). Scholars argue that cooperation leads to further cooperation (Varamäki and Veslainen, 2003). Indeed, start-ups emerge in a context of coexistence of competition and cooperation (Astley and Fombrum, 1983; Nalebuff and Brandenburger, 1997). Examples of cooperation in the EU on a national level between existing companies are well known and commonly linked to large firms.

The European aeronautic industry, for example, demonstrated an innovation capacity and a willingness to cooperate, resulting in a relatively short time in a high level of international competitiveness. The Concorde project also illustrates a vast technical cooperation between France and the UK, even if the plane was a commercial failure and performed its last flight in 2004. A perfect illustration for a successful cooperation is the Airbus project, which demonstrates that firms with a different culture and size can cooperate successfully in order to become leaders of their industry. Some key points of the Airbus history illustrate this process. In 1969 Airbus started as a French–German initiative to build a 'European' aeroplane. The need to cooperate was the crucial point to compete with the American domination of the industry at this period. France and Germany were the two big 'motors' of the Airbus project that developed to become a European consortium with several companies from different countries (Belgium, Germany, France, the Netherlands, Spain, the UK and so on). The organization now comprises several subgroups, coordinated by only one authority, which is the 'brain' of this great project that guides the different teams.

Of course, it may not be applied generally in others sectors, but this spirit also sets an example for international research projects, like that leading to

the present book. Headquartered in Montpellier (France), aiming at cooperation on entrepreneurship issues across multilevel cultural borders, the research group, SURVIE (Start Up Research and Valorization/Valuation of Intra- and Entrepreneurship in Europe), was created in 2004. The first meeting was held in Montpellier (France) in March 2005, the second in Portoroz (Slovenia) in November 2005 and a third meeting took place in October, 2006. This network started with a 'core' group of scholars belonging to the former 15 EU members (France, Germany, the Netherlands, the UK, including later scholars from Belgium, Austria and Ireland), completed by researchers from countries that recently joined the EU (Estonia and Slovenia) and will enlarge the group with members from applicant countries (Bulgaria, Romania and Turkey) or from Norway and Switzerland as neighbours of the EU. The character of this research network is voluntarily interdisciplinary. All these researchers belong to several disciplines: economics, management, human sciences, education sciences and so on. They have in common an interest for corporate entrepreneurship and the emergence, development and survival of firms, in addition to the contribution of the diverse parts of Europe to a more entrepreneurial economy and society. This is the leading issue that motivated the SURVIE European network, which brings together different viewpoints, findings and research results. This book contributes to this overall aim through its focus as expressed in the title: *Entrepreneurship, Cooperation and the Firm: The Emergence and Survival of High-Technology Ventures in Europe*.

HOW DOES EUROPE COMPARE WITH THE US ON THE EMERGENCE AND SURVIVAL OF HIGH-TECH VENTURES?

Frank Lasch

The previous section presented selected key figures for the contemporary economic situation of the EU in order to point out future challenges and the overall context in which entrepreneurship takes place. The main contribution of this book is to give a deeper insight into a series of issues linked to the emergence, cooperation and survival of European start-ups, especially in the high-tech sector. Before we advance this perspective, we shall briefly outline differences between the conditions met by entrepreneurs in the US compared to those in Europe.

Since the end of the Fordian growth regime, dominated by economies of scale and large-firm value creation, the role of entrepreneurship has

changed markedly to become the major source of new firm and job generation in the US and in Europe. In this context of a shift from economies of scale towards a knowledge-based economy, competitive advantages for SMEs, especially in innovation and knowledge-intensive activities, offer huge opportunities for entrepreneurship for this type of organization. The reversal of the trend was first described by Birch (1979), and since then, SMEs, traditionally considered as being less productive, less efficient, less innovative and making a relatively modest contribution to employment, are at the heart of research and political debate. Several studies about the emergence of small-sized entrepreneurship in the US and Europe confirm the growth of the importance of SMEs on both sides of the Atlantic (Loveman and Sengenberger, 1991; Acs and Audretsch, 1993). Audretsch and Thurik (2002) explain this shift towards SME entrepreneurship with reference to increasing globalization, which requires knowledge-based economic activity. According to Audretsch (2002), like in the US, the decreasing competitiveness of large firms is also a reality in the EU and restructuration has resulted in waves of corporate downsizing in order to preserve the viability of large firms. He points out two possible strategies to maintain competitiveness in traditional industries: increase productivity by means of innovation and technology or delocalize economic activity and employment into lower production cost regions. As a consequence, both strategies would suffer significant employment losses in the domestic economy.

Against this background of decreasing employment in large firms, empirical findings for France, for example, demonstrate the growing importance of small-size entrepreneurship for employment in little more than 10 years. From 1987 to 2001, the percentage of jobs generated by start-ups with fewer than 20 employees rose from 77.6 to 83.6 per cent (Lasch, 2003: 36). The shift from the industry to the service sector is also visible: the part played by the industrial sector in entrepreneurship decreases in the same period of observation from 10.3 to 7.4 per cent, while the business and private customer related services grow from 32.9 to 40.0 per cent (ibid.: 60). One of the most dynamic activities is the ICT sector. In this knowledge-based sector the number of firms in 2001 was 31 200 more than in 1993, and employment rose from 220 000 to 710 000 (ibid.: 93). Nine firms out of 10 in the ICT sector are small-sized service firms.

But while it is generally admitted that most jobs are created in small firms, studies for the different EU member states indicate that the situation in Europe is far more complex than that in the US. Audretsch (2002) presents findings of a large literature review on this issue. In the United Kingdom, for example, similar to the US, small enterprises create most of the new jobs and the job loss rate is lowest for this category. By contrast, in

Sweden, Finland and the Netherlands the high job creation rate of small firms goes hand in hand with the highest rate of job destruction. In Germany, job creation rates linked to small-sized entrepreneurship seem not to be systematically related at all (ibid.: 14).

Closely linked to the question of entrepreneurship intensity is that of performance and survival. A sustainable contribution of entrepreneurship to the employment situation of the domestic economy can only be achieved if the new ventures survive and grow. Audretsch (ibid.: 18) finds relatively little difference between the US and Europe: growth rates are higher for smaller and also for younger enterprises and even lower for small and young enterprises in high-tech industries. In the same way, the likelihood of survival is lower for small and also for younger enterprises and the risk of failure is higher in small and young high-tech industries. Results from France confirm these findings. Lasch (2003) argues that high firm birth rates in the ICT go hand in hand with a high mortality. So, after five years, only 38.7 per cent of the firms in the ICT sector survived, compared to 51.0 per cent in the middle-high technology and 46.3 per cent in non-innovative sectors. Thus young ICT SME firms tend to be extremely fragile, but those that survive create more jobs than new firms in non-innovative industries. Nevertheless, most net job creation is done by a minority of firms that display an extremely high growth potential (ibid.: 137).

These findings indicate that the structural differences of entrepreneurship in Europe are relatively similar to the US, but the most important difference is a difference of levels compared. From our point of view, this major difference is twofold: first, a difference of interest in entrepreneurship as a research field, and, second, a cultural difference mirrored by the high level of entrepreneurship of the US economy compared to the EU.

In comparing Europe with the US, there is a significant time lag in the appearance of entrepreneurship research of more than 10 years. In the early 1980s, the first real entrepreneurship-focused conferences appeared in the US and Babson held its first conference in 1981. Entrepreneurship research starts significantly in Europe in the mid-1980s, but at the same time more than 50 departments and 52 full professors in universities already existed in this field in the US (Katz, 1991). In 2002, Aldrich (2005) counted nearly a hundred US research institutions devoted to entrepreneurship, and the number of endowed chairs in entrepreneurship grew so rapidly that in the 1990s many were vacant for several years.

When we take France as an example of the entrepreneurship research landscape in Europe, we begin to appreciate the huge time lag compared to the US. In France, the first dissertation in management science devoted

entirely to entrepreneurship was published in 1993 (Bruyat) and doctoral research is still a recent phenomenon, with only 22 PhD dissertations between 2000 and 2005 (Paturel, 2004). The first entrepreneurship discussion forums were held in 1993 with the creation of the 'Conférénce Internationale Francophone en Entrepreneuriat et PME', mainly a conference for research on small business studies, PME (Petites et Moyenes Entreprises (Small and Medium-sized Enterprise)). In 1999 the first conference devoted entirely to entrepreneurship 'Académie de l'Entrepreneuriat' took place, and in 2001 the first entrepreneurship journal, *Revue de l'Entrepreneuriat*, was founded. Entrepreneurship articles in the field are mainly published in management journals such as *Revue Française de Gestion*, *Finance Contrôle Stratégie*, *Revue Sciences de Gestion*, *Gestion 2000*, *Management International* and so on, and from an international perspective, French scholars are relatively invisible: barely 10 publications in the three top-ranked entrepreneurship journals have been identified in the last 10 years (*Journal of Business Venturing*, *Entrepreneurship Theory and Practice* and *Entrepreneurship and Regional Development*; Lasch and Yami, 2005). The situation is somewhat similar in other countries, for example, Germany: although the Interdisciplinary European Conference on Entrepreneurship Research, founded in 2003 by German scholars, has become an annual conference with growing importance for European researchers, no journal devoted to the field has yet been set up in Germany.

The second major difference is linked to entrepreneurial culture and displayed by the results regularly achieved by the US each year in the Global Entrepreneurship Monitor (GEM). In the first year of this cross-national comparison of entrepreneurship activity, the US are top ranked with 8.5 per cent of the adult population starting a business (Reynolds et al., 1999: 32). This result underlines the strong entrepreneurial culture, in which the desire to be independent is associated with starting a new business. When we compare the countries that were involved in the GEM project every year during 2000–04, the average entrepreneurial activity index ranks the US in third place behind Argentina and Australia (Acs et al., 2005: 17). The entrepreneurial activity of the US is measured twice as high as the GEM country average (12.4 to 6.9). If we take into account the European countries that have participated each year during this observation period, their entrepreneurial activity is slightly below the GEM average (6.3). For Germany, an average of 6.1 is measured and France has the lowest of all European countries (4.8). These findings are clear indicators of cultural differences in terms of attitudes towards entrepreneurship and point to more or less favourable conditions for entrepreneurship across countries.

But one last point which makes it extremely difficult to compare research results on the critical issues of emergence and survival of high-tech ventures is common to entrepreneurship research in both the US and Europe: the lack of analysis of one sector at a time (Johnson, 2004). So future research should focus more on the analysis of one sector across regions or countries in order to validate or invalidate findings obtained without any industry criteria. Against this background, cooperation of a European research network focusing on the same sector of activity presents a huge potential of contributions to the field.

WHY SHOULD HIGH-TECH VENTURES COOPERATE IN ORDER TO EMERGE AND/OR SURVIVE?

Jan Ulijn

Despite the interesting cross-cultural differences in the emergence and survival of high-tech ventures which this book will describe, the study by Voss (2002) replicating Rokeach's and Schwartz's theory of values (see Vedina et al., ch. 11 in this book), shows that three human values appear to have a strong predictive power towards foundership and business ownership: risk propensity, innovativeness and proactivity. In this respect, the above comparison of the EU and the US, the entrepreneurial nation of the world (not to mention the present and future roles of China, India and Brazil) might indicate a different dealing with those three key factors. There is lot of innovativeness in Europe, perhaps as much as there is in the US, but it does not lead to new businesses to the same extent – for instance, in the different fields of science and engineering, such as biotechnology and aerospace. With a population of more than double that of the US, the EU appears to have fewer risk takers in business (see Groen et al., 2006). Both in the US and the EU, more than 50 per cent of new ventures might not survive their first five years, but the reason is different. The symbol of the Greek goddess of the hunt for the US-based DIANA project might illustrate this. It reflects a strong (female) proactiveness towards a new venture: 'If you have failed, just try it again, Sam'. Investors might even appreciate your persistence in trying your venture again and again, and learning throughout the survival process. What would be the average reaction of a European banker?

The EU defines its own way of attaining the objectives of the Lisbon agreement to become the most competitive and dynamic knowledge-based economy in the world by 2010. What is the rationale behind the SURVIE concept and the title of this book? Apart from the 'E', which

might stand for Emergence, Europe and Entrepreneurship and the 'I' of Intrapreneurship (to bring scientific and engineering results from the research and development (R&D) of multinational companies (MNCs) to the market, which is not the topic of this book (see Menzel, 2007 for a recent study), the 'S' of Survival and the 'V' of Value are essential – values not only as a given token (that is, money or culture), but also as something to develop in a process of Valuation or Valorization.

How can more (high-tech) start-ups bring more value of all kinds to the European and global economy? Is the answer survival through cooperation and beyond that, growth and more wealth for more people in all continents? It is the belief of the editors of this book that this valuation or valorization process needs another mindset, a mentality or culture containing not only the different layers of the concept of culture from the outside to the inside – artefacts, norms, values, attitudes, perceptions and assumptions about self and others – but also on the levels related to one's life cycle, that is, going from a strong national culture exposure through an educational and professional one to a corporate one, no longer in one firm or organization, as was the case before and after the Second World War. See below for further definitions, but this distinction between national, professional and corporate culture (NC, PC and, rather less, CC, because most start-ups still have to develop this; see Ulijn et al., 2001, for a substantiation of those levels in a comparison of 12 Dutch and 12 German firms) is key to the outline of this book, as well as the mutual perception: how are techno-starters, for instance, perceived by the market and the society as a whole and by their peer engineers looking for the job security of a big MNC (and vice versa)? Needless to say, the answer to this question also determines one's chance of emerging and surviving through cooperation with those parties as well (for a study on how different cultures perceive different things, for instance, in looking at the same intercultural business negotiation, see Ulijn and St. Amant, 2000).

Values can also be related to different capitals (see Bourdieu (1986); also referred to in Calay et al., Groen et al. and Kirwan et al., chs 6, 9 and 12, respectively, in this book) and the resource-based view theory outlined by Wernerfelt (1984). A resource can be anything that can be thought of as a strength or weakness of a given firm. Beyond this, Lerner and Almor (2002) perceive the firm as an aggregation of resources (for example, assets, capabilities, organizational processes, firm attributes, information and knowledge) to be controlled in order to conceive and implement strategies that improve its efficiency and effectiveness. Those, in turn, are then translated by management into strengths and weaknesses of that firm. Thus the underlying assumption for the elements of the title of this book is the valuation process through a culture of cooperation on the different layers and

group levels (nation, profession, firm). Survival gives the impression of a defensive attitude of reactiveness, rather than proactiveness, which might be the feeling of many European techno-starters in comparison with their US peers, but once put into the perspective of social innovation in response to technical innovation and related to sustainability, as is outlined in Part II, this might allow us to get away from a rescue syndrome: who is going to help us in our distress?

Therefore, if this book can prove, or at least illustrate, that cooperation alternating with the incentives of the competitive edge of the market might lead to a higher survival rate and ultimately the growth of techno-ventures, how then can we help them to survive and grow? Is help needed and by whom? It might give techno-starters and their stakeholders an insight and awareness into whether to cooperate or go it alone, and if the first is true, with which partner? How important is the role of the individual versus that of the institution of all levels: government, market parties and so on (Part I)? What about the 'helicopter' aspect of cooperation and survival through sustainable growth, viewed through some kind of econo-graphic lens (Part II)? Finally, does the success of the venture depend on his/her cultural background: NC or PC, as Ulijn et al. (ch.1 in this book) seem to indicate? In a broader perspective, how would a cultural level, such as that of nation, gender, profession, sector or region, affect the cooperation and survival of techno-starters (Part III)? Thirty-four contributors from different national cultural areas such as Anglo-Germanic (North America and Northwest Europe: US, UK, Ireland, Austria, Germany and the Netherlands), Latin (Midwest Europe: Belgium and France) and Balto-Slavic (Estonia and Slovenia) (Table 0.1) might provide the right intercultural mutual perception to avoid a biased view of the book's topic. 'Cooperate or become bankrupt' seems to be the issue, that is, cooperate to survive. Can this book substantiate this thesis? First we need some more definitions and research methods to give us some more insight into this question of cooperation, and ways to prove or reject its importance.

Table 0.1 The 34 contributors to the book by national cultural area

National cultural area	Country (number of contributors)
North America (Anglo)	United States (1)
Northwest Europe (Anglo-Germanic)	Austria (1), Germany (4), Ireland (1), Netherlands (10), United Kingdom (2)
Midwest Europe (Latin)	Belgium (3), France (3)
Eastern Europe (Balto-Slavic)	Estonia (2), Slovenia (7)

THE QUESTION OF DEFINITIONS AND METHODOLOGY

Jan Ulijn and Dominique Drillon

This book's title will pretty much bring forward the concepts to define and furnish with some background detail: entrepreneurship (and the entrepreneur), cooperation (and the firm), high-tech ventures (and the relation with technology and innovation), their emergence and survival stages (including sustainability at the institutional level) supplemented by the role of the individual (his/her gender, engineer or scientist) and the context of Europe including its cultural levels, not only among member states, but also professionals, engineers versus marketers and so on). What kind of definitions do we need? One weakness of starting a study by asking for the right definition is to take a lexicographic approach – if you want to define a concept, look up the related term in a dictionary, a seemingly easy choice without too much explanatory force, and it will be split into formal descriptors: other words without necessarily a logic of operation or argumentation behind it. For example, a definition of a bicycle in a dictionary will generally use the bare minimum to coin that term, but never explain how such a machine could be designed, operated by a cyclist or lead to a construction drawing to manufacture it. Similarly in this domain of high-tech ventures and cooperation, operational, strategic or simple working definitions might be more helpful than a 'dictionary' approach. An operationalizable definition of cooperation in Ulijn et al. (ch. 1) might lead to testable hypotheses, a strategic definition of entrepreneurial culture in Vedina et al. (ch. 11) might imply a notion of how to develop entrepreneurship and how to change culture as part of a business strategy. Some key concepts reflected in the title of this book will be reviewed here, but for details the reader is referred to the 12 individual chapters. We deal briefly here with: entrepreneurship and the entrepreneur, cooperation, high-tech ventures in their relation with technology and innovation, their emergence and survival or sustainability. Who is the techno-starter: a man or a woman, a scientist or an engineer; and where is s/he starting in Europe, in which (national or professional) culture?

The field of entrepreneurship and the entrepreneur is a conceptual and terminological jungle of definitions and approaches. Is this because so many disciplines are interested in it? This is not the place for a complete paradigm discussion (see several chapters in Fayolle et al., 2005 and the studies they refer to). What is an entrepreneur? According to Casson (2003: 203) a quite simple working definition might be 'a self-employed owner of a firm', but see Verhoeven et al. (ch. 2 in this book) for other coinages of the term. In

an institutional perspective on entrepreneurship in international business Wai-chung Yeung (2002: ch. 1) lists as main disciplines: development economics studying the relation with economic development (starting with Joseph Schumpeter in 1934); management studies interested in the link with (international) business venturing with international entrepreneurship, as a focus; and history, sociology and anthropology connecting entrepreneurship with business history and ethnicity. It is astonishing how little attention that a discipline such as psychology has so far paid with regard to the (starting) entrepreneur and the phenomenon of entrepreneurship. Kyrö and Kansikas (2005) found in the 337 refereed articles of the 12 top journals of entrepreneurship research that 52 per cent related to business and the firm, while the individual, including his/her relationship with other levels of analyses such as business, society and the economy, was covered by 28 per cent of the studies. Perhaps a meagre 4 per cent was devoted purely to the individual. Possibly this is because of a so-called 'failure' of the relevance of the psychological traits theory as a predictor for successful entrepreneurship, for which the broader context might play a predominant role rather than the relation between the psychology and the culture of the entrepreneurs (Brown and Ulijn, 2004: ch. 1). Nevertheless, since the emergence and survival of high-tech ventures in Europe and elsewhere always starts with the individual, a definition is adopted as a working one for this book, building on the one by Schumpeter, which had already underlined the importance of the individual (Menzel, 2007): 'Entrepreneurship is a process by which individuals – either on their own or inside organizations – pursue opportunities without regard to the alienable resources they currently control'. This book tries to stress the interplay between the individual, economic and social context and group culture with regard to the relevance of cooperation for high-tech ventures in Europe.

The second element of this book's title is cooperation (and the firm). Whereas the firm is further defined as the high-tech venture below, cooperation can take in the institutionalized form of a network, such as that developed by Castells (2004) who makes a cross-cultural and technological analysis of the transformation of our society due to the ever-increasing role of ICT. Between firms it may also imply institutionalized forms of collaboration, such as through strategic alliances. The awareness of a collaborative advantage between firms has led to the necessity to manage collaboration, for which Huxham and Vangen (2005) combine theory and practice and which includes the use of power and the resolution of conflicts, not only by avoiding, fighting, problem solving and accommodation, but above all by collaboration in a win–win situation. This book focuses mainly on the individual/personal level of cooperation which is not stressed very much in the literature, but it does not go as far as teamwork

versatility, for which the Germans and Japanese are famous (see Ulijn et al., forthcoming). It is surprising that studies on entrepreneurship, such as those by Shane (2000 and 2003) and Shane and Venkataraman (2000) pay such little attention to this. Even for technology entrepreneurship, where the relation with R&D teams seems to be clear-cut, the strategic value of cooperation is still ignored, not only in the US (Dorf and Byers, 2005), but also in Europe, for example, in France (Fayolle, 1999 and 2004). There are, of course, exceptions: Rottner and Pickar (2004), draw lessons in interdisciplinary collaboration from the Caltech entrepreneurial fellowship programme in the Los Angeles area. Casson (2003) also sees the entrepreneur as an intermediator and coordinator. Within the dialectics of the proliferation of negotiated environmental agreements in Europe, control is seen as a traditional perspective and coordination as an innovative one (see De Clerq and Suck, 2002). Coordinating, yes, but cooperation goes beyond that. With respect to high-tech ventures or start-ups, the following definition might be a working one, as outlined in Ulijn et al. (ch. 1):

> [A] functional system of activities between the HTSU [high-tech start-up] and one or more outside parties, with the purpose of improving its performance. Note that although the outside party may also benefit, key to this definition is the notion that cooperation, at minimum, benefits the HTSU.

High-tech ventures or high-tech start-ups are defined in this book as young companies whose aim is to produce technologically innovative products, processes and/or services. These firms typically generate a high turnover per employee. For further operationizable definitions, see Ulijn et al. (ch. 1) and Halman et al. (ch. 7). Both definitions complement each other, since Ulijn et al. stress more the firm level by origin, age, technology level, operating mode and digital access, while Halman et al. emphasize the age since foundation, the technology level specified as currently developing or distributing knowledge-intensive products, processes or services but also define the educational level of the founder and a high proportion of working time devoted to R&D (more than 10 per cent). Techno-ventures are strongly related to technology and open innovation, extensively described by Chesbrough (2005; see also Chesbrough et al., 2005) invites cooperation and mutual learning, as a new imperative for creating and profiting from a technology and research paradigm. Interesting examples are campuses where big and small firms together with universities share and jointly develop promising ideas and utilize R&D results in business application, such as at the University of Twente (Enschede) and the Philips R&D campus in Eindhoven (the Netherlands) and Nokia and the Helsinki University of Technology in Finland. In the traditional closed innovation

environment, for instance, at a university, it is considered smart to develop ideas in isolation, and protect the results by patents, which are immediately put on the market. In the open system it is acknowledged that there are also smart people outside, and internal and external ideas can be merged to create a joint business model that can be profitably marketed at a later date. The techno-venture on such an open innovation campus can act as a pressure cooker, where stakeholders are jointly responsible for interaction and partnering for the next 10 years. Beyond that, this rejuvenation stage might lead to a spin-out that is no longer labelled a 'high-tech venture'. As Part II of this book shows, this kind of campus can be enlarged into a national, regional or spatial innovation system and develop technologies in time and space, as Oinas and Malecki (2002), point out. MNCs have to manage technology and innovation for competitive advantage by making a strong collaborative mode part of their strategy, leading to alliances, joint ventures, mergers and acquisitions, as Narayanan (2001) succinctly describes.

It is precisely technology through ICT that brings people together from very distant disciplines and areas of the world, leading to innovation breakthroughs (see Hargadon, 2003): people who would never otherwise have met or influenced each other (see Guptara, 2004 for examples of managers' lives, work and careers in the twenty-first century). Innovation systems become virtual as is nicely exemplified by the present initiative of a virtual European Institute of Technology, where the best research groups in nanotechnology, ICT and aerospace of both universities and industries can cooperate thanks to substantial EU funding, thus meeting the competition from American, Chinese and Indian key research centres but also inviting them to join: if you cannot beat us, join us. Needless to say, high-tech start-ups should be the natural entrepreneurial spin-offs of that cooperation and can play a major role in developing the required mindset or culture, as shown by Ulijn and Fayolle (2004), for instance, with regard to the position of French, Dutch and German entrepreneurial and innovative engineers. As recent issues of *RTD info* indicate (July and November 2005), scientific research still needs stronger international cooperation to bring about more global wealth: out of 13 statements on which to agree in a Eurobarometer survey, the top three linked up with cooperation between different European countries, and between science and industry including a plea for more coordination between the EU member states. This open innovation space of R&D may act as the cradle of techno-ventures not only for Europe but also in other parts of the world, as Wai-chung Yeung (2002) stated when he described the role of transnational entre- and intrapreneurs from different cultures, such as Americans, Germans and ethnic Chinese. However; one should not underestimate the costs of coordination of such

ventures purely on economic grounds. Casson (2003) argues that coordination can be partial as it concerns an individual's own field of competitive edge. So, within certain financial limits, cooperation and coordination should follow the principles of banking.

The last step in defining concepts and giving some background is to examine the emergence and survival stages (including sustainability at the institutional level) of techno-ventures, supplemented by the role of the individual (his/her gender, engineer or scientist) and the context of Europe including its cultural levels, not only among member states, but also professionals, engineers versus marketers and so on. In literature, various measures of performance exist. They range from survival as a basic *conditio sine qua non* criterion, to growth (employment or turnover), investments (total amount; foreign investments as a criterion of internationalization; R&D investments; and so on), innovation or productivity indicators. But each industry, each type of firm or each type of entrepreneur requires a specific selection of adapted performance indicators, and often individual criteria such as personal satisfaction of the entrepreneur are neglected (Lasch, 2003: 140). For this book, which mirrors the diversity of European entrepreneurship research and its huge creativity concerning research issues, methods and approaches, we did not consider it wise to fix upon one definition. The different chapters that deal directly or indirectly with performance use the most frequent ones: survival or employment growth. We choose to use 'sustainability' as a generic term for the performance of new emerging organizations as being the research object of the book, which does not deal with the pre-entry entrepreneurial process.

For the survival stage this book stresses the first five years after start-up in several chapters (Ulijn et al.; Halman et al.). Beyond this and after 10 years, such as in the Bradford case reported by Verhoeven et al., the techno-venture develops and reaches a maturity which marks the perspective of the firms that survived. The term of sustainability can also be used (see Part II). From the point of view of the entrepreneur, survival may also mean continuation, that is in another venture; see, for instance, the studies by La Pira and Gillin (2006), who relate their intuition to their performance, and by Rushworth and Gillin (2006), who describe their personal value systems and motivations in an Australian context. This is again a lesson for Europe where the feeling that one should not start a business if there is a risk that it might fail, is still very much in evidence (see Groen et al., 2006), in particular in Germany and the Netherlands. Interestingly, Inglehart's thesis (1997) about cultural change, tested in 43 societies all over the world and in 55 European regions, shows some parallels with this start-up syndrome in Northern Europe with a secular rational authority and high sense of well-being: why start a business, when you are rich already? North America and

English-speaking Europe believe strongly in the idea that someone who has failed in a start-up should be given a second chance: 'Try it, again, Sam', which corresponds with a high sense of well-being and is halfway between traditional (rooted in religion) and secular-rational authority: do religious values help in starting your own business? Inglehart sees this cultural change as a result of two characteristics of the postmodern society: secularization and individuation, where the continents lagging behind in wealth are trying to get away from traditional authority towards survival. China, South Korea and Japan (the Confucian area), together with the former communist Central and Eastern Europe, are the frontrunners in this process to become rich (see Drnovšek et al. (ch. 3) and Prašnikar et al. (ch. 10) on Slovenia or Vedina et al. (ch. 11) on Estonia). For Inglehart, survival is in opposition to self-expression, meaning that the survivor would give priority to economic and physical security over self-expression and quality of life, would not see him/herself as very happy, would not sign a petition of protest and would be very careful about trusting people. Thus traditional religious values would oppose rational ones. Catholic Europe (Belgium, France, Spain, Portugal, Austria and Italy) is at the crossroads of these two value systems, between survival and well-being and the traditional and secular–rational. To what extent this applies to the survival of the entrepreneur, is not yet clear, but might be the subject of a repeat study. The general cultural context plays an eminent role in the survival of high-tech start-ups and their founders. They might to try to survive because they see in their well-being (and that of their employees) a self-expression or realization towards growth, maturity and wealth.

With regard to whether the founder of a techno-venture is a man or a woman, a scientist or an engineer, and what constitutes his/her personality, see Parts I and III. This has implications for the self-image of the techno-starter in a cultural level of assertiveness and affiliation (see Hofstede in several chapters of this book) and its relation with cooperation. Are women keener on this, because of their higher affiliation value and do engineers who are accustomed to working with project teams do a better job than selfish scientists, who all want the Nobel Prize? Is it also a matter of professional cultural difference?

Moreover, the book has 'Europe' in its title, an element that has already been introduced at the beginning of this chapter in its benchmark with the US (for a solid update on this, see also Audretsch et al., 2002). After two previous books in which one of us was also involved as an editor (Jan Ulijn), this picture is still incomplete with regard to Europe, innovation, entrepreneurship and new business development (Brown and Ulijn, 2004; and Fayolle et al., 2005). Europe is also a perfect example of an original national cultural diversity now more or less merging into one culture, but

preserving some of its original religious underpinnings, as demonstrated above by Inglehart's cultural/religious lens. In addition, it is an example of strong cooperation at the government level, with the EU and the single currency as a result; it also applies across Euroregions, the cooperation policy for which is described by Graute (ch. 8 in this book).

Although culture is a rather broad term, this chapter focuses primarily upon national culture (NC) and in particular, variables developed in earlier research by Hofstede (2001). According to Hofstede, culture can be treated as 'the collective programming of the mind that distinguishes the members of one group or category of people from another' (ibid.: 9); for more details, see Ulijn et al. (ch. 1). What is national culture other than other cultural levels, such as gender, age, profession, region and so on? The problem lies in the definition of a nation, which is mostly rooted in a political entity, and sometimes in ethnicity, such as the Arab nation in an Islamic world which does not make a distinction between state and religion. Hofstede's working definition of a mindset leading to observable behaviour has shown enough operationizable value to also be a yardstick for Europe. Weber (1958) has cited the Protestant ethic to explain the success of Northwestern Europe and North America, while Inglehart's picture depicts the borderland of Catholic Europe (of course), but also of Confucian values. Christian altruism, communion and so on, parallel sharing, empathetic values: '*Do unto others as you would have them do unto you*' (The Bible, Matthew 7:12). These values are at the forefront of Central and Eastern Europe thought in the emerging markets from the Balkans to the Baltic states, of which Dana (2005) gives a survey of surviving and renewed entrepreneurship. How deeply rooted in religious values entrepreneurship can be is well described for China by Young and Ciorzine (2004), who apply traditional Confucian practices of contemplation, self-scrutiny, discussion, reading and cognitive and affective development to contemporary entrepreneurship. Finally one of the principles of Islamic entrepreneurship as a work ethic in the Koran is cooperation (see Ali, 2005). Usury and interest as bank income are forbidden. The knowledge economy seems in line with old Islamic values: seek knowledge from the cradle to the grave. Muslim countries, such as Malaysia, Singapore and Indonesia, are doing well in this respect. Asians are keen to learn, and China and India will educate thousands of engineers with entrepreneurial talents and a cooperative spirit in the coming years. The female 'yin' means collectivism and cooperation, while the male 'yang' means individualism and competition which form a whole. Techno-starters will no longer be an exclusive phenomenon of the western part of the world and Japan, as has long been the case.

A similar holistic approach brings Dana (2006) to a proposal of a symbiotic entrepreneurship for the eurozone, and a reward for the introduction

of the European single currency. It seems to be an excellent substantiation of the ideal European business cooperation: let the Italians and the French design the product, let the Germans (or Swiss) manufacture it and let the Dutch (or the English) sell it. Europe might grow as a multicultural society not only by admission of non-Christian-based new member states, such as Turkey (Muslim) and (eventually) Israel (Jewish), but also through the migration flows from the 1960s that showed a large influx of cultures from countries such as (in order of decreasing numbers): India and Pakistan (mainly to the UK), former French West and North Africa (to France), Turkey (mainly to Germany and the Netherlands) and China (to all of Europe). This will increasingly be a source of Islamic, African and Chinese ethnic entrepreneurship – why not start your own techno-venture as part of the movement? This implies that the cultural/religious values as depicted by Inglehart might smoothly merge Confucian, Islamic and Christian (Protestant, Orthodox and Roman Catholic) values underlying a European entrepreneurial and innovative culture. Thus the survival, growth and maturity of techno-ventures might include not only the creativity of the individual, which is so much vaunted by the West, but also the commitment of a team, a family and so on, originating from eastern parts of the world. No longer just the US, but also Europe might serve as the playground for this. Is this view too optimistic? The EU and its individual member states might encourage techno-ventures, much more than it has done so far; protection by social security is largely unfair to start-ups which have to deal with too many rules and risks caused by government regulations at all levels: EU, state, province/department, EU region and so on. Social innovation in this sense might support technical innovation, which badly needs prosperous techno-ventures.

Finally, as indicated above, there is one cultural level out of the three generally distinguished (Ulijn et al., 2001) that has often been overlooked and might easily overrule the effect of corporate culture (not yet present in a techno-venture, unless as some heritage from the past of the founder) or even national culture as outlined above: that is, professional culture. What is it? Sirmon and Lane (2004: 311) define it as follows:

> A professional culture exists when a group of people employed in a functionally similar occupation share a set of norms, values and beliefs related to that occupation. Professional cultures develop through the socialization that individuals receive during their occupational education and training.

It is an old concept which Berry (1994: 81) in his ecology of individualism and collectivism dates back to early humankind as a subsistence or survival phenomenon: gathering, hunting, with a collectivistic peak in

agriculture, followed by the industrial era with decreasing social conformity and increasing individualism. Those sectors of human activity also mark stages in professional culture development. Engineering in itself already conceals so many fields of specialization, as has been shown by Delinchant et al. (2002) and Legardeur et al. (2004) in some French cooperative design projects. In the design of both an electro-mechanical plunger and of sheet moulding compound composite material in the automotive sector, cross-disciplinary cooperation between different engineering disciplines appeared to be essential. A typical techno-venture struggles immediately with the question of the market, which is definitely the domain of a different professional culture from that of the average engineer: marketing (for a clear delineation, see Ulijn and Weggeman, 2001). Cooperation in a techno-venture between engineering and marketing cultures might be more important for survival than any European (national) cultural differences.

How should we answer the question posed in this introductory chapter: how can entrepreneurship and cooperation help more high-tech ventures in Europe to emerge and survive? In the next section we shall search for some underlying conceptual model or guiding principle for this book; once the definitions have been established, we can try to operationalize them using some available methods. It is remarkable that in a recent survey by Coviello and Jones (2004) of international entrepreneurship research reported in leading journals (55 in total in the 1989–2002 period), Europe is poorly represented or at least gives a disparate picture with six UK studies, plus Slovenia, Portugal and Finland (one each), 15 focus on the entrepreneur as the unit of analysis (32 on the firm), none on start-ups and five on potential entrepreneurs. The authors make a plea for a multidisciplinary approach combining positivist and interpretivist methods and reconciling static and longitudinal procedures and making more cross-national and replication studies. Similarly the Kyrö and Kansikas (2005: 141) overview of 337 articles in basically the same journals over the years 1999 and 2000 (cited above), estimates percentages for the whole field of entrepreneurship research (not only international): theoretical and model studies accounted for 11 per cent, qualitative ones for 11 per cent and quantitative in the wide sense for the rest. It is clear that to increase the ecological validity of such studies, more qualitative methods would be welcome, such as discursive description (68 per cent in the Kyrö and Kansikas sample) and case analyses for which Dana and Dana (2005) make a plea (21 per cent), but also narratives, ethnography and historical description.

This book covers a wide variety of methods, with the stress on qualitative ones, for instance through case studies which, according to Bhalla et al. (2005), allow for a multiparadigm perspective in entrepreneurship research. But, especially in Part II, two chapters use quantitative–empirical

approaches based upon secondary data, which illustrates that there are both (a) various methods for analysing one research issue at a time, and (b) specific methods that are more adapted to deal with certain themes.

The attempt to answer the question 'can cooperation help techno-ventures to survive?', has to be tentative because most of the methods and the theoretical framework are still to be developed. Case studies and narrative approaches, such as in Verhoeven et al., Wakkee et al. and Kirwan et al. (chs 2, 9 and 12, respectively) (most studies of Parts I and III have elements of this methodology) can hardly prove anything. Some empirical evidence from econometric/sociological/survey-based studies, such as in Ulijn et al., Drnovšek et al., Brennan and McGowan, Halman et al. and Vedina et al. (chs 1, 3, 4, 7 and 11, respectively) can give some indications. In all we have to be prudent about generalizations and the aspiration of this book can only be to illustrate that cooperation in the specified and described cases in our chapters helps techno-ventures to survive. It is probably the best bet after all, although the autonomous *Einzelgänger* (lone wolf) might be an attractive role model for some techno-starters. We could not find any evidence to suggest that this would be an easy way to arrive at sustainable results for a techno-venture.

AN UNDERLYING CONCEPTUAL MODEL OR GUIDING PRINCIPLE

Jan Ulijn

Most empirical studies have some underlying (applied) conceptual model and most of the individual chapters are no exception to this. Within the framework of cooperation between high-tech ventures in Europe this book might have one as such, but unfortunately again it cannot endorse this ambition of one conceptual model, since the subject matter covered in the title still has too many intangibles. We can only refer to some elements in the chapters which may serve as building stones for a future attempt. There are roughly three lines of thought in this matter:

1. Possible factors of the effect on cooperation between techno-ventures at a given stage, pre-foundation, emergence, survival, growth and maturity (specified in the particular chapters) should be considered.
2. Cooperation, support and skills of techno-starters are needed throughout the above life cycle from a longitudinal perspective, where the survival/growth limit has been defined as about six to ten years from the start-up.

3. The 'model' should include the effect of cooperation (or not) on the survival of the start-up at the above limit, as an independent variable for which to control.

First, the following factors of the effect on cooperation between techno-ventures are dealt with at a given stage of their life cycle: the role of the personality of the founder at the maturity stage in Verhoeven et al. (ch. 2). Some nations show more latent or potential entrepreneurship than others. As seen above, Americans show more willingness to take the risk of starting a business (see Groen et al., 2006). This might be due to an NC effect in Ulijn et al. (ch. 1) (until the survival stage), Lasch et al. (ch. 5) (within one country, France), Vedina et al. (ch. 11) (within the multicultural society of Estonia), Calay et al. (ch. 6) (within one region as part of an NC: Wallonia, part of Belgium) and Halman et al. (ch. 7) who present a comparison of European regions or countries: Eindhoven, the Netherlands and Darmstadt, Germany (to the survival level) and Chapter 12 which does so with Slovenia and Germany (but now at the growth and maturity level). Two chapters deal with the PC effect: Wakkee et al. (ch. 9) and Prašnikar et al. (ch. 10), where the common ICT sector seems to override the NC effect of Slovenia versus Germany. In Ulijn et al. there is a link, since in the larger study than that reported here, cross-functional experience was related to cooperative strategy and acceptance of a dissimilar partner, as a sort of PC dimension. Culture can also be seen as capital to be accumulated in the classic financial and technical types in the Bourdieu (1986) sense: economic and strategic, to be supplemented by social to establish and develop the venture. Chapter 10 highlights this effect at both the pre- and post-foundation stages. In Chapter 6, by 'human capital' Calay et al. probably imply something preliminary to social and cultural. Finally regional/support effects are assessed in more detail through the context of incubators (Slovenia in Drnovšek et al. (ch. 3), the university–industry interface in Northern Ireland in Brennan and McGowan (ch.4)) and the effect of the European regionalization policy on cooperation in Central and Eastern Europe (Graute, ch. 8).

Second, this book does not deal with the pre-founding stage leading to the emergence of the start-up for which Ulijn and Fayolle (2004) propose a model based upon Ajzen's (1991) planned behaviour theory. A business start-up model would include a filter process fed by motivation, a raw idea, perhaps recycled up to six times, validation of the idea, scaling and looking and negotiating for resources before it comes to a launch. Possibly after family funding in its design phase, a 'valley of death' might appear with regard to the development and start-up phases: who is going to invest in the validated idea? Beyond this survival stage, venture capital is often available

to bring the firm to the growth phase, ultimately leading to the mature phase, where the firm may be sold or go public on the open market. The different stages require skills or personality traits of techno-starters throughout the above life cycle from a longitudinal perspective, such as creativity, drive, empathy and persistence at the start-up, courage and risk orientation, ability to reflect, strategic orientation and leadership and communication together with reliability and decisiveness, and personal values that subsist at the maturity level: reliability, decisiveness, persistence and determination (Dutch Ministry of Economic Affairs, 2001; see also page 1 of the introductory section). Both Verhoeven et al. (Chapter 2 of this volume) and Wakkee et al. describe Dutch cases in a longitudinal perspective, one from aerospace and two from electrical and physical engineering.

Finally an applied conceptual model should include the effect of cooperation (or not) on the survival of the start-up at the above age limit of six to ten years before the growth stage beyond the valley of death. All chapters deal with this key factor of success either explicitly or implicitly. The level of operationalization and empirical evidence is still in a stage that is too kaleidoscopic or exploratory to be conclusive, as has been inferred earlier. Ulijn et al. are probably the most specific on this one: how will the individualism and masculinity of the selected sample countries in 109 techno-starters affect their willingness to cooperate and accept a dissimilar partner? Interestingly six chapters (Ulijn et al., Verhoeven et al., Drnovšek et al., Calay et al., Halman et al. and Kirwan et al.) also report some findings on support as a form of a one-way cooperation which is generally not perceived as very positive in its effect on success. This might come as a surprise with all the government subsidies at all levels through incubators and academic help: the baby might be overincubated in its cradle!

What is the rationale behind the three parts of this book and how do they relate? If techno-starters are asked what their motivation is (Wissema, 2004), they say (in order of decreasing importance):

- I want to take responsibility for my own future (53 per cent);
- I relish the challenge of doing it alone (52 per cent);
- I want to be my own boss (48 per cent);
- I have a unique idea (43 per cent);
- I want to make more money (28 per cent);
- I am unhappy in my job (19 per cent), (Hofstede et al., 2004 mention dissatisfaction as a reason for self-employment: 25 per cent);
- I want flexible working hours (8 per cent); and
- I am unemployed (6 per cent).

This seems to be a rather selfish approach, not at all related to cooperation, but at the same time Wissema reports (personal communication), that most of the Delft University start-ups begin with two people at least, after a beer or so, as a team of friends who are likely to split up within four years, largely before the age of survival. Why is this? Is the role of the institutions from which those individuals come, the broader economic and market context and above all culture towards self-employment underestimated? To help more high-tech ventures in Europe to emerge and survive, a distinction between the individual and his/her context is very important (Parts I and II), but this is not easy, because there is overlap, as the distribution of our chapters over the book shows. Two comparisons of European regions therefore end up in different parts, Halman et al. in Part II and Prašnikar in Part III, because of difference in focus (geography in Part II versus culture in Part III). Part I focuses on the individual or person of the techno-starter, Part II presents a helicopter view and Part III brings in the other mindset, a set of values of different cultural levels needed to cooperate to survive, if we can prove or at least illustrate this point to an acceptable level. What is the role of the individual versus that of the institution (Part I)?

What different levels of intelligence are needed: cognitive/rational, social, emotional? What does the psycho-analytical approach teach us (Kets de Vries, 1980 and 1995)? What are the econo-geographic aspects of cooperation and survival (Part II). Cooperation, networks, local proximity effects and knowledge spillovers play an important role in national and regional innovation systems (geographical entities), as Fornahl and Brenner (2003) illustrate in a series of studies.

What are the cultural levels of nation, gender, profession, sector and region in emergence, cooperation and survival (Part III) in a cumulative effect? Techno-starters begin as an individual or with one or more partners, and face the broader econo-geographic context and the culture which surround them. They grew up in a country and hence have learned its NC value, undertaken their education, perhaps with some professional practice, and through this acquired a PC. If they worked with a company some years before the foundation of the venture, then they have also had some exposure to the CC values of that firm. Given the scope of this book it is impossible to cover all relevant cultural levels to the same depth. The effect of NC on cooperation between techno-starters is dealt with primarily, then comes the region in Drnovšek et al., Brennan and McGowan, Lasch et al., Calay et al., Halman et al., Graute and Kirwan et al., unfortunately not always testing an effect by comparison. Finally comes the professional culture and the sector, mostly ICT (in Lasch et al., Kirwan et al. and Prašnikar et al.), nano-, bio- and laser technology (in Kirwan et al.,) and services versus others at some level in Ulijn et al. Some attention will be

given to the effect of gender, but none of our chapters focuses on this aspect exclusively. Theoretical underpinning of this part will be fed mostly by Bourdieu with culture as one of his and others' capitals; by Hofstede et al. (2004) who deal with the effect of NC on the above motivation of a start-up: self-employment out of dissatisfaction in roughly 19–25 per cent of the cases; for the overall distinction between NC/PC and CC by Ulijn and Weggeman (2001); and about relating culture back to personality as discussed in Part I, see Schwartz (1994; and important later work referred to in Vedina et al.). In sum, the rationale for the interlinkage between the three parts of the book is basically that one cannot start a techno-venture without the broader socio-economic context and the underlying culture of both oneself and others. This experience strongly suggests the option of cooperation, even if one prefers to be an *Einzelgänger*, given the need to survive. So the book brings the reader from the individual through his/her context to the culture and back again to the individual on the psychological level.

PART ONE: THE ROLE OF THE INDIVIDUAL VERSUS THAT OF THE INSTITUTION

Dominique Drillon

The previous section presented a wide variety of aspects that are to be considered when a framework or a conceptual model has to be discussed for a book dealing with the crucial aspects of emergence, cooperation and survival. So, when we approach these three main issues, individual, organizational and environmental or cultural factors have to be analysed. Consequently, Part I focuses on the individual and proposes chapters using a new psycho-analytic method to diagnose this with the emphasis on gender or profession (Ulijn et al. and Verhoeven et al.), embedded in the academic environment which may or may not act as a stimulant in the examples of Slovenia (Drnovšek et al.) and Northern Ireland (Brennan and McGowan). Chapter 1 focuses on the aspect of cooperation in the start-up context. Analysing a sample of 109 techno-starters located in five European countries (France, Germany, Sweden, Switzerland and the UK), this explanatory study uses quantitative methods to measure the impact of culture upon attitudes that may or may not predict cooperative behaviour. Chapter 2 explores new assessment methods in applying psycho-analytical and sociological approaches. In the example of a case study (Bradford), the authors are interested in the way cooperation between stakeholders affects the successful or unsuccessful start-up and sustainable performance of a

techno-venture. Chapter 3 gives a deeper insight of the institutional support environment for high-tech entrepreneurs in a transition economy (Slovenia). First, empirical data is mobilized to outline trends and evolution of technology entrepreneurship in Slovenia; second, the authors use survey data (questionnaires) to analyse the efficiency of incubator policy for high-tech venturing. In Chapter 4, the authors focus on the role that universities and academia can play to foster high-tech venturing, especially academic start-ups. From a theoretical perspective, this study explores the interaction between high-tech entrepreneurs and academic institutions and identifies different types of academic entrepreneurs.

In Chapter 1, 'The influence of national culture on cooperative attitudes in high-technology start-ups', by Jan Ulijn, Hans Frankort and Lorraine Uhlaner the main focus is the concept of cooperation by high-technology start-ups and in particular, the influence that culture may have upon attitudes that may predict cooperative behaviour. The research question is: what is the influence of national culture on cooperative attitudes within high-tech start-ups towards (potential) strategic partners, including partners from a different cultural background? The authors propose a definition and discuss past research on culture and economic behaviour. One interesting aspect in past research on national culture is the differing roles these characteristics may play in different phases in a firm's development. First, the authors stress the role of techno-ventures in the European economy and identify the challenges faced by high-tech start-ups. Then, to explore the relationship between culture and cooperation, the authors build a research model that tests a series of hypotheses for a better understanding of three cultural dimensions in high-tech start-ups: individualism, uncertainty avoidance and masculinity. This model is tested on a sample of 109 such start-ups representing 13 European countries and five different cultural clusters. The results point to a negative influence of individualism and masculinity on cooperative attitudes among the start-ups. No support was found for the effect of uncertainty avoidance. In addition, research results show a positive relationship between cross-functional experience and cooperative attitudes, as well as a sector effect. Manufacturers, for example, are not only more likely to report positive cooperative attitudes towards strategic partners but also more willing to acknowledge the value of strategic partners from a different cultural background. These latter findings emphasize the importance of professional and sector experience of individuals. Finally, the authors give some directions for future research. There is a need, for example, to link attitudes about cooperation to cooperative behaviours, to validate the importance of such attitudes more clearly. In the same spirit, other types of national cultural characteristics, such as

postmaterialism (Inglehart, 1997; Inglehart and Welzel, 2005) should also be further explored, and future research should not only focus on attitudes but also deepen the understanding of cooperative behaviours across firms and cultures. Finally, the authors present further implications for EU policy. Facilitating cooperation among firms, for example, is likely to become an increasingly important success factor for high-tech venturing in Europe. The authors also stress that the notion of cooperation, within and between cultural boundaries, is a more comfortable notion for high-tech entrepreneurship for certain countries (those with lower individualism and masculinity) than for others.

In Chapter 2, 'Entrepreneurship in a high-tech venture: psychological and social methods of survival assessment in the aerospace sector', Moniel Verhoeven, Dominique Drillon, Arjen Verhoeff and Jan Ulijn use a case study (Bradford) to analyse the survival and performance of high-tech ventures. New assessment methods based upon psycho-analytical and sociological approaches are used to understand the specificities of this company. The authors point out that it is not merely the technical figures in business development that are important, but also their ability to act as a community and use cooperation to develop their span of innovation. The research question focuses on the cooperation between stakeholders as a necessary condition for a successful start-up of a high-tech venture. In order to describe and analyse the Bradford community, the authors use the narrative approach. The analysis is executed by using two different approaches: the psycho-analytical method and the sociological approach to how communities work. For the psycho-analytical method, new insights are given into how brain functions can be related to cooperation. The sociological approach is based on Robert Nisbet's analysis of communities. The authors stress that in this way not only can the patterns of the individual entrepreneur or the orientations of the community as a whole be described, but also their interaction can be illustrated. The analysis of the Bradford case leads to insight into four basic relations. First, the relation between the (un)conscious motivation of the original founder/entrepreneur Ed Voeten and the current entrepreneurs, Raoul Voeten and Nico van Putten, and the expectations that the employees have developed from an intuitive way of working in a situation where differences in expectation over generations become visible. Second, for some 10 years the relation between those inside the company, who act as a community, has been based on trust within the family of insiders. Gradually this type of trust is changing into a kind of conditional trust over the various generations. Third, the relation between the working community towards the business environment is based on a sound mutual challenge. Fourth, the relation of the working community towards other sections of human society is of a

hybrid character. The management aims to combine profitability with societal spin-off, within a framework of small margins, while the personnel are struggling with the tensions caused by differences in belief systems at work and at home.

A tentative conclusion can be that cooperation between stakeholders is indeed a necessary condition for success in a high-tech venture. In the perspective of this conclusion, the authors have illustrated that the personal traits of the entrepreneur really are relevant to the development of a high-tech venture. A second and intuitive conclusion can be drawn regarding the method that is applied: both the Bradford directors have fully recognized the case description and have acknowledged the precision of the analysis of their personal leadership and the community of practice. Finally, the authors give a series of recommendations. First, cooperation can be seen as a powerful driver to enlarge the span of innovation of a company. A second guideline concerns the need in high-tech ventures to invest in the conditions that favour cooperation. Unlike high-tech 'gadgets' that can be bought immediately at a price, cooperation is a virtue that needs time to develop. Finally, not only can entrepreneurs themselves stimulate the abilities for survival, but also supervisors as well as individual employees play their own role and in this sense they are all part of the venture capital.

The aim of Chapter 3, 'Incubating technology entrepreneurship in Slovenia: do the nation's institutions foster cooperation?', by Mateja Drnovšek, Patricia Kotnik, Valentina Nahtigal, Janez Prašnikar and Aleš Vahčič, is to analyse the state of the art of technology entrepreneurship in Slovenia, which has been demonstrated as the key driver of the output effectiveness of innovation and knowledge clusters in developed Western economies. The authors present first results based upon the exploitation of empirical secondary data to illustrate the evolution and trends in technology entrepreneurship in Slovenia. First, they analyse the most important issues to outline the high-tech entrepreneurship landscape: technology transfer and spin-off firms; the role of high-tech venturing for knowledge transfer; the role of the support infrastructure; enterprise development in general and innovation and technology entrepreneurship in particular; firms' cooperation in the innovation process; cross-border cooperation in research and innovation. Second, the authors describe the development and the pillars of support infrastructure for technology entrepreneurship. Third, the case study of high-tech venturing in the Ljubljana Technology Park completes the empirical part with a qualitative description of the characteristics of the national innovation system, industrial policy measures for high-tech ventures and survey data based on interviews with high-tech spin-off entrepreneurs. The authors identify several obstacles

hampering the existence of an entrepreneurship support environment. First, in order to improve firms' absorptive capacity and their effectiveness in creating innovation output, the quality of human capital has to be enhanced and links with research institutions strengthened. Second, the government should rethink its financial support instruments for high-tech start-up companies. Third, public policies can only be effectively implemented if a social consensus attributing a greater value to entrepreneurship is achieved in the broader society. Finally, the authors argue that although Slovenia has created an extensive entrepreneurship-supportive environment in the last decade which at times even appears overinstitutionalized, its effectiveness will depend on the soft, culture-related determinants of the level of entrepreneurial activity.

Finally, in Chapter 4, 'The knowledge marketplace: understanding interaction at the academic–industry interface', Michael C. Brennan and Pauric McGowan focus on the role that universities and academia can play to promote high-tech venturing. The authors stress that understanding how high-tech entrepreneurs interact with academics and academic institutions is little understood. This is surprising given that such institutions are traditionally perceived as important generators of innovation through discipline-based, mode 1 knowledge production. In addition, such institutions are an important source of well-qualified employees for high-tech and knowledge-intensive firms. The focus of this chapter is at the level of an individual academic institution and the individuals who operate within that institution. The study is based on the premise that policy makers are changing how they view (and fund) such institutions. This change can be characterized as a movement away from perceiving academic institutions as linear suppliers of knowledge, to institutions as being part of a knowledge market. Such a view suggests that interaction between academics and high-tech firms is a complex and recursive phenomenon. The authors proceed in three stages: in-depth interviewing of university managers of innovation and academic entrepreneurs; development of a questionnaire, based on the key themes identified in stage 1; use of thematic characteristics as a practical tool in understanding the nature of academic entrepreneurs in three distinct groups. The key outcome of the study, from a theoretical perspective, is the identification of four types of academic entrepreneur: the hero, the maverick, the broker and the prospector. Each is distinguished on the basis of their relationship with the host university and the way in which they perceive discipline knowledge. For practitioners, both within universities and in high-tech firms, suggestions are made concerning how to interact and engage with academic entrepreneurs in practical ways.

PART TWO: THE ECONO-GEOGRAPHIC ASPECTS OF EMERGENCE, COOPERATION AND SURVIVAL

Frank Lasch

Entrepreneurship is a multidimensional phenomenon and needs to be explored from three main angles: individual, organizational and environmental (geography) factors. Part II focuses on the last point and deals with emergence, cooperation and sustainability from an econo-geographic viewpoint. It demonstrates the importance of considering different levels of analysis to provide a wide variety of findings. Consequently, the first chapter gives a holistic overview of one industry (the ICT sector) of a whole country (France at the aggregate level of labour market areas) and deals with the emergence of a whole industry. In particular, the issue of localization and environmental determinants affecting high-tech entrepreneurship is explored. A second theme of this chapter is sustainability, and it focuses on individual and organizational factors affecting successful organizational emergence. The second chapter uses similar methods (a quantitative, empirical-deductive approach based upon exhaustive secondary data), but deals with a particular type of entrepreneur (novice entrepreneurs) and explains why entrepreneurship activity varies within a region (Wallonia in Belgium). The third chapter differs in scope and method and uses qualitative methods to measure how cooperation and support for high-tech ventures affect successful entrepreneurship. The authors compare a Dutch agglomeration (Eindhoven) with the German Darmstadt region. The last chapter is a theoretical, descriptive contribution that gives a deeper insight into the European institutional context fostering competitiveness and cooperation from a transnational viewpoint, and explores how European economic policy can provide a useful framework for entrepreneurs. This chapter completes the previous academic insight into issues such as emergence, cooperation and sustainability from an institutional viewpoint given by a practitioner from the EU commission.

In Chapter 5, 'Emergence of high-tech ventures in France: how do regional, individual and organizational factors influence birth and sustainability of new firms?', Frank Lasch, Frédéric Le Roy and Saïd Yami present a holistic view of an emerging industry, the ICT sector, in France. Consequently this section is organized in a straightforward way. First, the authors note that the perception of this emerging industry is still incomplete for scholars and economic actors. In particular, the borders of the ICT sector are not clearly defined and the question 'what constitutes an ICT firm?' has to be answered. The definition-finding process has to be discussed in order to quantify the emergence of this young industry. Second,

the localization pattern of the industry reveals sharp regional disparities that raise the question 'why are certain areas more attractive and entrepreneurial than others?'. Third, entrepreneurial opportunities in this emerging industry are linked to high risks and the authors analyse individual and organizational factors of survival.

This empirical chapter is based upon secondary data from the French Institute of Statistics and Economic Studies (INSEE). The dataset is exhaustive and encompasses all new firms founded over the observation period (85 500 firms). The authors use a quantitative approach and their period of observation covers nearly a decade, from 1993 to 2001, which corresponds to the emergence of the whole ICT industry. The aggregate level covers all 348 labour market areas of metropolitan France. In summary, this chapter can be characterized as an empirical multilevel approach, including spatial, individual and organizational variables that form a sort of a triangle framework in which entrepreneurship takes place.

In the first section, which deals with the definition of the industry, the authors give an overview of the definition-finding process over the last decade in France and, based upon what can be called a 'consensual' definition, analyse the quantitative growth and infra-sectoral structure of the ICT sector. The main finding for the first question is twofold. First, the ICT sector is dominated by small-sized organizations related to computer services; only one firm out of 10 belongs to the high-tech industry, which are mostly large firms. It is mainly the service branch that drives the growth of the ICT sector as a whole. Second, the structural analysis of the ICT sector reveals a strong heterogeneity with sharp differences between industry and service activities in terms of new-firm birth dynamics; additionally, the authors note that the sector is characterized by high firm birth rates, but the new firms are of a very small size at start-up.

The second section focuses on the relationship between the local socio-economic environment and entrepreneurship activity. The findings strongly support the thesis that geography matters even for so-called 'footloose' high-tech ventures. The major determinants are proximity effects and knowledge spillovers emanating from already existing ICT firms and the R&D infrastructure. Localization economies prime over agglomeration economies. Other determinants are population growth (increase of the potential of future entrepreneurs and growth of the local market) and the presence of large firms in the local context. These findings, obtained through an empirical deductive approach measured through multiple regression models, clearly show that knowledge transfer and formal or informal cooperation drives high-tech entrepreneurship.

The last section deals with the crucial question of sustainability. A high level of entrepreneurial activity in an area is worthless if the young firms

are not sustainable. Since sustainability is not only a matter of a favourable regional environment offering entrepreneurial opportunities, the authors analyse individual and organizational factors over a five-year period, using a cohort analysis on one firm out of five created in 1994 from the dataset. The main findings indicate that initial organizational factors such as firm size at start-up and financing prevail and affect survival more than the human capital of the entrepreneur. So the choices made for the initial organizational set-up are extremely crucial for high-tech ventures and may help to build predictive models of sustainability.

The contribution of this study for high-tech entrepreneurship research in Europe is manifold. First, the holistic approach to analyse one industry at a time offers a helpful insight into the structure and dynamics of an emerging sector. Second, from a practical viewpoint, the results represent findings on the critical issue of factors affecting entrepreneurship. Thus, the findings are useful for entrepreneurs themselves, practitioners, private or public support infrastructure (finance, government and so on) especially for crucial topics such as localization and sustainability of new firms. Finally, from a methodological viewpoint, the exhaustive dataset, the long time observation period and the fine-grained geographical aggregation level provide extremely robust results.

Chapter 6, 'Are human capital and culture the key factors in explaining intra-regional differences? Novice entrepreneurship and geo-cultural context in the Walloon region', by Vincent Calay, Jean-Luc Guyot and Gilles Van Hamme, focuses less on high-tech ventures but analyses a specific type of entrepreneur. The authors note that few studies in Europe deal with the transition from being a non-entrepreneur to being a novice entrepreneur. The authors explore the value of human capital and culture as explanatory key factors for entrepreneurship as a regionally differentiated process. These determinants are used to explain why certain areas in the Walloon region in Belgium are more entrepreneurial than others. The first section presents the theoretical framework and discusses the impact of different environmental features on entrepreneurship (institutional and economic context, facilities and infrastructure and cultural context). The main objective of this study is to identify infra-regional disparities in terms both of emergence (entrepreneurial activity) and of spatial determinants (human capital and culture). The second section discusses a specific analytical and methodological framework, the concept of principles of action. This concept provides a common interdisciplinary platform for scholars from sociology, geography and economics. This framework refers to the relationship between the agent in his/her strategic and historico-cultural constitution, on one hand, and the situation on the other. The main purpose of this concept is to transcend more 'classical' deterministic constructs.

The authors use exhaustive secondary data collected by the Wallonian governmental institutions. The data cover a three-year period and encompass all firms founded between June 1998 and May 2001 in the Wallonian region. From 12 748 firms, 3257 firms created by novice entrepreneurs were identified. A methodological specificity of this study is a double aggregate level approach on both the municipality and the labour market levels. The main reason for this choice is to enhance the robustness of the results, measured on two different aggregate levels. For the data processing, mainly principal components analysis is conducted.

The findings indicate that spatial diversity of novice entrepreneurship in Wallonia is strongly influenced by the socio-cultural and economic dimensions of the geographical context. The authors measure significant differences between an entrepreneurial Walloon Brabant and a southeast region with a less dynamic central belt. Within urban areas, core–periphery disparities are identified. Entrepreneurship is highest in areas with a high-qualified, high-income population. Areas with a lower-qualified population are less favourable for novice entrepreneurship. So, the emergence of novice entrepreneurship is strongly linked with the socio-economic level. Demographic variables such as age or matrimonial status seem not to affect novice entrepreneurship. In the same way, agglomeration effects (proxied by population density) seem not to have a determinant influence. Conforming to the results of the previous chapter, population growth characterizes entrepreneurial areas. Electoral behaviour, as a proxy for historical–cultural determinants, is found to affect novice entrepreneurship. Positive correlations are measured for centre-right voters and negative ones for socialist voters. In summary, novice entrepreneurship is strongly influenced by the socio-cultural and economic dimensions of the geographical context.

The contribution of this chapter to entrepreneurship research in Europe, in contrast to Chapter 5 (industry criteria analysing one sector), is to explore entrepreneurship based upon a type of entrepreneur criterion. The main finding is that local entrepreneurship as a crucial form of economic growth in a region is strongly influenced by the socio-cultural and economic dimensions of the geographical context. The study is an example of how entrepreneurship research can help regional governments to understand why certain territorial configurations are particularly favourable or unfavourable to novice entrepreneurship.

In Chapter 7, 'The importance of cooperation and support for technology start-ups: a comparison of the Eindhoven and Darmstadt areas', Johannes Halman, Jan Ulijn, Vareska van de Vrande and Frank Umbach show the results of a survey that was held among high-tech start-ups in the Eindhoven area in the south of the Netherlands and in the Darmstadt area in the west of Germany. The authors deal with the crucial topic of

cooperation between and support for high-tech ventures using the examples of a Dutch and a German agglomeration. Since the EU Lisbon agreement in 2000, technology-based start-ups in European regions can count on big support. Although cooperation and networks are needed, the question remains as to what extent this kind of support or cooperation really helps and whether or not it is appreciated by techno-starters.

First, the authors made a pre-selection of potential technology start-ups by using the European classification system (NACE; the same classification as that used in Chapter 5). Only companies that were founded during the last five years were considered in order to meet the overall focus of the book – 'emergence'. Second, the authors proceed with a qualitative approach based upon a telephone enquiry among 86 companies in Eindhoven and 21 in Darmstadt. The enquiry followed a pre-structured protocol by means of a questionnaire which included topics such as characteristics of the company; support received or desired in the future; considerations for starting a business in the local geographical context; problems experienced; and characteristics of the entrepreneur.

The results show that about 50 per cent of the respondents are currently cooperating with other start-ups, whereas more than 90 per cent indicate that they can imagine cooperating with other start-ups in the future. Of the technology start-ups that currently cooperate with others, the majority do so in R&D. The results also indicate that many high-tech starters currently receive no or very limited support from governmental or other institutions. However, the results also indicate that the attitude towards support in the Darmstadt region is somewhat different from that in the Eindhoven region. The respondents in the Eindhoven study claimed that they did not desire any support in the future either, whereas the respondents in the Darmstadt study indicated that they would like to get more support in the future. In addition, the study shows a positive attitude among the majority of the technology start-ups towards cooperating with other start-ups, both nationally and internationally.

The contribution of this study to entrepreneurship research in Europe is to demonstrate how, for the same type of firm, high-tech companies selected on the same criteria and interviewed with the same questionnaire, attitudes towards support may be linked to national or cultural factors. In both the Dutch and the German context, the findings for cooperation, were similar and give strong support for the crucial importance of cooperation for successful high-tech venturing.

In Chapter 8, 'European territorial cooperation to improve competitiveness in the Union: the case of EU-funded cooperation in Central and Southeastern Europe', Ulrich Graute provides a snapshot of the institutional context the European Commission offers for entrepreneurs and is

focused on the macro level of European cooperation as a framework to improve EU competitiveness against a background of cohesion policy. The author provides a detailed insight into the EU funding programmes which are often perceived by entrepreneurs and local economic actors as a veritable 'jungle' offering strong and various support, but only for those economic actors who are able to explore its complexity in order to identify opportunities matching to their projects. The objective of this chapter is to give a brief overview of the history of European integration, which in the past focused on two main issues: fostering economic competitiveness and reducing spatial disparities. The chapter features particularly the new emerging field of European territorial cooperation, described as a mainly actor-centred institutionalism. The author argues that the specific role of private actors is a rarely analysed issue in a context where policies related to the development of the EU territory are dominated by the public sector. Consequently, this chapter deals with the following questions: how can small-sized entrepreneurship and SMEs contribute and benefit from transnational cooperation in the field of EU cohesion policy? How do public actors handle the challenge to promote competitiveness and at the same time support a balanced, sustainable development of the territory? The chapter ends with a synopsis on the achievements so far and the perspectives for the future.

The intention of the author is to provide a critical discussion of the current situation in order to provide descriptions, and to facilitate further research on the development of the cooperation of public and private actors. The first section of this chapter explains the European policy framework and deals with three topics: EU cohesion policy fostering competitiveness and sustainability, territorial cooperation to strengthen economic and social cohesion, and, finally participation in European territorial cooperation. The second section draws first lessons from territorial cooperation and points out the limited opportunities for enterprises interested in territorial development especially in the last decade. The author argues that since the late 1990s, awareness of the territorial dimension has emerged and demonstrates in the following section how cooperation takes place in the framework of the INTERREG programme for transnational cooperation. The importance of cooperation is displayed by the growth of partners involved in the approved projects: the number rises from 211 for the first period of 1997 to 1999 up to nearly 1600 in spring 2006!

This study points out that when actors talk about the Lisbon objective, in European territorial cooperation, they primarily mean competitiveness of the regions. Indeed, it is difficult to harmonize rapidly changing economic conditions in a globalizing world with an integrated and long-term coordination of territorial development, but this is precisely the challenge that has to be faced.

PART THREE: THE CULTURAL LEVELS OF NATION, GENDER, PROFESSION, SECTOR AND REGION IN EMERGENCE, COOPERATION AND SURVIVAL

Jan Ulijn

This part builds further on Parts I and II – through its four chapters it will also focus on NC, PC, sector and region. Gender is not dealt with specifically, but there is some reference to family culture, where the start-up often takes place, as a natural source of cooperation and teamwork with respect to future research. This part ends with a return to the issues in Part I, by describing some skills and values of the individual in his/her decision as to whether to look for cooperation or not. Two chapters from the University of Twente (NL) present case studies which build upon social network theory and the capitals/resources issue. Although no exhaustive attempt can be made here to cope with the extensive literature and to define all the different varieties, we shall try to come to some positioning of the three main ones for cooperation between start-ups as a means of survival: human as related to Part I, socio-economical in a broad sense as linked to Part II and cultural in Part III, mainly based on Bourdieu (1986; see also Coviello and Jones, 2004, CJ below; Koen, 2005; Subramaniam and Youndt, 2005, SY below), The classic iceberg analogy (Ulijn and St. Amant, 2000) allows us to range the different capitals which are distinguished in the literature in some order, from the 'hard', visible explicit factors at the top to the 'soft' invisible, implicit ones under the sea at the bottom. The soft ones at the bottom are as hard, but largely overlooked as a predominant layer – which also applies in the case of the emergence, survival, growth and maturity of techno-ventures. The order, then, is as follows with respective sources for definitions: technical, financial and economic (Wakkee et al.), strategic (Wakkee et al.), organizational (Kirwan et al.; Wakkee et al.; and SY), network capital (for a definition, see Kirwan et al.) and intellectual capital, being at sea level (the number of patents above, for instance, as a result of the cognitive skills of engineers and scientists), human (Calay et al.; and SY/CJ), social (Wakkee et al., its references and SY/CJ) and cultural. Cultural capital is defined as related to connections in cultural patterns such as value and norm systems, and also to knowledge necessary to maintain (or change) the patterns of behaviour (Bourdieu, 1986: 42). There is a good link with innovativeness and entrepreneurship under the sea, through human and social capitals. Human capital involves the entrepreneur's innovativeness, tolerance for ambiguity/flexibility, commitment and need for achievement; also his/her general perception of risk (tolerance), entrepreneurial and management competence, international

experience, education and language proficiency (from Coviello and Jones, 2004). Social capital involves the entrepreneur's proprietary network relationships, such as communication/social networks and informal contacts (from Coviello and Jones, 2004; see also Kim and Aldrich, 2005). The other two chapters in Part III relate to Slovenia (Prašnikar et al.) with a professional culture comparison, which Wakkee et al. also provide, and Estonia (Vedina et al.), which is also included in Kirwan et al., and brings us back to value diversity on the individual level with respect to innovativeness, entrepreneurship and cooperation. As stated earlier, European region/country effects are discussed in Drnovšek et al., Graute and again here in all chapters. Finally the effect of sector cooperation is mostly felt in ICT (Lasch et al., Kirwan et al. and Prašnikar et al.), supplemented by nano-, bio- and laser technology (Kirwan et al.). Ulijn et al. also deal somewhat with the culture of the sector (services or not) – partner dissimilarity is more easily accepted in services.

In Chapter 9, 'High-tech start-ups and innovation journeys: strategic shifts, culture and networks', Ingrid Wakkee, Aard Groen and Reinier Heerink explore the link between innovation (journeys), entrepreneurship, opportunities and social networking. How do technology-based start-ups use social networking to create value by the pursuit of different opportunities for business derived from a single technological breakthrough? In particular, how do entrepreneurs manage tensions between conflicting demands of maintaining operational effectiveness and strategic flexibility? To that end the authors develop a framework for analysis that distinguishes between four managerial mechanisms (goal attainment, optimization, pattern maintenance and social networking) and shows what capitals are involved in these mechanisms in relation to the development of operational effectiveness and strategic flexibility. Two case studies are then presented in which the authors explore the relationships empirically. The cases provide evidence of how high-technology start-ups can use networks in different ways to pursue opportunities: either they enter different networks and let the dynamics lead them to the recognition of new opportunities or they build and develop their networks such that they can exploit the recognized opportunity optimally in a way that best fits their emerging culture. The authors discuss how the occupational background (scientific versus business) and orientation (science versus market) of the founder, that is, the professional culture, might have affected the process. From a managerial perspective, the framework developed in this chapter enables managers to justify claims on particular resources and their dedication to specific activities. The network strategies adopted by the entrepreneurs can be used by managers as an example of how they can reach their goals in a way that best fits their professional culture and the emerging culture of their business. Finally, this

study should make managers aware of the importance of taking into consideration other organizations, involved in the same or related innovation journeys, when engaging in social networking and developing social capital.

This study not only substantiates the network dealings of two technoventures over a couple of years in a longitudinal sense, but also links survival to a given professional and emerging corporate culture. It is striking that one case (Sound Inc. on a flow sensor for liquids), build up their network, while evolving in their venture, whereas the Motion Inc. case (developing a runner's watch) uses upfront a network of different capitals in their innovation journey, including the alliance with a German multinational. Motion was looking for cooperation with a potential market immediately after combining two types out of the four identified by Jones-Evans (1995), the researcher and the opportunist or the technician, very close to the inventor profile and the manager close to the innovator in the typology by Fayolle et al. (2005). Sound was more technology driven, and the researcher remained in that capacity for a longer time. Ultimately both PCs of engineering merged with a marketing culture.

In Chapter 10, 'Making the transition from entrepreneurial to professional management in small and medium-sized ICT businesses in Slovenia and Germany', Janez Prašnikar, Karl-Heinz Rau, Marko Pahor and Monika Klinar present a study of the transition from entrepreneurial to professional management in high-tech organizations in three Slovenian and three German ICT firms. This transition is characterized by the functional specialization of top and middle managers, the increased formalization of decision making, the formalization of communication, originating delegation of decision making and trust that the agreed tasks will be performed at all levels. Companies are starting to develop their employees through further education and a formal system of planning and control is being established. Interestingly, there is less stress on performing tasks according to formal job descriptions and respect for the rules. Their analysis, performed on data from 121 interviews, found no substantial differences in the transition from entrepreneurial to professional management between six companies from different ICT subsectors from Germany and Slovenia and firms from other industries. They noticed, however, a greater rigidity of German engineers in performing tasks according to their formal job descriptions, probably a consequence of the cultural environment.

As discussed earlier, the findings seem to suggest that a possible ICT sector culture effect seems to override that of PC. Whereas at the stage of growth and maturity the study by Ulijn et al. (2001) indicates that German firms need to become more entrepreneurial instead of 'just' managing their business (compared with Dutch ones), this German–Slovenian comparison shows a remarkable similarity between the two samples: entrepreneurial

culture is well suited to the initiation stage of innovation, whereas professional management in a collective mood warrants an efficient implementation. Similar commonalities are found at the start-up stage between 627 Austrian and 778 Czech ventures, in addition to the Czech characteristics of a young economy (Mugler and Kessler, 2004). Since this study, both the start-up and the maturity phases of a firm by two five-year-old techno-starters in the Slovenian sample and four firms older than 13 years (one in Slovenia and all three in Germany), indicate that cooperation continues to be an asset throughout the development of a firm.

In Chapter 11, 'Value diversity for innovativeness in the multicultural society of Estonia', Rebekka Vedina, Gerhard Fink and Maaja Vadi offer a closer look at what values are important for entrepreneurs for providing the ground for innovation and suggest a way in which they can be combined to achieve better cooperation. The potential for entrepreneurship in Estonia stems from value diversity.

The values of the two major cultural groups, Estonians and Russian speakers, are studied. Their hypothetical impact on innovativeness and cooperativeness is discussed and implications are drawn for managers. The importance of values related to innovativeness was found to differ in these two groups, which suggests that their representatives could play different roles in the different stages of the innovation process. The presence of complementary group cultures is important for cooperation in entrepreneurship in order to combine advantages in the early stages of innovation with those in the later ones. It can be concluded that the cultural basis for innovation is provided by a large part of Estonian society, whereas the other part complements it with capabilities for implementing the innovative ideas. Shared values among Estonians and Russian speakers, such as being honest and logical and aiming at high self-respect and a sense of accomplishment, will provide sufficient ground for cohesion among the members from the different population groups. Values such as being courageous and imaginative may be brought into innovative groups from Russian speakers while the instrumental value of being capable may rather be supplemented by the members of the Estonian population group. This shows that cohesion and diversity between the cultures of the major population groups may enhance the repertoire of values for initiation of innovation. A successful cooperation between the people with diverse cultural values thus brings further advantages for entrepreneurship. Knowledge and awareness of one's own and one's partners' values can be an important asset for establishing successful partnerships in the new business development.

Are new EU member states, such as Slovenia and Estonia, better implementers of innovation than initiators of it? Whereas the previous chapter seems to illustrate that mature Slovenian firms developed a collective imple-

mentation culture as similar to the Germans, this chapter demonstrates (using Rokeach instrumental and terminal values) that Estonians may importantly add to values that are considered as a requirement for the implementation of innovation. Russians may strongly enhance the capabilities for initiation of innovation. Here we have an example of the ethnic entrepreneurship in which human capital has strong ties with the start-up phase which become weaker at the stage of growth (Stiles and Galbraith, 2004; also for links with social capital in the United States, Canada and New Zealand). As Inglehart shows on the basis of his data for Estonia, this country is moving rapidly from the traditional to the rational, still refraining from too much self-expression, which is a characteristic of the Northwest European regions. The method which is used in this chapter clearly goes beyond Hofstede's work, since it strongly draws from the psychology of the individual business starter having to opt for cooperativeness and innovativeness. It might even give an opportunity to update Schwartz's original work of 1994 for 38 cultures for related values.

In sum, what other relevant aspects can be addressed? In particular the studies of entrepreneurship in former socialist societies show that even before communist rule, the family was an important source of new business development in which the role of the woman was crucial (Gundry et al., 2002). Cooperation and teamwork developed naturally, but is this possible, for instance in techno-ventures, where technology demands a specific educational background which might be not available for each family member? If the founder of such a venture is a woman, then as a scientist or an engineer she might be more inclined towards cooperativeness. Are women keener on this, because of their higher affiliation value than men who are more competitive? Do engineers who are used to working with project teams do a better job than selfish scientists who seek the glory of a Nobel Prize? Is it also a matter of professional cultural difference? In addition, women often also display intuition, as part of their female emotional intelligence (see the exploratory study of perceptions and experiences by Kakkonen, 2005 on how this intuition translates into family entrepreneurship and Verheul et al., 2001 and 2002 on how women's self-image might be more entrepreneurial). There are not enough female start-ups in the EU and those that do exist are mostly in services, to be combined more easily with family and childcare. The positive image of the female entrepreneur is that she can be a good relationship builder, she controls costs better, hires fewer personnel, but also takes less risks. Family cultures in entrepreneurship provide a type of transformational leader, rooted in Confucianism in mainland and overseas Chinese that can be very effective (Wah, 2004); the Bradford company analysed in Chapter 2 is a Dutch example of this.

In Chapter 12, 'Early-stage networking: how entrepreneurs use their social capital to establish and develop high-technology start-ups', Paul

Kirwan, Peter van de Sijde and Aard Groen investigate the early-stage networking activities of high-technology start-ups. How do the entrepreneurs drive these firms to utilize their networks to accumulate the necessary resources from the initial period prior to the firms' foundation right through to their successful emergence and early growth? To answer this question an entrepreneurship in networks (EiN) model depicts the entrepreneur, acting in a social system, who needs to accumulate four types of 'capital' (economic, strategic, cultural and social) to establish and develop the venture. This follows an entrepreneurial process, from opportunity recognition, through opportunity preparation, leading to opportunity exploitation, all the while creating value for the firm. Using this model, the early-stage networking activities of 22 high-technology start-ups are examined, highlighting the differences pre- and post-foundation. A specific case illustration is given to further demonstrate how these early networking activities enable the entrepreneur to establish and develop the firm. Finally some European regions are compared with respect to the differences in regional support for these firms. The cases emphasize the importance of a key partner to the development of high-technology start-ups and the perceived inadequacies in the regions for supporting these firms.

The six UK (Warwick and Cardiff) start-ups enjoyed mainly economic capital support in pre- and post-foundation stages of the start-up, in the Netherlands (Twente) and Belgium (Leuven) the capital support became mainly economic, cultural and strategic in this order after the foundation, whereas in Estonia (four start-ups from the University of Tartu) the support remained strategic, both before and after the foundation stage. Hence, culture seemed to be not that important after all. This chapter contributes to the emergence process as an important element in using different capitals as a form of cooperation and support, so the study operates longitudinally, but social network theory has not yet been tested sufficiently to a controllable level throughout those cases to prove a relative unimportance of the effect of culture on cooperation modes of techno-ventures, let alone the cooperation between them.

CONCLUSIONS AND POSSIBLE FUTURE RESEARCH

Jan Ulijn

How can cooperation help more high-tech ventures in Europe to emerge and survive? This book has made a start to signal how techno-starters could cooperate across the borders of old and new member states, not only at the emergence and survival stages, but also at the growth and maturity levels.

Moreover, it has provided some ingredients for a comprehensive model or theory which is needed to see how a general European innovation and entrepreneurial culture could develop across the borders of nation, region, profession, sector and gender (compare the national, professional and sectoral cultures: NC, PC and SC). The social network and 'capitals' theories are promising elements. This then might 'automatically' lead to more cooperation at the emergence and survival phases of techno-ventures, in which the initiation and implementation stages have to be clearly distinguished: there is nothing more practical than a good theory! As part of this culture, the technopreneur has to develop skills and values not only at the collective level of a national, professional or sectoral culture, but also at the individual one to foster this cooperation. The theoretical contribution of the book here is to bring culture and psychology together in this particular context of the nascent technopreneur.

An important question for government policy makers at any level – EU, individual member state, province, region (Euroregion) or city – is to know how cooperation between techno-ventures should materialize and whether it happens often enough. EU integration could support cooperation across NC, PC and SC borders, as the SURVIE programme shows. In this sense a framework, such as that presented in Ulijn et al. (ch. 1) might be useful, at least for national culture. Is high cooperation propensity and acceptance of culturally dissimilar partners the ideal for the emergence and survival of techno-starters? It seems likely. Finland and Slovenia, then, are examples for the other member states to follow, at least according to the results of this pilot study. Apart from the above cultural EU member state benchmarking, the following lessons can be drawn from this book:

- Be careful with support; give only the one the techno-starter really asks for. Do not overincubate the baby in the cradle!
- Symbiotic and not competitive entrepreneurship might be the solution for Europe, but clearly embedded in a strong relation between (technological) innovation and entrepreneurship.
- The EU should learn from the US (and the UK) that risk taking should be encouraged.
- European innovative and entrepreneurial culture should not only use its (hidden) Christian values, but also the upcoming Confucian and Islamic ones as part of the above symbiosis and cooperation.

Which Research Methods?

How should future research back up this process of growing cooperation between techno-ventures in Europe? We shall review the following elements

with regard to research methods, a more institutionalized form of cooperation, strategic alliances and so on.

To sum up: the review has to be modest because only some case studies and narrative approaches could be presented together with some statistical reviews (mostly in Part II) and one hypothesis testing survey (Ulijn et al.). With regard to the question: 'can cooperation between techno-ventures help them to survive?', a theoretical framework still has to be developed to give an acceptable answer. This book may only illustrate and not prove that cooperation makes a difference in the survival of techno-starters and their ventures. Techno-starters may well prefer to start their own ventures, as discussed previously on pages 22 and 23 of this chapter, however we were unable to find any proof that this would lead to sustainable results in the long-run. As noted earlier, a conceptual model of cooperation between techno-ventures, should account for the following, in a longitudinal perspective:

- Possible factors of the effect on cooperation among high-tech start-ups at a given stage, pre-foundation, emergence, survival, growth and maturity, as is specified in the particular chapters of this book.
- Cooperation, support and skills of techno-starters are needed throughout the life cycle from a longitudinal perspective, where the survival/growth limit has been defined as approximately 6–10 years of age of the start-up.
- The 'model' should include the effect of cooperation (or not) on the survival of the start-up at the upper age limit, as an independent variable for which to control.

Teamwork and Strategic Alliances

The longitudinal research method proposed by Davidsson (2006) with 17 specific propositions on the basis of some 75 studies might also be a workable approach with regard to cooperation. A stage beyond the mere intention to cooperate is teamwork, for which Ancona and Caldwell (1998) rethink its composition from the outside in. This is an interesting perspective since most teams, also in new businesses, start with a family, or a group of friends or colleagues, and so on, whereas the technological knowledge and market economies need an outside perspective for techno-ventures to survive. A benchmark of 20 Italian start-ups with five British, five Dutch and 24 German ones by Ulijn et al. (forthcoming) concludes that cooperating in technology start-ups is not only a local, but also a European entrepreneurship challenge. Different NCs take different perspectives: Germans see the advantage of team versatility; Italians prefer the 'family' setting; the English and Dutch prefer individualistic

approaches, although they see the usefulness of the team approach. Perhaps they are less capable of teaming up naturally right from the start of the venture, given the finding of Chapter 1 that the Dutch sample of 37 start-ups disclosed a low acceptance of partner dissimilarity with a high cooperation level. At the growth and maturity levels, cooperation is often organized into institutionalized forms, such as strategic alliances (SAs), joint ventures, mergers and even acquisitions, particularly relevant for the above technological sectors mentioned hereafter. It is also important to research the dissolution procedures of such endeavours. How should cooperation be terminated in a businesslike way? We come here to the final step of the classic team development: forming, storming, norming, performing and adjourning. As far as we know, SAs are seldom seen in a historical way from the inception stage of a firm. Cooperation culture can also be studied in this way to predict possible hurdles of collaboration between businesses and individuals.

With Respect to Europe and Its Regions

Europe in general is the link between (technological) innovation and entrepreneurship as it is also embedded in the culture and skills needed of the (future) techno-starter or intrapreneur within a large R&D department of an MNC or government body, for instance. EU policy makers have problems with clearly linking up entrepreneurship and intrapreneurship with new business development. Initiatives are taken such as those described in the Pan-European Gazelles project through one single entrepreneurial and cross-cultural space (Wilson and Twaalfhoven, 2005), but do they lead to more cooperation across professional and sectoral borders? Oversupport and regulation should be avoided. What are the needs of techno-ventures themselves? If one looks at the recent Europe INNOVA initiative (European innovation, December 2005) as a clear stage in the implementation of the Lisbon agreement, the focus is very much on the assessment of innovation performance and exchange of good practice in networks by industrial sectors and clusters. Future studies about cooperation between and by European techno-ventures should also include more detailed professional and sector culture effect assessment, in particular in some specialized science and technology sectors, such as biotech, aerospace or environment care, to see how they constitute a major step in making Europe the most competitive knowledge market by 2010. Part of it is the cooperation between Euroregions, as described in Graute (ch. 8) and for regions, such as southeast Netherlands with nearby Belgium and Germany (Eindhoven–Leuven–Aachen) as the technological brainport of that EU region and the Baltic Sea region bringing other Nordic, Germanic and

Balto-Slavic countries and cultures together. Those European elements of cooperation should be part of a solid research agenda.

What Culture and Skills Research Is Required for Collaboration for Technopreneurs: Techno-starters or Intrapreneurs?

Following the groundbreaking work by Triandis (see Kim et al., 1994) collectivistic attitudes might be tested in techno-starters, as a logical step beyond the pilot study by Ulijn et al. (ch. 1), which itself needs a careful and comprehensive replication. Both Bierbrauer et al. (1994) and Chan (1994) propose psychometrically sound methods of measurement of cultural orientation scales of individualistic and collectivistic orientations which can be used in techno-ventures to diagnose a possible lack of cultural cooperation skills at the survival level. As mentioned before, a techno-starter also has a history of cooperation – perhaps in a previous R&D job, his/her firm might be a spin-off. Some 67 per cent of Europeans think that science and technology play an important role in industrial development and around 50 per cent think that Europe is lagging behind the US with respect to scientific discoveries, education of scientists and application of technological advances to industry (S&T Eurobarometer in *RTD info*, 2005). Hence technology entre- and intrapreneurs are badly needed. An open innovation space of public and private R&D in Europe, perhaps linked up with the new initiative of a virtual European Institute of Technology combining its main campuses, could act as a techno-venture cradle not only for Europe, but also for other parts of the world.

To create much more successful ventures, the intrapreneurship which is needed has to be studied in more detail, along with the relevant skills (see Wai-chung Yeung, 2002 for the skills of transnational entre- and intrapreneurs; and Menzel, 2007 for skills needed by technology intrapreneurs). The intrapreneur characteristics in those studies differ from Shell's HAIRL model: helicopter view, analytical skills, imagination, realistic bottom line, and leadership, in this order of priority (see Ulijn and Fayolle, 2004): vision and ambition come first in China. The list cited earlier (creativity, drive, empathy and persistence at the start-up, courage and risk orientation, ability to reflect, strategic orientation and leadership and communication) together with reliability and decisiveness, and personal values that subsist at the maturity level (reliability, decisiveness, persistence and determination) overlaps with 14 items of intrapreneur characteristics, for which we suggest a decreasing order of priority, still to be tested:

- vision and creativity;
- initiative;

- internal motivation (see Chinese innovative culture);
- autonomy;
- risk taking;
- internal control;
- commitment and persistence;
- market knowledge/customer orientation;
- knowledge of organizational structures and willingness to cross functional borders;
- hands-on attitude and ability to make rapid decisions under uncertainty;
- self-confidence and willingness to learn from failure;
- leadership;
- team play and motivation; and
- communication skills.

The above list is seen from the individual's level. The cultural perspective from the group/corporate perspective overlaps (seven items):

- vision and creativity;
- tolerance for risk;
- tolerance for failure;
- support by top-management, sponsors and mentors;
- recognition of small contributions;
- mutual trust and confidence, superordinate goals; and
- expectation of excellence, high standards of performance.

Amazingly, all these skills have in common that they are poor on items that relate to the other party/person or cooperation. A few exceptions are: leadership, communication, empathy, customer orientation, team play and motivation, support by top-management, sponsors and mentors and recognition of small contributions. So, engineering education and training, both academically and on the job, might have an important task in such skills development. Entrepreneurship is not the same as intrapreneurship. Schumpeter had already included individuals inside corporations in his concept of entrepreneurship (see Schumpeter's definition on page 12. Intrapreneurship indicates a serial or recurring as a source of innovation for corporations: 'Intrapreneurship denominates episodically recurring processes by which individuals inside organizations pursue opportunities without regard to the alienable resources they currently control'. In a longitudinal perspective, cooperation also needs to be studied before the techno-ventures emerge, that is in the R&D environment where intrapreneurship should be available. How does this kind of skill and culture

assessment lead to a change of behaviour, if this is necessary to make for the survival of techno-ventures? With regard to intrapreneurship, Menzel (2007) offers a scenario-based simulation process which might contribute to this, one of the possible options being to become a techno-starter after working for some time in a large R&D facility. The question is whether to stay in the company or leave it, and how? More studies in this vein might suggest how behaviour can become more cooperative. At the other end, the social and economic context of the techno-starter might also make or break his/her success. In the studies reported in this book it was not always easy to make the right distinction between the individual and his/her context (Parts I and II); there is a lot of overlap.

Repeatedly we have said that this book should not be overambitious: the picture of cooperation between techno-ventures and -starters in Europe is too kaleidoscopic in this respect with regard to distribution over countries, regions, professions, sections and gender. We could not prove anything, but merely illustrate, often using barely comparable case studies, but nevertheless there were some prudent attempts to obtain empirical evidence plus some econometric/sociological/survey-based studies, and the narrative approach proposed in Chapter 3 seems promising. The authors hope to have given at least some insight and awareness into the process of cooperation across the cultural levels of nation, gender, profession, sector and region in the emergence and survival of techno-ventures in Europe.

REFERENCES

Acs, Z.J., P. Arenius, M. Hay and M. Minniti (2005), *Global Entrepreneurship Monitor – 2004 Executive Report*, Babson Park, MA and London, UK: Babson College/London Business School.

Acs, Z. and D.B. Audretsch (1993), *Small Firms and Entrepreneurship: An East–West Perspective*, Cambridge: Cambridge University Press.

Ajzen, I. (1991), 'The theory of planned behavior', *Organizational Behavior and Human Decisions Processes*, **50**, 1–63.

Aldrich, H.E. (2005), 'Entrepreneurship', in N. Smelser and R. Swedberg (eds), *Handbook of Economic Sociology*, Princeton, NJ: University Press: pp. 451–78.

Ali, A.J. (2005), *Islamic Perspectives on Management and Organization*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.

Ancona, D.G. and D.F. Caldwell (1998), 'Rethinking team composition from the outside in', *Research on Managing Groups and Teams*, **1**, 21–37.

Astley, W.G. and C.J. Fombrum (1983), 'Collective strategy: social ecology of organizational environments', *Academy of Management Review*, **8**(4), 576–87.

Audretsch, D. (1998), 'Agglomeration and the location of innovative activity', *Oxford Review of Economic Policy*, **14**(2), 18–29.

Audretsch, D.B. (2002), *Entrepreneurship: A Survey of the Literature. Prepared for the European Commission, Enterprise Directorate General*, Indianapolis, IN: Institute for Development Strategies (Indiana University) and London: Centre for Economic Policy Research.
Audretsch, D.B. and R. Thurik (2002), 'Linking entrepreneurship to growth', OECD STI Working Paper, 2081/2, Organization for Economic Cooperation and Development, Paris.
Audretsch, D., A.R. Thurik, I. Verheul and S. Wennekers (eds) (2002), *Entrepreneurship: Determinants and Policy, European–US Comparison*, Boston, MA: Kluwer, pp. 11–81.
Berry, J.W. (1994), 'Ecology of individualism and collectivism', in Kim et al. (eds), pp. 77–84.
Bhalla, A., S. Henderson and D. Watkins (2005), 'The origins, lessons and definition of entrepreneurial achievement: a multi-paradigm perspective via the case study', in A. Fayolle, P. Kyrö and J. Ulijn (eds), *Entrepreneurship Research in Europe: Outcomes and Perspectives*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar, pp. 150–73.
Bierbrauer, G., H. Meyer and U. Wolfradt (1994), 'Measurement of normative and evaluative aspects in individualistic and collectivistic orientations: the cultural orientation scale (COS)', in Kim et al. (eds), pp. 189–99.
Birch, D.L. (1979), 'The job generation process', MIT Program on Neighbourhood and Regional Change, Cambridge, MA.
Bourdieu, P. (1986), 'The forms of capital', in J.G. Richardson (ed.), *Handbook of Theory and Research for the Sociology of Education*, New York: Greenwood, pp. 241–56.
Bourdieu, P. (1987), *Choses dites*, Paris: Éditions de Minuit.
Brown, T.E. and J. Ulijn (eds) (2004), *Innovation, Entrepreneurship and Culture: The Interaction between Technology, Progress and Economic Growth*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Bruyat, C. (1993), 'Création d'entreprise: contributions épistémologiques et modélisation', PhD dissertation, Pierre Mendès-France University, Grenoble.
Casson, M. (2003), *The Entrepreneur: An Economic Theory*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Castells, M. (2004), *The Network Society: A Cross-Cultural Perspective*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Chan, D.K.-S. (1994), 'COLINDEX: a refinement of three collectivism measures', in Kim et al. (eds), pp. 200–212.
Chesbrough, H.W. (2005), *Open Innovation: The New Imperative for Creating and Profiting from Technology*, Boston, MA: Harvard Business School Press.
Chesbrough, H.W., W. Vanhaverbeke and J. West (2006), *Open Innovation: Researching a New Paradigm*, London: Oxford University Press.
Collinson, S. and G. Gregson (2003), 'Knowledge networks for new technology-based firms: an international comparison of local entrepreneurship promotion', *R&D Management*, **33**(2), 189–208.
Coviello, N.E. and M.V. Jones (2004), 'Methodological issues in international entrepreneurship research', *Journal of Business Venturing*, **19**, 485–508.
Dana, L.P. (2005), *When Economies Change Hands: A Survey of Entrepreneurship in the Emerging Markets of Europe from the Balkans to the Baltic States*, Binghamton, NY: Haworth.
Dana, L.P. (2006), *Entrepreneurship and SMEs in the Eurozone: Toward a Theory of*

Symbiotic Entrepreneurship, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Dana, L.P. and T.E. Dana (2005), 'Expanding the scope of methodologies used in entrepreneurship', *International Journal of Entrepreneurship and Small Business*, **2**(1), 79–88.
Davidsson, P. (2006), 'Nascent entrepreneurship: empirical studies and developments', *Foundations and Trends in Entrepreneurship*, **2**(1), 1–76.
De Clerq, M. and A. Suck (2002), 'Theoretical reflections on the proliferation of negotiated agreements', in M. De Clerq (ed.), *Negotiating Environmental Agreements in Europe: Critical Factors for Success*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Delinchant, B., V. Riboulet, L. Gerbaud, P. Marin, F. Noël and F. Wurtz (2002), 'Cooperative design among mechanical and electrical engineers over the internet: some implications for tools supporting human communication between various professional cultures', *IEEE Journal of Professional Communication* on *The future of ICT-studies and their implications for human interaction and culture in the innovation management process* (edited by J. Ulijn, D. Vogel and T. Bemelmans), **45**(4), 231–4.
Dorf, R.C. and T.H. Byers (2005), *Technology Ventures: From Idea to Enterprise*, Boston, MA: McGraw-Hill.
Dutch Ministry of Economic Affairs (2001), *De succesvolle ondernemer* (The successful entrepreneur), The Hague.
Fayolle, A. (1999), *L'ingénieur entrepreneur français: contribution à la comprehension des comportements de creation et reprise d'entreprise des ingénieurs diplomés*, Paris: L'Harmattan.
Fayolle, A. (2004), *Entrepreneuriat: apprendre à apprendre*, Paris: Dunod.
Fayolle, A., J. Ulijn and J.-M. Degeorge (2005), 'The entrepreneurial and innovative orientation of French, German and Dutch engineers: the proposal of a European context based upon some empirical evidence from two studies', in: A. Fayolle, P. Kyrö and J. Ulijn (eds), *Entrepreneurship Research in Europe: Outcomes and Perspectives*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar, pp. 227–55.
Fornahl, D. and T. Brenner (eds) (2003), *Cooperation, Networks and Institutions in Regional Innovations Systems*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Groen, A., J. Ulijn and A. Fayolle (2006), 'Teaching diversity in technology entrepreneurship: some experiences from the Netherlands and France', *International Journal of Entrepreneurship and Small Business*, **3**(5), 517–37.
Gundry, L.K., M. Ben-Yoseph and M. Posig (2002), 'Contemporary perspectives on women's entrepreneurship: a review and strategic recommendations', *Journal of Enterprising Culture*, **10**(1), 67–86.
Guptara, B. (2004), 'Managers' lives, work and careers in the 21st century', in C.L. Cooper (ed.), *Leadership and Management in the 21st Century*, Oxford: Oxford University Press, pp. 107–38.
Hargadon, A. (2003), *How Breakthroughs Happen: The Surprising Truth about How Companies Innovate*, Boston, MA: Harvard Business School Press.
Hofstede, G. (2001), *Culture's Consequences: Comparing Values, Behaviours, Institutions, and Organizations Across Nations*, 3rd edn, London: Sage.
Hofstede, G., N.G. Noorderhaven, A.R. Thurik, L.M. Uhlaner, A.R.M. Wennekers and R.E. Wildeman (2004), 'Culture's role in entrepreneurship: self-employment out of dissatisfaction', in Brown and Ulijn (eds), pp. 162–203.

Huxham, C. and S. Vangen (2005), *Managing to Collaborate: The Theory and Practice of Collaborative Advantage*, Andover: Routledge.
Inglehart, R. (1997), *Modernization and Postmodernization*, Princeton, NJ: Princeton University Press.
Inglehart, R.F. and C. Welzel (2005), *Modernization, Cultural Change and Democracy*, Cambridge: Cambridge University Press.
Johnson, P. (2004), 'Differences in regional firm formation rates: a decomposition analysis', *Entrepreneurship Theory and Practice*, Fall, 431–45.
Jones-Evans, D. (1995), 'A typology of technology-based entrepreneurs: a model based on previous educational background', *International Journal of Entrepreneurial Behaviour and Research*, **1**(1), 26–47.
Kakkonen, M.L. (2005), 'Intuition of family entrepreneurs: an exploratory study of perceptions and experiences', *Journal of Enterprising Culture*, **13**(1), 47–68, special issue on Exploring Some Aspects of European Entrepreneurship Research: New Ways of Action and Education, edited by A. Fayolle, J. Ulijn and P. Kyrö, Singapore: World Scientific.
Katz, J.A. (1991), 'The institution and infrastructure of entrepreneurship', *Entrepreneurship Theory and Practice*, **15**(3), 85–102.
Kets de Vries, M. (1980), *Organizational Paradoxes: Clinical Approaches to Management*, London: Tavistock.
Kets de Vries, Manfred F.R. (1995), *Organizational Paradoxes: Clinical Approaches to Management*, 2nd edn, London: Routledge.
Kets de Vries, M. (1996), 'The anatomy of the entrepreneur: clinical observations', *Human Relations*, **49**(7), 853–82.
Kim, P.H. and H. Aldrich (2005), *Social Capital and Entrepreneurship*, Hanover, MA: Now publishers.
Kim, U., H.C. Triandis, C. Kagitcibasi, S.-C. Choi and G. Yoon (eds) (1994), *Individualism and Collectivism: Theory, Method, and Applications*, London and Thousand Oaks, CA: Sage.
Koen, C.I. (ed.) (2005), *Comparative International Management*, London: McGraw-Hill.
Kyrö, P. and J. Kansikas (2005), 'Current state of methodology in entrepreneurship research and some expectations for the future', in A. Fayolle, P. Kyrö and J. Ulijn (eds), *Entrepreneurship Research in Europe: Outcomes and Perspectives*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar, pp. 121–49.
La Pira, F. and M. Gillin (2006), 'Non-local intuition and the performance of serial entrepreneurs', *International Journal of Entrepreneurship and Small Business*, **3**(1), 7–35.
Lasch, F. (2003), 'Innovations- und technologieorientierte Neugründungen in Frankreich. Eine Untersuchung von EinXussfaktoren auf regionale Disparitäten im Gründungsgeschehen in Informations- und Kommunikationstechnologien (1993 bis 2001)'; 'La création d'entreprises dans le secteur des technologies de l'information et de la communication (TIC) en France. Une analyse des facteurs déterminants de la création régionale et une étude des déterminants de la survie et du succès des jeunes entreprises (1993 à 2001)', *Beiträge zur Wirtschaftsgeographie* Volume 4, Regensburg.
Lasch, F. and S. Yami (2005), 'The nature and focus of entrepreneurship research in France over the last decade', paper presented at the Interdisciplinary European Conference on Entrepreneurship Research, Regensburg (Germany), 22–24 February.

Legardeur, J., J.F. Boujut and H. Tiger (2004), 'Entrepreneurship and the design process: the paradox of innovation in a routine design process', in Brown and Ulijn (eds), pp. 147–61.
Lerner, M. and T. Almor (2002), 'Relationships among strategic capabilities and the performance of women-owned small ventures', *Journal of Small Business Management*, **40**(2), 109–25.
Loveman, G. and W. Sengenberger (1991), 'The re-emergence of small-scale production: an international perspective', *Small Business Economics*, **3**(1), 1–38.
Menzel, H.C. (2007), 'Intrapreneuring in industrial R&D: a comparative study in France, Germany and the Netherlands using scenario-based simulation', PhD thesis, Eindhoven University of Technology.
Mugler, J. and A. Kessler (2004), 'Comparison of business start-ups in a transition economy and in a traditional market economy: the case of the Czech Republic and Austria', *Journal of Enterprising Culture*, **12**(3), 225–51.
Nalebuff, B.J. and A.M. Brandenburger (1997), 'Coopetition: competitive and cooperative business strategies for the digital economy', *Strategy and Leadership*, November–December, 28–35.
Narayanan, V.K. (2001), *Managing Technology and Innovation for Competitive Advantage*, Upper Saddle River, NJ: Prentice Hall.
Nguen, G.D. and J. Vicente (2003), 'Réseaux métropolitains, formes locales d'organisation et ancrage de l'activité économique', *Géographie, Économie, Société*, **5**(3–4): 287–310.
Oinas, P. and E.J. Malecki (2002), 'The evolution of technologies in time and space: from national and regional to spatial innovation systems', *International Regional Science Review*, **25**(1), 102–31.
Paturel, R. (2004), 'Les choix méthodologiques de la recherche doctorale française en entrepreneuriat. Remise en cause partielle d'idées préconçues', *Revue de l'Entrepreneuriat*, **3**(1), 47–65.
Reynolds, D., M. Hay and M.S. Camp (1999), *Global Entrepreneurship Monitor: 1999 Executive Report*, Kauffman Center for Entrepreneurial Leadership, Kansas (US).
Ritsilä, J.J. (1999), 'Regional differences in environments for enterprises', *Entrepreneurship and Regional Development*, **11**: 187–202.
Rottner, R. and K. Pickar (2004), 'Lessons in interdisciplinary collaboration: the Caltech entrepreneurial fellowship program', in E. Baum and C. McHargue (eds), *2003 ECI Conference on Teaching Entrepreneurship to Engineering Students*, Berkeley, CA: Berkeley Electronic Press, pp. 1–3.
RTD info (quarterly magazine on European research) (July and November 2005), Brussels: European Commission (including S&T Eurobarometer in November issue).
Rushworth, S. and M. Gillin (2006), 'Personal value systems and motivations of successful serial entrepreneurs', *International Journal of Entrepreneurship and Small Business*, **3**(1), 106–22.
Schwartz, S.H. (1994), 'Beyond indivualism/collectivisim: new cultural dimensions of values', in Kim et al. (eds), pp. 85–122.
Shane, S. (2000), 'Prior knowledge and the discovery of entrepreneurial opportunities', *Organization Science*, **11**(4), 448–69.
Shane, S. (2003), *A General Theory of Entrepreneurship: The Individual–Opportunity Nexus*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Shane, S. and S. Venkataraman (2000), 'The promise of entrepreneurship as a field of research', *Academy of Management Review*, **25**(1), 217–26.

Sirmon, David G. and Peter J. Lane (2004), 'A model of cultural differences and international alliance performance', *Journal of International Business Studies*, **35**(4), 306–19.
Stiles, C.H. and C.S. Galbraith (eds) (2004), *Ethnic Entrepreneurship: Structure and Process*, Elsevier: Amsterdam.
Subramaniam, S. and M.A. Youndt (2005), 'The influence of intellectual capital on the types of innovative capabilities', *Academy of Management Journal*, **48**(3), 450–63.
Ulijn, J. and A. Fayolle (2004), 'Towards cooperation between European start-ups: the position of the French, Dutch and German entrepreneurial and innovative engineer', in Brown and Ulijn (eds), pp. 204–32.
Ulijn, J., G. Guerra, S. Chiolo, R. Masiello and M. Pozzi (forthcoming), 'Cooperating in technology start ups, a local or a European entrepreneurship challenge? An Italian study compared with Dutch, British and German findings', *International Journal of Entrepreneurship and Small Business*, **4**(1).
Ulijn, J., A. Nagel and W.-L. Tan (2001), 'The impact of national, corporate and professional cultures on innovation: German and Dutch firms compared', *Journal of Enterprising Culture*, **9**(1), 21–52, special issue on Innovation in an International Context, edited by A. Nagel, J. Ulijn and W.-L. Tan, Singapore: World Scientific.
Ulijn, J. and K. St. Amant (2000), 'Mutual intercultural perception: how does it affect technical communication, some data from China, the Netherlands, Germany, France and Italy', *Technical Communication*, **47**(2), 220–37.
Ulijn, J. and M. Weggeman (2001), 'Towards an innovation culture: what are its national, corporate, marketing and engineering aspects? Some experimental evidence', in C. Cooper, S. Cartwright and C. Early (eds), *Handbook of Organizational Culture and Climate*, London: Wiley, pp. 487–517.
Vanhaverbeke, N.J. and H.W. Chesbrough (eds) (2006), *Open Innovation: Researching a New Paradigm*, Oxford: Oxford University Press.
Varamäki, E. and J. Veslainen (2003), 'Modelling different types of multi-lateral cooperation between SMEs', *Entrepreneurship and Regional Development*, **15**: 27–47.
Verheul, I., P.A. Risseeuw and G. Bartelse (2002), 'Gender differences in strategies and human resource management: the case of Dutch real estate brokerage', *International Small Business Journal*, **20**(4), 443–76.
Verheul, I., L.M. Uhlaner and A.R. Thurik (2001), 'Business accomplishments, gender and entrepreneurial self-image', *Journal of Business Venturing*, **20**(4), 483–518.
Voss, R.S. (2002), *Generating Entrepreneurial and Administrative Hierarchies of Universal Human Values as a basis of Identifying Entrepreneurial Administrative Potential across Contexts*, Dissertation Abstracts International Section A: Humanities and Social Sciences, **62**(9-A), p. 3110.
Wah, S.S. (2004), 'Entrepreneurial leaders in family business organisations', *Journal of Enterprising Culture*, **12**(1), 1–34.
Wai-chung Yeung, H. (2002), *Entrepreneurship and the Internationalisation of Asian Firms: An Institutional Perspective*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Weber, M. (1958), *The Protestant Ethic and the Spirit of Capitalism*, New York: Charles Scribners.
Wernerfelt, B. (1984), 'A resource based view of the firm', *Strategic Management Journal*, **5**, 171–80.

Wilson, K. and B. Twaalfhoven (2005), 'Breeding more gazelles: the role of European universities', in P. Kyrö and C. Carrier (eds), *The Dynamics of Learning Entrepreneurship in a Cross-cultural Context*, Entrepreneurship Education Series 2/2005, Haemeenlinna: University of Tampere, Research Centre for Vocational and Professional Education, pp. 310–21.

Wissema, J.G. (2004), *Shell LiveWIRE Entrepreneur of the Year Award Finalists Report*, Shell: Amsterdam.

Young, J.E. and J. Baker Ciorzine (2004), 'The sage entrepreneur: a review of traditional Confucian practices applied to contemporary entrepreneurship', *Journal of Enterprising Culture*, **12**(1), 79–104.

PART ONE

The role of the individual versus that of the institution

1. The influence of national culture on cooperative attitudes in high-technology start-ups

Jan Ulijn, Hans T.W. Frankort and Lorraine M. Uhlaner*

INTRODUCTION

The main focus of this chapter is the concept of cooperation by high-technology start-ups or HTSUs and in particular, the influence that culture may have upon attitudes that may predict cooperative behaviour. HTSUs are defined in this chapter as young companies whose aim is to produce technologically innovative products, processes and/or services. These firms typically generate a high turnover per employee. Adapted from Barnard (1938), furthermore, HTSU cooperation is defined as a functional system of activities between the HTSU and one or more outside parties, with the purpose of improving its performance. Note that although the outside party may also benefit, key to this definition is the notion that cooperation, at minimum, benefits the HTSU. Finally, although culture is a rather broad term, the focus is primarily upon national culture (NC) and in particular, variables developed in earlier research by Hofstede (2001). According to Hofstede, culture can be treated as 'the collective programming of the mind that distinguishes the members of one group or category of people from another' (ibid.: 9).

HTSUs may choose to cooperate for many reasons. For instance, such cooperation may offer the HTSU and its partner complementary resources or skills, alternative markets, or other opportunities to share expertise and problem solving. The sources of such cooperation may involve social networks, that is, personal contacts of the members of the HTSU (Cottica and Ponti, 2004; Labory, 2004). Alternatively, cooperation may derive from formal agreements between the HTSU and other parties such as joint ventures, buyer–supplier alliances, or technology alliances (Harrison et al., 2001; Sarkar et al., 2001; Caloghirou et al., 2003), sometimes referred to as 'strategic partners'. This chapter will concentrate primarily on understanding

precursors for cooperation with these more formal types of relationships. In spite of the many possible advantages of cooperation, past research suggests that HTSUs are not always ready to cooperate with outsiders. They may fear a loss of independence or of firm-specific knowledge (see OECD, 1998). The key objective of this chapter is thus to identify possible antecedents for the degree of readiness or willingness on the part of HTSUs to cooperate with outsiders – especially potential strategic partners.

Culture, in particular, may be one of the important clues which helps to explain differences in cooperation levels across countries (Steensma et al., 2000a, 2000b) though external forces of competition may also explain differences in cooperation, especially within cultures (see Song et al., 1997). In a study of over 1400 small manufacturing firms, Steensma and colleagues examine differences in national culture using Hofstede's model (Steensma et al., 2000b). Other research by Tihanyi and colleagues (Tihanyi et al., 2005) is a meta analysis of over 24 000 firms and 55 different articles which study the effect of one component of culture, that of cultural distance, on entry mode choice, international diversification and performance. In another research study, Ali (2005: 59) identifies cooperation as a highly rated work value in the Islamic culture, suggesting once again that it is an attitude that may be deeply embedded in certain cultures.

In exploring these aspects of cooperative attitudes, this chapter presents results of an exploratory study (for a more comprehensive treatment of the theory of cooperation between HTSUs, see Wakkee et al. and Kirwan et al. in this volume). In particular, this chapter explores the following research question: what is the influence of national culture on cooperative attitudes within HTSUs towards (potential) strategic partners, including partners from a different cultural background?

Note that it is beyond the scope of the exploratory study to measure cooperation behaviours *per se* but rather to explore the degree to which national cultural characteristics may help to predict HTSU attitudes associated with cooperation and related attitudes towards partner diversity. It is presumed that each of these attitudes in turn, is an important precursor to actual cooperation behaviours between the HTSU and potential strategic partners but this latter linkage is beyond the scope of this chapter.

'Cooperative attitudes regarding (potential) strategic partnerships', refers more specifically to the degree to which the leadership of an HTSU recognizes that strategic partnerships can lead to firm growth and success. To reiterate, this variable relates more to cooperative intentions than to cooperative behaviours *per se*. Second, 'attitudes towards partner diversity', refers to the degree to which an HTSU is not only willing to accept

dissimilarities in its strategic partner's cultural background and values but recognizes that such diversity can provide an added strategic benefit to both parties. Thus, this second variable addresses not just an attitude of 'tolerance for diversity' but, rather an embracing of cultural diversity as a potential competitive advantage for the HTSU.

Our basic premise takes a closer look at the role that culture may play in the formation of cooperative attitudes within HTSUs generally, as well as specifically to outsiders who come from a different cultural background. It is the basic premise of this chapter that recognition by HTSUs of the value of strategic partnerships may be an important factor, not only for the success of the HTSU, but also for European business activity as a whole. The remainder of this study addresses the following issues: the role of the HTSU in the European economy and the challenges that HTSUs face; a research model of culture and cooperation, including a series of hypotheses linking national culture and cooperative attitudes; summary of a research study that aimed at testing those hypotheses; directions for future research on culture and cooperation; and, lastly, a summary with further implications for European Union policy.

THE ROLE AND CHALLENGES OF THE HTSU IN THE EUROPEAN ECONOMY

Recent research suggests that HTSUs may contribute disproportionately to the creation of wealth of the surrounding economy (European Commission, 2002). Evidence suggests that knowledge-based start-ups are more successful than other start-ups in growth in sales turnover, mainly because of their creation of technologically valuable products, processes and services (Shane, 1995; Snijders and van Elk, 1998).

In higher-income regions, such as countries within the European Union, economists view HTSUs increasingly as a critical means to compete on the global market in spite of higher labour force and welfare costs within much of Europe. For instance, the meeting of the European Council at the Lisbon Summit in 2000 put such knowledge-based enterprises at the heart of the European Union's strategy (European Commission, 2003). As stated in its report, the goal of the European Union is to become 'the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion' (European Union, 2005).

The underlying rationale for such a strategy is that it is presumed that knowledge-based economic activities contain not only more highly specialized knowledge, but also tacit knowledge, both of which are presumed

to be more difficult to transfer to low-cost locations. The knowledge economy (driven in part by growth in successful HTSUs), may thus provide the means for the European Union to maintain current standards of living in the face of growing global competition from developing countries, especially in low-technology services and manufacturing (Audretsch, 1998; Murray, 2003).

In spite of their perceived importance to the economy, HTSUs face significant challenges in their development, the complexity of which may benefit from cooperation with strategic partners. The following are just some of these challenges:

- The creation of knowledge is an iterative process and often involves tacit dimensions that cannot be managed in a unified way (Nonaka and Takeuchi, 1995; Cavusgil et al., 2003). The dynamics of this process are strongly dependent on the type of product, process or service, on the environment of the organization, and on the organizational arrangement of the people that create the knowledge (Olson, 1987).
- During its development, the HTSU changes with regard to governance requirements (Olson, 1987; Alpander et al., 1990; Sull, 2004). The kind of management required during the initial start-up is believed to be different from that required during the growth of the venture. This involves not only people but also structures (Shuster, 1999; Treen, 2001).
- HTSUs operate in highly specialized, competitive and dynamic competence fields. The link between the technological inventions and the market is believed to be unclear in many cases, but is very important (Gartner, 1985; Ulijn and Fayolle, 2004).
- The formation of a single internal European market in many ways forces companies to interact with people who have different cultural backgrounds. Because of the initial smallness of HTSUs they have to interact even more, especially if they would like to enter foreign markets.

Cooperation between HTSUs and external parties may help to overcome some of these challenges. Moreover, past research shows positive effects of cooperation on learning (Van Gils and Zwart, 2004; Cegarra-Navarro, 2005; Kim and Inkpen, 2005) and resource collection (Combs and Ketchen, 1999), among others. However, the antecedents of cooperation are themselves still poorly understood. An exploration of one of these antecedents in particular, national culture, is discussed in the following section.

CULTURE AND COOPERATION: A RESEARCH MODEL

This section explores the concept of national culture somewhat more deeply and why it may be an important antecedent for cooperative attitudes and behaviours. In the first subsection below, we elaborate on the definition of culture provided in the introduction. We also describe the link between research on culture and other economic behaviours. In the remaining subsections, we discuss the linkages that are predicted between certain national culture factors, especially individualism, uncertainty avoidance and masculinity, and various cooperative attitudes.

Definition and Past Research on Culture and Economic Behaviour

As defined by Hofstede, culture may refer to both categories and groups. A group is a number of people who are in contact with one another, as for instance, organization members, or members of a sports team. A category refers only to a characteristic that people may hold in common, and does not imply group contact, such as for instance, all people who are born in 1980, or all people living in the United Kingdom. Obviously, categorical cultures cut across group cultures. Both create social order and provide a means of sense making (Louis, 1980; Schein, 1993; Trice and Beyer, 1993). Hence, an individual's way of making sense is influenced by the cultures that he or she is part of (Salk and Shenkar, 2001; Sirmon and Lane, 2004).

As mentioned in the introduction, this chapter focuses primarily on national culture, although later we address a few other groups or categories that may influence work-related norms and values, such as professional background of HTSU members and characteristics of the industrial sector culture (Erramilli and Rao, 1993; Nightingale, 1998; Sirmon and Lane, 2004). An extensive literature already exists that supports the premise that national culture influences different aspects of economic behaviour. Thus, it has been shown to influence modes of employment (Blanchflower et al., 2001; Hofstede et al., 2004), entrepreneurial potential (Mueller and Thomas, 2000), innovation championing strategies (Shane et al., 1995), international alliance formation, dissolution and success (Cartwright and Cooper, 1993; Barkema and Vermeulen, 1997; Park and Ungson, 1997; Steensma et al., 2000a, 2000b; Sirmon and Lane, 2004), relationships in teams (Salk and Brannen, 2000), knowledge sharing (Möller and Svahn, 2004), and perceptions of others (Ulijn et al., 2003). Research supports the assumption that as national culture is already 'programmed' into individuals' minds early in life, behaviour tends to be, on average, more or less

consistent with this national culture (Hofstede, 2001; Wennekers et al., 2002: 41). Moreover, research indicates that even in companies that are known for their strong corporate culture, national culture remains of paramount importance in explaining its employees' business-related behaviour (Hofstede et al., 1990; Hofstede, 1994). The current study relies on Hofstede's (2001) dimensions of national culture. These dimensions are mutually independent and result from extensive research in 72 countries, including both developing as well as developed ones. In sum, the concepts of individualism, uncertainty avoidance and masculinity are well established, extensively researched, and believed to be relevant in this study. These dimensions have been used before in entrepreneurship research (Shane et al., 1995; Steensma et al., 2000a, 2000b; Hofstede et al., 2004).

One interesting aspect in past research on national culture is the differing roles these characteristics may play in different phases in a firm's development. Nakata and Sivakumar (1996), for instance, argue that the optimal culture differs in the initiation stage versus the implementation stage of new product development (see Table 1.1). In the initiation stage, the ideal culture may be more highly individualistic – such an atmosphere perhaps more conducive to brainstorming individual ideas. On the other hand, a collectivistic culture may promote the type of cooperation, communication and flexibility required during the implementation phase. Nakata and Sivakumar argue that opposite ideal patterns may also come into play concerning masculinity, uncertainty avoidance and power distance – with low values more suited to the initiation phase and high values in the implementation phase. The point of such an argument is that perhaps cultural diversity may allow for more flexibility, with different individuals functioning better in one phase versus the other, within the same firm or between partnerships.

We have chosen not to look at power distance in this chapter, even though it is one of the four cultural factors examined by Hofstede (2001). Although future research may want to examine this aspect, especially in

Table 1.1 Ideal cultural backgrounds for new product development (NPD) initiation and implementation

(National) Culture dimensions	NPD initiation	NPD implementation
Individualism	High	Low
Masculinity	Low	High
Uncertainty avoidance	Low	High
Power distance	Low	High

Source: Adapted from Nakata and Sivakumar (1996).

established high-technology firms, we assume its reduced relevance among very small HTSUs – especially those employing only one or two people. Thus, the proposed research model concentrates on the other three culture dimensions, individualism, masculinity and uncertainty avoidance and their possible influence on cooperative attitudes of HTSUs regarding strategic partnerships and attitudes towards partner diversity.

Individualism and Cooperation in HTSUs

Collectivism is likely to be an important influence on cooperation, as suggested in a comprehensive review of the literature by Chen et al. (1998). According to Hofstede, societies differ with regard to their emphasis on individual versus collectivist values, defining these terms as follows:

> Individualism stands for a society in which the ties between individuals are loose: everyone is expected to look after him/herself and her/his immediate family only. Collectivism stands for a society in which people from birth onwards are integrated into strong, cohesive in-groups, which throughout people's lifetime continue to protect them in exchange for unquestioning loyalty. (Hofstede, 2001: 225)

Tiessen argues that a high individualism score 'does not preclude relationships with others' (1997: 370). Rather, in his view, individualism determines the importance of the pursuit of individual versus collective benefits in relationships. In a highly individualistic society, cooperation thus does not necessarily occur less frequently than in collectivist societies but the motives for such cooperation may differ. Nevertheless, in other research, Steensma et al. (2000a) produce statistical evidence suggesting that individualism is negatively correlated with the acceptance of cooperative strategies. This confirms earlier research by Cox et al. (1991) that collectivists' propensity to cooperate appears to be higher than that of individualists. One underlying explanation may be the differences in belief systems in the two types of cultures. For instance, Hofstede (2001: 226) finds that in high-individualism societies, individuals are more likely to believe that individually made decisions are better than group decisions. In the light of existing research, we propose the first hypothesis:

> *Hypothesis 1* The higher a country's individualism, the more negative the attitudes of its HTSUs will be regarding cooperation with potential strategic partners.

The second hypothesis relates to the possible influence of individualism on choice of strategic partner. In particular, how culture might influence the

comfort level an HTSU manager might feel in working with someone from a different cultural background, a variable we shall henceforth refer to as attitudes towards partner diversity.

Past research is somewhat mixed in this regard. For instance, Möller and Svahn (2004: 222) predict that those in collectivist cultures, although they tend to cooperate more, may have a tendency to communicate primarily with others within their in-group, given their stronger social identity, whereas individualists may be more willing to communicate across cultural boundaries. However, Steensma et al. (2000a) do not find empirical evidence supporting this prediction. Thus there is the counterargument that given less acceptance of the advantages of cooperating generally, those in individualistic cultures will also see less advantage in cooperating with partners different from themselves. Thus, we come to the second hypothesis, and state it as follows:

Hypothesis 2 The higher a country's individualism index, the more negative its HTSUs' attitudes towards partner diversity are likely to be.

Uncertainty Avoidance and Cooperation in HTSUs

Hofstede defines uncertainty avoidance as 'the extent to which the members of a culture feel threatened by uncertain or unknown situations' (Hofstede, 2001: 161). What is the effect of uncertainty avoidance on the cooperation attitudes of HTSUs?

Societies show different levels of uncertainty avoidance, as their members feel more or less comfortable in uncertain or unknown situations. People tend to value structure and formal rules more in uncertainty-avoiding cultures, whereas in cultures with a low level of uncertainty avoidance people cope better with ongoing change. Hofstede (ibid.: 160) also indicates that in uncertainty-avoiding cultures there tends to be an 'ideological preference for group decisions'. According to the latter logic, especially, the amount of uncertainty avoidance is thus believed to increase the acceptance of cooperative strategies.

Hypothesis 3 The higher a country's uncertainty avoidance, the more positive the attitudes of its HTSUs will be regarding cooperation with potential strategic partners.

Furthermore, uncertainty-avoiding societies show a higher general anxiety level and a suspicion of foreigners and others, and they also show a higher resistance to change (ibid.). Steensma et al. (2000a) find that uncertainty-avoiding cultures place significantly more importance on partner

commonality in cooperation. Hence, we predict that higher uncertainty avoidance will decrease the acceptance of partner diversity:

> *Hypothesis 4* The higher a country's uncertainty avoidance index, the more negative its HTSUs' attitudes towards partner diversity are likely to be.

Masculinity and Cooperation in HTSUs

Hofstede (2001: 297) defines masculinity as follows:

> Masculinity stands for a society in which social gender roles are clearly distinct: men are supposed to be assertive, tough, and focussed on material success; women are supposed to be more modest, tender, and concerned with the quality of life. Femininity stands for a society in which social gender roles overlap: both men and women are supposed to be modest, tender, and concerned with the quality of life.

Based on this definition, we surmise that masculinity may have a negative influence on cooperation attitudes. Femininity, on the other hand, may have a positive effect on willingness to cooperate, because of the associated traits of affiliation, and caring for and belonging to a group and/or the family (Thomas, 1976; Hall, 1993, 1995).

In general, feminine cultures are believed to prefer cooperation and group decision making, whereas masculine cultures tend to prefer individual initiatives and decisions. Feminine cultures will place greater value on relationships and helping others, while masculine cultures will place greater value on careers and money, that is, more ego-related goals (Hofstede, 2001). It can thus be concluded that femininity relates more to cooperation while masculinity relates more to competition. Although research is limited on this topic, we thus propose Hypothesis 5 as follows:

> *Hypothesis 5* The higher a country's masculinity index, the more negative the attitudes of its HTSUs will be towards cooperation with potential strategic partners.

We shall not formulate a hypothesis for the relationship between masculinity and attitudes towards the benefits of partner diversity because the literature and concepts do not provide sufficient guidance to make a clear prediction. For instance, masculine societies might reject partners from different cultures, because they may be competitors or enemies (out-group). On the other hand, feminine cultures might reject partners from different cultures out of jealousy or a sense of protection of the in-group.

AN EXPLORATORY STUDY OF NATIONAL CULTURE AND HTSU ATTITUDES TOWARDS COOPERATION

This section describes an exploratory study carried out to test aspects of the research model proposed in the previous section, including a preliminary test of the five hypotheses. Furthermore, this section will describe the method, results and discussion of the findings.

Method

Sample and data-collection techniques

The research study used an English-language-based questionnaire, using an online survey design and administration tool. After the creation of the survey (see Appendix 1A), a link (URL address) was sent to a target group of 870 firms by email, accompanied by an appropriate cover letter. The cover letter specifically addressed higher-level employees and members of the team that started up the company. This is sometimes referred to as a 'key informant design' (Steensma et al., 2000b) and has been shown to be sufficiently valid, even in the case of a single respondent per company (for example, Menon et al., 1999). In the email, the respondents were asked to click on the link if willing to participate in the study. Instructions were then provided on the website regarding how to complete and return the questionnaire. The settings were changed in such a way that every respondent was allowed to participate only once and, in order to be able to transmit the survey, all questions had to be filled in. Two reminders were sent and, in total, the data-collection period spanned 36 days, slightly more than one month.

The companies in the sample were selected online by using websites of business directories, science and industrial parks, chambers of commerce and incubators. Also, personal contacts in a number of countries were used to target the HTSUs indirectly (France, Germany, Sweden, Switzerland and the UK). The following criteria were used for sample selection:

- *firm origin*: the company should be established in a European country;
- *firm age*: the company had to be less than six years old at the time of the survey;
- *technology level*: the company should have a high technology level (that is, be a high-tech company);
- *firm operating mode*: the company should be independently operating (that is, not operating as a subsidiary of a larger firm); and

- *digital firm access*: the company should be accessible through the email addresses of either its higher-level employees or its information address (this criterion did not necessarily hold for the indirect approach through personal contacts).

Table 1.2 lists the range of countries included in the sample, divided into country clusters adapted from Hofstede (2001). In some countries, fewer than two responses were received. Table 1.2 shows, in parentheses, after the name of the country, the number of respondents included in subsequent analysis. Although some culture clusters (especially Balto-Slavic and Germanic) are not well represented, there is good representation in at least two of the national clusters (namely, Greco-Latin and Nordic).

Because the full sample resulted from a mix of both a direct as well as an indirect approach of the HTSUs, the real sample sizes are unknown. Table 1.3 organizes known information based on direct contacts. A total of 812 were contacted directly by the researchers. However, out of the 109 respondents, given the methodology, it could not be determined which respondents came from the direct contacts and which from additional indirect contacts. Thus, the 13 per cent response rate is probably somewhat overstated. It appears, however, that response rates varied substantially by country. The response is, in general, skewed towards the Greco-Latin and Nordic culture clusters. Emails were sent randomly to non-respondents. Reasons for not answering were, among others, a busy schedule, an abundance of requests for filling in surveys, and irrelevance of the research for the company. To test non-response bias the respondents were divided into two groups of early and late respondents, respectively, as recommended by Armstrong and Overton (1977). After a check for variance equality across the two groups, a one-way analysis of variance was performed. From this

Table 1.2 Sample countries in culture clusters (followed by firms participating >1)

Anglo (A)	Balto-Slavic (BS)	Germanic (G)	(Greco-) Latin (GL)	Nordic (N)
Ireland (3)	Estonia	Austria	Belgium (8)	Denmark (3)
UK (9)	Lithuania	Germany (2)	Cyprus	Finland (3)
	Poland	Luxembourg	France (11)	Netherlands (37)
	Slovenia (2)		Greece	Norway
			Italy (8)	Sweden (2)
			Portugal	
			Spain (10)	

Table 1.3 Sample demographics and response rates divided by cultural cluster[a]

Cluster	Country	No. of firms targeted[b] (a)	Response (b)	As % of total response (c) (= (b/109) *100%)	Country response % (d) (= (b/a) *100%)
A	Ireland	23	3	3	13
	UK	118	9	8	8
G	Germany	74	2	2	3
GL	Belgium	78	8	7	10
	France	85	11	10	13
	Italy	55	8	7	15
	Spain	87	10	9	11
N	Denmark	26	3	3	12
	Netherlands	187	37	34	20
	Others[c]	79	18	17	23
	Total	812	109	100	13
Gender	Female		7	6	
	Male		102	94	
Support[d]	No		58	53	
	Yes		51	47	

Notes:

a. The Balto-Slavic respondents are included in the 'Others' category.
b. Column (a) excludes the addresses that could not be reached by email. Reasons for this included oversized mailboxes, non-existent addresses and recipient server errors.
c. These are: Austria, Cyprus, Estonia, Finland, Greece, Lithuania, Luxembourg, Norway, Portugal, Slovenia and Sweden.
d. Respondents indicated whether their HTSU received major support from an incubator, development company or any other support centre.

procedure there is no evidence of significant differences between the two waves of respondents for either dependent variable.

The variables

This subsection describes the variables used in the study. With the exception of the indices for national culture, the other variables are based on responses provided by respondents to the online survey. Explanatory principal components factor analysis using Varimax rotation and Kaizer normalization was used to confirm scales. The factor loadings showed sufficient convergent scale validity, as all loadings on assigned scales were found equal or above 0.60. Details of the items, including sources, scales and reliability coefficients,

are included in Appendix 1A (for more information, including results of the factor analysis, see Frankort, 2005).

Cooperative attitudes (regarding strategic partners) This scale asks respondents to rate the degree to which they agree with the belief that strategic partnerships can be beneficial to business success and growth. It averages responses to four items. For each item, a Likert-type scale is used, ranging from 1 = strongly disagree to 6 = strongly agree. The item is adapted from Steensma et al. (2000a), though the phrase, 'strategic partnerships', is substituted for the phrase, 'strategic alliances'. 'Strategic partnerships' is defined in the questionnaire as 'partnerships of various types, like joint ventures, buyer–supplier alliances, marketing alliances, technology alliances for either product or process R&D, informal bilateral agreements, and so on'.

(Attitudes towards) Partner diversity This scale uses three items averaged together on a similar Likert-type scale, measuring the degree to which respondents agree that cultural diversity benefits both strategic partners. It was constructed specifically for this study although items were adapted from Hofstede (1994), Nakata and Sivakumar (1996) and Tiessen (1997).

National culture scales: individualism, uncertainty avoidance and masculinity This study uses scores reported in Hofstede (2001) for individualism, uncertainty avoidance and masculinity (see Table 1.4). Many studies have applied these constructs and have shown their usefulness (see, for example, Shane et al., 1995; Brown, 2003; Li et al., 2004). From a theoretical point of view they have received wide attention as well (Nakata and Sivakumar, 1996, Tiessen, 1997; Chen et al., 1998). The table shows the respective indices for each country from which HTSUs responded and for which figures are available. Scores for Slovenia are similar to those for Yugoslavia, as IBM Ljubljana was part of IBM Yugoslavia at the time of Hofstede's original study. Hofstede (2001) used data gathered by analysis of surveys conducted with IBM employees in 49 countries around 1967 and 1973, which remains the benchmark for discussion of national cultures or values. Since the 1960s and 1970s his questionnaire has been replicated extensively in a large variety of studies (ibid.; see also Hofstede and Hofstede, 2005).

Cross-functional experience Respondents were asked the following question, 'To what extent do the employees in your company have experience in more than one function?'. A scale was used ranging from 1 = very little to 6 = very much.

Table 1.4 Hofstede's cultural measures for the participating countries[a] *in clusters (see Table 1.2)*

Culture cluster	Country	Individualism	Uncertainty avoidance	Masculinity
A	Ireland	70	35	68
	UK	89	35	66
BS	Slovenia	27	88	21
G	Germany	67	65	66
GL	Belgium	75	94	54
	France	71	86	43
	Greece	35	112	57
	Italy	76	75	70
	Spain	51	86	42
N	Denmark	74	23	16
	Finland	63	59	26
	Netherlands	80	53	14
	Sweden	71	29	5

Note: [a] Scores for Cyprus and Lithuania are not available in Hofstede (2001). Scores for Estonia and Poland are available through other sources (see the sources referred to in Hofstede, 2001: 502).

Gender of respondent Respondents were asked to indicate whether they were male or female (a categorical variable was created having the value 0 for female and 1 for male).

Number of partnerships Respondents were asked to indicate the number of strategic partnerships in which their firm has engaged.

Industry dynamism This scale was based on three items adapted from Covin and Slevin (1989) and Steensma et al. (2000b) and included rates of change in products/services and technology, and R&D intensity.

Company size Respondents were asked to indicate the number of employees working for their company (including themselves).

Data analysis

The relationship among study variables is explored using the inter-item correlation matrix and a stepwise OLS (ordinary least squares) regression procedure. The significance of the βs in the resulting regression models indicates the strength and direction of the relationships between the various independent and dependent variables. By using a stepwise proce-

dure, the effect of introducing the main effects in the control-variable model can be clearly observed. The inter-item correlation matrix is used to provide some additional evidence for the discriminant validity of the constructs.

Results and Initial Discussion of Results from the Exploratory Study

Descriptive statistics and bivariate analyses

Table 1.5 presents descriptive statistics of the variables as well as Pearson product-moment correlation coefficients between all variables included in analyses. It is interesting to note first of all, that the average score for cooperative attitudes regarding strategic partners is a full point higher than for attitudes of HTSUs towards partner diversity, suggesting that there is somewhat less acceptance of the benefits of taking on a partner with a different cultural background (mean = 3.86) than for cooperation with an outside strategic partner, more generally (mean = 4.65). As shown in Table 1.3, only 6 per cent of respondents are female. Regarding sector, 69 per cent of the HTSUs are service firms; 31 per cent are in manufacturing.

Results of the bivariate correlation analyses, also shown in Table 1.5, appear consistent with the predicted direction for Hypotheses 1, 2 and 5, but clearly not for Hypotheses 3 and 4. Thus individualism, as predicted in Hypothesis 1, is negatively correlated with cooperative attitudes regarding strategic partners ($r = –0.24$, $p < 0.01$) and also negatively correlated with attitudes towards partner diversity ($r = –0.20$, $p < 0.01$). Counter to Hypotheses 3 and 4, uncertainty avoidance does not predict either variable. As predicted by Hypothesis 5, however, masculinity is negatively associated with cooperative attitudes regarding strategic partners ($r = -0.25$; $p < 0.01$). Although no a priori prediction was made, no relationship is found either between masculinity and attitudes towards partner diversity ($r = 0.02$, ns).

Although cooperative attitudes regarding strategic partners and attitudes towards partner diversity are positively correlated ($r = 0.18$; $p < 0.05$), the relationship is modest enough to suggest that they are based on different constructs.[1]

Regression results and hypothesis tests

In addition to the bivariate statistics, Hypotheses 1 to 5 were also tested using a stepwise OLS regression analysis. Tables 1.6 and 1.7 display the results for prediction of each of the dependent variables, cooperative attitudes regarding strategic partners and attitudes towards partner diversity, respectively. In each table, five models are included. In each case, Model 1 shows the control variable only model. Models 2, 3 and 4 show the added effects of each of the national culture variables, individualism, uncertainty avoidance and masculinity when added separately to the control variable

Table 1.5 Intercorrelation matrix for dependent, independent and control variables[a]

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Cooperative attitudes	1.00										
2. Partner diversity	0.18*	1.00									
3. Individualism	−0.24**	−0.20**	1.00								
4. Uncertainty avoidance	0.10	0.06	−0.56****	1.00							
5. Masculinity	−0.25***	0.02	0.01	0.30***	1.00						
6. Cross-functional experience	0.25***	0.14	0.08	−0.09	−0.12	1.00					
7. Sector	−0.13	−0.17*	−0.15	0.21**	0.04	−0.01	1.00				
8. Gender	−0.12	0.05	0.22**	−0.22**	−0.20**	0.00	−0.18*	1.00			
9. No. of partnerships	0.10	0.11	−0.07	0.01	−0.23**	0.15	−0.05	−0.06	1.00		
10. Industry dynamism	0.08	0.16	−0.23**	0.23**	0.04	0.03	0.12	−0.11	−0.02	1.00	
11. Company size	0.11	0.03	−0.11	0.01	−0.12	−0.25***	0.02	0.03	0.25**	−0.16*	1.00
Mean	4.65	3.86	72.45	62.99	35.60	4.16	0.69	0.94	4.42	4.08	10.11
SD	0.84	0.95	13.20	20.86	21.84	1.42	0.47	0.25	3.20	0.86	12.40

Note: [a] All significances result from a two-tailed Pearson correlation test. * $p<0.10$; ** $p<0.05$; *** $p<0.01$; **** $p<0.001$.

Table 1.6 OLS regression models for cooperative attitudes regarding strategic partners

Explanatory variables	Model 1 β-value	Model 2 β-value	Model 3 β-value	Model 4 β-value	Model 5 β-value
Control variables					
Cross-functional experience	0.30**	0.27***	0.26**	0.22**	0.24**
Sector	−0.18*	−0.18*	−0.18*	−0.16*	−0.19**
Gender	−0.15	−0.10	−0.11	−0.20**	−0.16
No. of partnerships	−0.02	0.06	0.07	0.01	0.00
Industry dynamism	0.11	0.05	0.08	0.10	0.04
Company size	0.22	0.15	0.17	0.15	0.13
National culture variables					
Individualism		−0.24**			−0.18
Uncertainty avoidance			0.11		0.10
Masculinity				−0.27***	−0.29***
R-square	0.14	0.19	0.15	0.20	0.25
Delta *R*-square[a]		0.05**	0.01	0.06***	0.11****
Adjusted *R*-square	0.08	0.13	0.08	0.14	0.18
F-statistic	2.49**	3.10***	2.31**	3.31***	3.44****
DF	96	95	95	95	93

Note: [a] Delta *R*-square of national culture variable(s) entered last in the model. * $p<0.10$; ** $p<0.05$; *** $p<0.01$; **** $p<0.001$.

model. Finally, Model 5 includes all three variables together with the control variables.

First in examining the prediction of cooperative attitudes regarding strategic partners (Table 1.6), in the controls only model (Model 1), cross-function experience of HTSU employees has a positive effect, together with company size. The negative sign for sector is interpreted to mean that manufacturers (coded as 0) are more apt to have cooperative attitudes than service firms (coded as 1), when other variables are controlled for. In reviewing Models 2–5, company size weakens in its effect whereas the effect of the other two variables remains statistically significant. In reviewing Models 2 and 5, individualism appears to have a negative effect on cooperative attitudes (consistent with Hypothesis 1), but only when it is included alone. When masculinity, in particular, is added to the equation, its effect is weakened, suggesting that in spite of a lack of multicollinearity (tested separately), the intercorrelations between these two variables may still alter the results when both are introduced in the all variables model (Model 5).

Table 1.7 OLS regression models for attitudes towards partner diversity

Explanatory variables	Model 1 β-value	Model 2 β-value	Model 3 β-value	Model 4 β-value	Model 5 β-value
Control variables					
Cross-functional experience	0.13	0.11	0.10	0.10	0.11
Sector	−0.19*	−0.19*	−0.18*	−0.17*	−0.18*
Gender	−0.02	0.01	−0.02	−0.02	0.01
No. of partnerships	0.06	0.10	0.11	0.12	0.12
Industry dynamism	0.23*	0.17*	0.21**	0.22**	0.18*
Company size	0.10	0.04	0.06	0.07	0.04
National culture variables					
Individualism		−0.22**			−0.27**
Uncertainty avoidance			0.06		−0.09
Masculinity				0.02	0.06
R-square	0.11	0.15	0.11	0.11	0.15
Delta *R*-square[a]		0.04**	0.00	0.00	0.04
Adjusted *R*-square	0.05	0.08	0.04	0.04	0.07
F-statistic	1.94*	2.31**	1.59	1.53	1.84*
DF	96	95	95	95	93

Note: [a] Delta *R*-square of national culture variable(s) entered last in the model. * $p<0.10$; ** $p<0.05$.

Table 1.7 presents results for prediction of attitudes towards partner diversity. Once again, certain control variables predict these attitudes including sector and industry dynamism. And again, manufacturers tend to report greater recognition of the advantages of a partner from a different cultural background than do those from service industries. Interestingly, industry dynamism also predicts greater acknowledgement of the importance of partner diversity, an effect that decreases slightly, but remains statistically significant when national culture variables are also included.

The results for each hypothesis are summarized in Table 1.8. Again, there appears to be fairly good support for three of the five hypotheses: 1, 2 and 5, with little or no support for Hypotheses 3 and 4.

In sum, HTSUs in countries with higher levels of individualism and masculinity appear less likely to carry attitudes favourable to cooperation. Furthermore, those in more individualistic cultures (but not necessarily those in cultures scoring higher in masculinity) are likely to have more negative attitudes towards strategic partners from a different cultural

Table 1.8 Test of hypotheses

Hypotheses	Variables	Predicted direction	Conclusions
H1	Individualism and cooperative attitudes	Negative	Supported, except when combined with masculinity in the multiple regression analysis
H2	Individualism and attitudes towards partner diversity	Negative	Supported
H3	Uncertainty avoidance and cooperative attitudes	Positive	Rejected
H4	Uncertainty avoidance and attitudes towards partner diversity	Negative	Rejected
H5	Masculinity and cooperative attitudes	Negative	Supported

background. The level of uncertainty avoidance, on the other hand, appears to have little effect on either of these attitudes in this particular study.

Further discussion of results of the exploratory study

In reviewing the results presented in this section of the chapter, the reader should keep in mind that this study is exploratory and limited to a relatively small sample of HTSUs. These findings may or may not hold for companies with a lower level of technology or for more-established firms. The study is also limited to European companies. Nevertheless, the results suggest some interesting outcomes and directions for future research. Possible implications are discussed later in the chapter.

Individualism of the national culture and strategic partnerships

Results related to Hypotheses 1 and 2 provide support for the prediction that levels of individualism in the national culture might influence cooperative attitudes regarding strategic partners reported by HTSUs in those same countries. Indeed, both bivariate relationships as well as multiple regressions controlling for other HTSU characteristics (other than national

culture characteristics) suggest that in more individualistic cultures, HTSUs are less open to cooperation, both generally speaking, and in particular, towards strategic partners from a different culture. Again, the explanation for this finding is that in individualistic cultures, less benefit may be seen as derived from working in a group, consistent with past research by Cox et al. (1991) and Steensma et al. (2000a). The limited number of HTSUs and total countries in the overall sample require a cautionary but optimistic note, suggesting that it may nevertheless be of interest to explore the impact of this dimension on cooperative attitudes and behaviours in future research.

Uncertainty avoidance of national culture and strategic partnerships

Hypotheses 3 and 4 predicted a positive relationship between uncertainty avoidance and cooperative attitudes more generally, as well as specifically towards partners with a different cultural background. No support was found for either hypothesis. Methodological limitations aside, there may be some possible theoretical explanations for these findings. It should be noted that, especially for this prediction, support from past research was rather weak at best (see Steensma et al., 2000a and 2000b). Thus, it may well be that uncertainty avoidance, as found in the present study, is irrelevant in shaping cooperative attitudes and intentions. There are other possibilities to consider, however, with respect to future tests of the hypothesis. For instance, this study explored only the attitudes towards strategic partners and not other types of cooperative activity (such as those involving social networks). It is interesting to note that not only the lack of a positive, but also the lack of a negative significant effect seems to rule out an alternative explanation that by involving more parties and thus greater complexity, collaboration may increase uncertainty. A different view comes from research by Brown (2003), whose results suggest that especially with respect to uncertainty avoidance, entrepreneurs may have characteristics counter to the mainstream of their cultures. Thus, entrepreneurs may have greater than average ability to cope with uncertainty across cultures (in spite of the main characteristics of that culture) masking or even eliminating the effect of this aspect within the entrepreneurial 'subculture'. Such an interpretation is also raised in work by Hofstede and colleagues in separate research on self-employed individuals (Hofstede et al., 2004). In any event, the influence of uncertainty avoidance on cooperative attitudes by HTSUs is not apparent in the present study and requires further exploration and more careful study on larger random samples in future research.

Masculinity of national culture and strategic partnerships

Hypothesis 5 proposed that masculinity of the national culture may also influence cooperative attitudes among HTSUs regarding strategic

partnerships, again in a negative direction. As mentioned earlier, it may be reasoned not only that masculinity could have a negative effect, due to the tendency towards 'stand-alone' assertiveness in male-dominated cultures but that furthermore, feminine cultures may have a positive influence on the willingness to cooperate, because of the tendency in such cultures towards greater valuation of affiliation, caring for and belonging to a group (Thomas, 1976; Hall, 1993, 1995).

Other influences on cooperative attitudes regarding strategic partners and partner diversity

Three rather interesting findings in the exploratory study, in addition to the influence by national culture, are the significant effects of cross-functional experience and sector differences on cooperative attitudes and the influence of sector and industry dynamism on attitudes towards partner diversity even when national culture variables are included in the model. These findings suggest that the norms and values regarding cooperation may derive not only from the background national culture but from other aspects of the firm's environment as well.

Song et al. (1997) analysed the antecedents and consequences of cross-functional cooperation by comparing R&D, manufacturing and marketing perspectives. More broadly speaking, Sirmon and Lane (2004: 311) identify the concept of professional culture, for instance, which they define as follows:

> A professional culture exists when a group of people are employed in a functionally similar occupation share a set of norms, values and beliefs related to that occupation. Professional cultures develop through the socialization that individuals receive during their occupational education and training.

Ulijn and Weggeman (2001), Brown and Ulijn (2004) and Fayolle et al. (2005) discuss several studies pinpointing the understated effect of professional culture, such as engineering and marketing in the relation between innovation and entrepreneurship.

Sector was also found to influence cooperative attitudes. Recent research by Quintana-García and Benavides-Velasco (2004), for instance, examines the nature of cooperative attitudes within the biotechnology industry. Dorabjee et al. (1998) explore the 'subculture' found within the pharmaceutical industry. To sum up, the norms and values generated from the professional culture as well as the norms and values from a particular sector may thus also play a role in determining the balance between cooperation versus competition with potential strategic partners and is worthy of more careful attention.

Finally, industry dynamism has a positive relationship with attitudes towards partner diversity. There may be a number of reasons for this linkage but it appears to be consistent with research that shows a relationship between environmental turbulence and innovation. Thus firms that are in such industries must be open and ready for change, and this may include reaching out to partners that have new ideas to add.

Balancing assets from different cultures: possible implications of the exploratory study

Figure 1.1 groups countries with two or more respondents according to their average scores of HTSUs from each country on cooperative attitudes regarding strategic partnerships and partner diversity. Although there are certainly exceptions, a surprising number of the countries fit the overall predictions. Thus, HTSUs from most of the more feminine countries in our sample, including those from Sweden, Denmark, Slovenia and Finland report relative higher levels of cooperative attitudes regarding strategic partners (the Netherlands being an exception to the rule). Looked at in a different way, among countries with high cooperative attitudes regarding strategic partnerships (that is, Finland, Slovenia, Spain, Sweden, Denmark and Germany), only Germany reveals a high score in masculinity. Furthermore,

Low cooperative attitudes *High acceptance of partner diversity*	*High cooperative attitudes* *High acceptance of partner diversity*
Greece (high M, very low I) (GL) Italy (high M, medium I) (GL)	Finland (low M; medium I) (N) Slovenia (low M; very low I) (BS) Spain (medium M, low I) (GL) Sweden (low M, high I) (N)
Belgium (high M, high I) (GL) France (high M, high I) (GL) Ireland (high M, high I) (A) Netherlands (low M, very high I) (N) UK (high M, medium high I) (A)	Denmark (very low M; high I) (N) Germany (high M; very high I) (G)
Low cooperative attitudes *Low acceptance of partner diversity*	*High cooperative attitudes* *Low acceptance of partner diversity*

Note:
Ratings on two dimensions of national culture are included in the first parentheses: M = Masculinity; I = Individualism. Exact scores are also included in Table 1.4. Country clusters are noted in the second set of parentheses: A = Anglo; B = Balto-Slavic; G = Germanic, GL = Greco-Latin, N = Nordic. (See also Table 1.4.)

Figure 1.1 Clustering of countries in the study based on cooperative attitudes regarding strategic partners and partner diversity

all five countries in the study scoring lower for both cooperative attitudes regarding strategic partners as well as towards partner diversity – including Belgium, France, Ireland, the Netherlands and the United Kingdom – tend also to be those countries scoring particularly high on individualism. It should be noted that the overall sample is relatively small and non-random, and that in several countries only two or three HTSUs chose to participate in the exploratory study on cooperative attitudes. Thus, conclusions should be drawn with caution. Nevertheless, the results are intriguing and suggest the benefit of this line of research. If the results reflect an underlying reality, there are some interesting implications in them. First, it may well be that cooperative attitudes and feelings about partner diversity may vary considerably by country, and if so, may provide hitherto unexplained obstacles towards cross-cultural cooperation, especially for HTSUs within countries with high ratings for masculinity and individualism.

There may be other possible implications of these findings. For instance, perhaps it is possible that certain EU member states may serve as front-runners for cooperation and for reaching out to diverse strategic partners. Slovenia, for instance (consistent with low scores in both masculinity and individualism, and high scores for both cooperative attitudes regarding strategic partners and attitudes towards partner diversity) was also one of the first new member states to be allowed to adopt the euro as its currency from January 2007 on. This could be seen as a clear act of cooperation with the overall European Union as a new member state. Its cooperation on other issues is also documented in a recent book by Prašnikar and Cirman (2005) who present cases of alliances and other forms of collaboration with partners in Southeastern Europe, Turkey, Russia and China through both a strategic and cultural lens.

As mentioned earlier in the chapter, research by Nakata and Sivakumar (1996) on new product development, may point to an advantage of mixing HTSUs from different cultures (see Table 1.1). As mentioned before, they hypothesize that different stages in new product development require different strengths that result from one's national culture. They refer to these as 'stage-dependent strengths' (ibid.). A prerequisite for mixing these culturally divergent strengths is the acceptance of cultural divergence, conceptualized in the current study as attitudes towards partner diversity. Thus, combining companies high in individualism and low in masculinity (for instance, from Sweden, which also demonstrates higher cooperative attitudes), with companies low on individualism and high on masculinity (in this case, Greece or Italy), may provide an interesting combination of ideal types for initiation and implementation of new products (see Table 1.3). However, special support would need to be provided to overcome the negative cooperative attitudes towards formal strategic partners in the last

two countries, although both score well regarding attitudes towards partner diversity. However, further research on cooperative attitudes and their embeddedness in national culture may lead to more successful programmes for stimulating cross-country cooperation between HTSUs and their strategic partners within the European Union.

Summary and Preliminary Conclusions from the Exploratory Study

To summarize the empirical results presented in this section, an exploratory study was conducted of 109 HTSUs representing 13 countries within Europe and five different cultural clusters. Consistent with the research question posed at the beginning of this chapter, different aspects of national culture, in particular, uncertainty avoidance, individualism and masculinity, were examined for their possible relationships with cooperative attitudes towards strategic partnerships and partnership diversity by HTSUs within each country.

Results support the hypotheses most clearly for the negative influence of individualism on cooperative attitudes and partner diversity (Hypotheses 1 and 2) and the negative influence of masculinity on cooperative attitudes among HTSUs (Hypothesis 5). No support was found for the effect of uncertainty avoidance on cooperative attitudes and partner diversity (Hypotheses 3 and 4). In addition, research results show a positive relationship between cross-functional experience and cooperative attitudes, as well as a sector effect such that manufacturers are more apt not only to report positive cooperative attitudes towards strategic partners but also more willing to acknowledge the value of strategic partners from a different cultural background. These latter findings suggest perhaps the value of thinking of the influences of norms and values derived not only from the background culture of the country but also from one's professional experience and sector in which one works. Finally, industry dynamism is also found to be an important positive predictor of attitudes towards partner diversity, though not predictive of cooperative attitudes regarding strategic partners, more generally.

DIRECTIONS FOR FUTURE RESEARCH ON CULTURE AND COOPERATION

This chapter has introduced the notion of cooperation as an attitude embedded in the culture of the HTSU. Although primary emphasis was placed on the influence of national culture, future research could also elaborate on certain other cultural levels that may be found within or across different

societies, influenced for instance, by different types of professional experience, or work within different industries. Past research by Nightingale (1998) and Sirmon and Lane (2004) suggests that engineers, for instance, have a different mental picture from scientists. Research presented in this chapter has touched on only one possible difference, that is, comparing companies whose employees differ in extent of cross-functional experience. The exploratory study also suggests that sector may influence cooperative attitudes, manufacturers being more likely than service firms to accept the need for cooperation.

Future research must also link attitudes about cooperation to cooperative behaviours, to validate the importance of such attitudes more clearly. Nevertheless, such attitudes do appear to be predicted by norms and values embedded in national culture, as measured by Hofstede's dimensions in particular, of masculinity and uncertainty avoidance. Future research may also examine other types of national cultural characteristics, such as post-materialism, a concept originally coined by Inglehart (1997, 2000), and which in recent research has shown to be predictive of entrepreneurship rates, independently of economic factors (see Uhlaner and Thurik, 2004).

There are clearly limitations to the research presented in this chapter. First, the response rate of HTSUs varied widely by country, with several countries represented by only a few companies. Future research might better select a smaller number of countries but examine those more intensively or have the resources to set up a large random sample and more careful follow-up to determine response bias and the like. More information about respondents might be helpful as well. For instance, especially in the future, as borders become increasingly open, entrepreneurs from different ethnic and cultural backgrounds are more likely to start firms in countries different from their own origin, where both the birth and host culture possibly influence their attitudes and behaviours.

From a method standpoint, more careful attention needs to be paid to the language of study. Language also appears to be a differential barrier across countries. Thus, in spite of its size, only two German HTSUs but 34 Dutch HTSUs responded. This may in part have been due to the greater language barrier created by English in some countries versus others, though this is only a guess. Thus, although the use of the internet to gather data allowed for a rather diverse population of firms, it may be that self-selection based on language biased results from several of the countries. Future international studies on this topic would do better to include options to answer in multiple languages, preferably one native to the respondents, to avoid response bias towards those more likely to know other foreign languages, which in itself may co-vary with openness to other cultures.

Regarding other method issues, although the reliability coefficients for cooperative attitudes towards strategic partners and towards partner diversity were reasonably adequate in the current study, further examination of these concepts is necessary. Perhaps more detailed indices could be developed. Tests of external validity (such as against actual cooperative behaviours) may also improve the methodology. Furthermore, it may be useful to look at not only cooperation with respect to strategic partners but also use of social and other types of formal or informal networks other than partners *per se* (such as for instance, consultation with university or other research centres, or trade associations).

FURTHER IMPLICATIONS FOR EUROPEAN UNION POLICY

One of the key obstacles to economic growth within the European Union in the coming years is likely to be the degree to which starters can overcome barriers to success. High-technology starters or HTSUs in particular, face enormous challenges that can often be bridged only with the help of external strategic partners (see, for example, Combs and Ketchen, 1999). However, due to an unconscious discomfort from working with others different from themselves, companies only look for partners with similar backgrounds. In doing so, they may exclude a much wider pool of potential collaborators, limiting their access to knowledge and expertise. Findings from the exploratory study presented in this chapter suggest that the notion of cooperation – within and between cultural boundaries – is a more comfortable notion for HTSUs from certain countries (that is, those with lower individualism and masculinity) than for others.

The research presented in this chapter does not provide direct solutions to the problem. However, it appears that there are significant differences in attitudes towards cooperation regarding strategic partners, and more specifically, towards those with different backgrounds and cultures. Given such variations in comfort levels across cultures, companies within those countries whose cultures are most open to cooperation can provide a leading role in stimulating cross-cultural alliances with their European neighbours. It is unclear how this might take place or whether national governments or agencies serving the European Union could expedite opportunities for such alliances.

One key may be the other findings in the study, which show an independent effect of industry dynamism and sector. Those companies in the most dynamic industries (especially within manufacturing) might lead the way with alliances, with secondary alliances evolving with their suppliers and clients (including those in less-dynamic industries and/or in the service

sector). Such companies might be brought together in different forums, either to discuss the problem of collaboration directly, or to be enticed by other educational or business topics of common interest.

As pointed out in the opening section of this chapter, facilitating cooperation among firms is likely to become an increasingly important success factor for HTSUs and for the European Community in general. The European Union is faced with tremendous obstacles as well as opportunities given the particularly diverse sets of cultures within its ever-widening borders. Although the focus of this chapter has been primarily upon the differences based on national culture, and how these may influence cooperation, future studies may want to examine how cooperative norms and attitudes are influenced by other contextual and cultural elements within the organization, such as profession or industry, and how these interact with national culture effects (see, for example, Sirmon and Lane, 2004). Also, future research needs to target not only attitudes but also the understanding of cooperative behaviours across firms and cultures. In short, cooperation between HTSUs and external parties may help to overcome some of the common hurdles faced by HTSUs, but only if different cultural barriers can be overcome. The reader should be cautioned that this chapter has not explored possible negative consequences of cooperation. The underlying rationale for wariness regarding partnering may be well established, yet has not been explored. More research on the topic of culture and cooperation is needed, including more thorough examinations of the consequences of cooperative attitudes and behaviours. Nevertheless, in the meantime, creating opportunities for HTSUs to mix in positive situations may help to break down the cultural barriers that exist.

This chapter has hopefully stimulated some thought on the topic of cooperation, and more specifically the possible antecedents and consequences of cooperative attitudes. Preliminary data point to the importance of considering both organizational contextual elements (differences, for instance, in industry characteristics or professional mix) as well as national culture, in understanding the openness the HTSUs may have towards setting up relationships with outsider partners, both those from within the same culture and those with a different cultural background.

NOTES

* The authors gratefully acknowledge the support received by the European Foundation for Management Development (EFMD), Brussels, Belgium, during the empirical part of this study. In addition, Lorraine Uhlaner would also like to acknowledge the financial support of this research by Arenthals Grant Thornton accountants and advisers, Fortis Bank, and Fortis MeesPierson private banking, the private bankers of Fortis Bank.

1. The factor analysis also strongly supports this assertion, see Frankort (2005).

REFERENCES

Ali, Abbas J. (2005), *Islamic Perspectives on Management and Organization*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.

Alpander, Guvenc G., Kent D. Carter and Roderick A. Forsgren (1990), 'Managerial issues and problem-solving in the formative years', *Journal of Small Business Management*, **28** (2), 9–19.

Armstrong, J.S. and T.S. Overton (1977), 'Estimating nonresponse bias in mail surveys', *Journal of Marketing Research*, **14** (3), 396–402.

Audretsch, David B. (1998), 'The contribution of entrepreneurship', in EIM (Economisch Instituut voor het Midden – en Kleinbedrijf), *Entrepreneurship in the Netherlands. New Firms: The Key to Competitiveness and Growth*, Zoetermeer, The Netherlands: EIM, pp. 3–16.

Barkema, Harry G. and Freek Vermeulen (1997), 'What differences in the cultural backgrounds of partners are detrimental for international joint ventures?', *Journal of International Business Studies*, **28** (4), 845–64.

Barnard, Chester (1938), *The Functions of the Executive*, Cambridge, MA: Harvard University Press.

Blanchflower, David G., Andrew Oswald and Alois Stutzer (2001), 'Latent entrepreneurship across nations', *European Economic Review*, **45** (4–6), 680–91.

Brown, Kate (2003), 'Cultural dimensions of New Zealand entrepreneurial behavior', paper presented at the 16th Annual Conference of Small Enterprise Association of Australia and New Zealand, University of Ballarat, 28, September–1, October.

Brown, Terrence E. and Jan Ulijn (2004), *Innovation, Entrepreneurship and Culture*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.

Caloghirou, Yannis, George Hondroyiannis and Nicholas S. Vonortas (2003), 'The performance of research partnerships', *Managerial and Decision Economics*, **24**, 85–99.

Cartwright, Susan and Cary L. Cooper (1993), 'The role of culture compatibility in successful organizational marriage', *Academy of Management Executive*, **7** (2), 57–70.

Cavusgil, S. Tamer, Roger J. Calantone and Yushan Zhao (2003), 'Tacit knowledge transfer and firm innovation capability', *Journal of Business and Industrial Marketing*, **18** (1), 6–21.

Cegarra-Navarro, J.G. (2005), 'An empirical investigation of organizational learning through strategic alliances between SMEs', *Journal of Strategic Marketing*, **13** (1), 3–16.

Chen, Chao C., Xiao-Ping Chen and James R. Meindl (1998), 'How can cooperation be fostered? The cultural effects of individualism–collectivism', *Academy of Management Review*, **23** (2), 285–304.

Combs, James G. and David J. Ketchen Jr (1999), 'Explaining interfirm cooperation and performance: toward a reconciliation of predictions from the resource-based view and organizational economics', *Strategic Management Journal*, **20** (9), 867–88.

Cottica, Alberto and Giovanni Ponti (2004), 'Dynamic networks in innovation-intensive industries', in Patrizio Bianchi and Sandrine Labory (eds), *The Economic Importance of Intangible Assets*, Aldershot, UK: Ashgate, pp. 137–52.

Covin, Jeffrey G. and Dennis P. Slevin (1989), 'Strategic management of small firms in hostile and benign environments', *Strategic Management Journal*, **10** (1), 75–87.

Cox, Taylor H., Sharon A. Lobel and Poppy Lauretta McLeod (1991), 'Effects of ethnic group cultural differences on cooperative and competitive behavior on a group task', *Academy of Management Journal*, **34** (4), 827–47.
Dorabjee, S., C.E. Lumley and S. Cartwright (1998), 'Culture, innovation and successful development of new medicines: an exploratory study of the pharmaceutical industry', *Leadership and Organization Development Journal*, **19** (4), 199–210.
Erramilli, M.K. and C.P. Rao (1993), 'Service firms' international entry mode choice: a modified transaction-cost analysis approach', *Journal of Marketing*, **57**, 19–38.
European Commission (2002), 'Observatory of European SMEs', Enterprise Publication, 2002/6.
European Commission (2003), 'Observatory of European SMEs: SMEs and Cooperation', Enterprise Publication, 2003/5.
European Union (2005), 'The European Union at a glance', European Union, http://europa.eu.int.
Fayolle, A., J. Ulijn and J.-M. Degeorge (2005), 'The entrepreneurial and innovative orientation of French, German and Dutch engineers: the proposal of a European context based upon some empirical evidence from two studies', in A. Fayolle, P. Kyrö and J. Ulijn (eds), *Entrepreneurship Research in Europe: Outcomes and Perspectives*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar, pp. 227–55.
Frankort, J.T.W. (2005), 'The culture of European high-tech start-ups: an empirical exploration of its influence on strategic cooperation and partner selection', unpublished MSc thesis, Eindhoven University of Technology.
Gartner, William B. (1985), 'A conceptual framework for describing the phenomenon of new venture creation', *Academy of Management Review*, **10** (4), 696–706.
Hall, W.J. (1993), 'Encompassing Culture and Managing Strategic Relationships, PhD thesis', Vrije Universiteit, Amsterdam.
Hall, W.J. (1995), *Managing Cultures: Making Strategic Relationships Work*, Chichester: Wiley.
Harrison, Jeffrey S., Michael A. Hitt, Robert E. Hoskisson and R. Duane Ireland (2001), 'Resource complementarity in business combinations: extending the logic to organizational alliances', *Journal of Management*, **27**, 679–90.
Hofstede, Geert (1994), 'The business of international business is culture', *International Business Review*, **3** (1), 1–14.
Hofstede, Geert (2001), *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations across Nations*, London: Sage.
Hofstede, Geert and Gert Jan Hofstede (2005), *Cultures and Organizations: Software of the Mind*, 2nd edn, New York: McGraw-Hill.
Hofstede, Geert, Bram Neuijen, Denise Daval Ohayv and Geert Sanders (1990), 'Measuring organizational cultures: a qualitative and quantitative study across twenty cases', *Administrative Science Quarterly*, **35**, 286–316.
Hofstede, Geert, Niels G. Noorderhaven, A. Roy Thurik, Lorraine M. Uhlaner, Alexander R.M. Wennekers and Ralph E. Wildeman (2004), 'Culture's role in entrepreneurship: self-employment out of dissatisfaction', in Brown and Ulijn (eds), pp. 162–203.
Inglehart, R. (1997), *Modernization and Post-modernization: Cultural, Economic and Political Change in 43 Societies*, Princeton, NJ: Princeton University Press.
Inglehart, R. (2000), 'Globalization and postmodern values', *The Washington Quarterly*, **23** (1), 215–28.
Kim, Chang-Su and Andrew C. Inkpen (2005), 'Cross-border R&D alliances,

absorptive capacity and technology learning', *Journal of International Management*, **11** (3), 313–29.
Labory, Sandrine (2004), 'EU policies for innovation and knowledge diffusion', in Patrizio Bianchi and Sandrine Labory, *The Economic Importance of Intangible Assets*, Aldershot, UK: Ashgate, pp. 49–72.
Li, Chieh-Lu, Harry C. Zinn, Garry E. Chick, Alan R. Graefe and James D. Absher (2004), 'Hofstede's measure of cultural values in a national forest recreation context', working paper, Finnish Forest Research Institute, Helsinki, 2-2004.
Louis, Meryl Reis (1980), 'Surprise and sense making: what newcomers experience in entering unfamiliar organizational settings', *Administrative Science Quarterly*, **25** (2), 226–51.
Menon, Anil, Sundar G. Bharadwaj, Phani Tej Adidam and Steven W. Edison (1999), 'Antecedents and consequences of marketing strategy making: a model and a test', *Journal of Marketing*, **63** (2), 18–40.
Möller, Kristian and Senja Svahn (2004), 'Crossing East–West boundaries: knowledge-sharing in intercultural business networks', *Journal of World Business*, **33**, 219–28.
Mueller, Stephen L. and Anisya S. Thomas (2000), 'Culture and entrepreneurial potential: a nine country study of locus of control and innovativeness', *Journal of Business Venturing*, **16** (1), 51–75.
Murray, Alasdair (2003), 'Der Lissabon-Anzeiger: EU Wirtschaftsreformen vor der Osterweiterung', working paper, Centre for European Reform, London.
Nakata, Cheryl and K. Sivakumar (1996), 'National culture and new product development: an integrative review', *Journal of Marketing*, **60** (1), 61–72.
Nightingale, Paul (1998), 'A cognitive model of innovation', *Research Policy*, **27**, 689–709.
Nonaka, Ikujiro and Hirotaka Takeuchi (1995), *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford and New York: Oxford University Press.
Olson, Philip D. (1987), 'Entrepreneurship and management', *Journal of Small Business Management*, **25** (3), 7–13.
Organization for Economic Cooperation and Development (OECD) (1998), *Fostering Entrepreneurship*, Paris: OECD.
Park, Seung Ho and Gerardo R. Ungson (1997), 'The effect of national culture, organizational complementarity, and economic motivation on joint venture dissolution', *Academy of Management Journal*, **40** (2), 279–307.
Prašnikar, Janez and Andreja Cirman (eds) (2005), *Global Economy and Cultural Diversity*, 7th Portoroz Business Conference (Slovenia), 17–18 November.
Quintana-García, Cristina and Carlos A. Benavides-Velasco (2004), 'Cooperation, competition, and innovative capability: a panel data of European dedicated biotechnology firms', *Technovation*, **24**, 927–38.
Salk, Jane E. and Mary Yoko Brannen (2000), 'National culture, networks, and individual influence in a multinational management team', *Academy of Management Journal*, **43** (3), 191–202.
Salk, Jane E. and Oded Shenkar (2001), 'Social identities in an international joint venture: an exploratory case study', *Organization Science*, **12** (2), 161–78.
Sarkar, M.B., R.A.J. Echambadi and Jeffrey S. Harrison (2001), 'Alliance entrepreneurship and firm market performance', *Strategic Management Journal*, **22**, 701–11.

Schein, Edgar H. (1993), *Organizational Culture and Leadership*, 2nd edn, San Francisco: Jossey-Bass.
Shane, Scott (1995), 'Is the independent entrepreneurial firm a valuable organizational form?', *Academy of Management Journal*, Best Papers Proceedings, 110–13.
Shane, Scott, S. Venkataraman and Ian MacMillan (1995), 'Cultural differences in innovation championing strategies', *Journal of Management*, **21** (5), 931–52.
Shuster, Laurie A. (1999), 'Growing pains', *Civil Engineering*, **69** (5), 64–5.
Sirmon, David G. and Peter J. Lane (2004), 'A model of cultural differences and international alliance performance', *Journal of International Business Studies*, **35** (4), 306–19.
Snijders, Jacqueline and Koos van Elk (1998), 'Some characteristics and trends of Dutch entrepreneurship', in EIM, *Entrepreneurship in the Netherlands. New Firms: the Key to Competitiveness and Growth*, Zoetermeer, The Netherlands: EIM, pp. 17–34.
Song, X. Michael, Mitzi M. Montoya-Weiss and Jeffrey B. Schmidt (1997), 'Antecedents and consequences of cross-functional cooperation: a comparison of R&D, manufacturing, and marketing perspectives', *Journal of Product Innovation Management*, **14**, 35–47.
Steensma, H. Kevin, Louis Marino and K. Mark Weaver (2000a), 'Attitudes toward cooperative strategies: a cross-cultural analysis of entrepreneurs', *Journal of International Business Studies*, **31** (4), 591–609.
Steensma, H. Kevin, Louis Marino, K. Mark Weaver and Pat H. Dickinson (2000b), 'The influence of national culture on the formation of technology alliances by entrepreneurial firms', *Academy of Management Journal*, **43** (5), 951–73.
Sull, Donald N. (2004), 'Disciplined entrepreneurship', *Sloan Management Review*, **46** (1), 71–7.
Thomas, K. (1976), 'Conflict and conflict management', in M. Dunnette (ed.), *The Handbook of Industrial and Organizational Psychology*, Chicago: Rand McNally, pp. 889–935.
Tiessen, James H. (1997), 'Individualism, collectivism, and entrepreneurship: a framework for international comparative research', *Journal of Business Venturing*, **12** (5), 367–84.
Tihanyi, L., D.A. Griffith and C.J. Russell (2005), 'The effect of cultural distance on entry mode choice, international diversification, and MNE performance: a meta-analysis', *Journal of International Business Studies*, **36**, 270–83.
Treen, Doug (2001), 'The HR challenge for the high-tech start-up', *Ivey Business Journal*, **65** (3), 10–12.
Trice, Harrison M. and Janice M. Beyer (1993), *The Cultures of Work Organizations*, Englewood Cliffs, NJ: Prentice-Hall.
Uhlaner, Lorraine M. and A.R. Thurik (2004), 'Post-materialism: a cultural factor influencing total entrepreneurial activity across nations', Paper 07-2004: Series: Papers on Entrepreneurship, Growth and Public Policy, Jena, Germany: Max Planck Institute for Research into Economic Systems.
Ulijn, Jan M., Geert Duysters, Rainer Schaetzlein and Sebastian Remer (2003), 'Culture and its perception in strategic alliances, does it affect the performance? An exploratory study into Dutch–German ventures', Working Paper 03.05, Eindhoven Centre for Innovation Studies, The Netherlands, March.
Ulijn, Jan M. and Alain Fayolle (2004), 'Towards cooperation between European start-ups: the position of the French, Dutch and German entrepreneurial and innovative engineer', in Brown and Ulijn (eds), pp. 204–32.

Ulijn, Jan M. and Mathieu Weggeman (2001), 'Towards an innovation culture: what are its national, corporate, marketing, and engineering aspects, some experimental evidence', in C. Cooper, S. Cartwright and C. Early (eds), *Handbook of Organizational Culture and Climate*, Chichester: Wiley, pp. 487–517.

van Gils, Anita and Peter Zwart (2004), 'Knowledge acquisition and learning in Dutch and Belgian SMEs: the role of strategic alliances', *European Management Journal*, **22** (6), 685–92.

Wennekers, Sander, Lorraine M. Uhlaner and Roy Thurik (2002), 'Entrepreneurship and its conditions: a macro perspective', *International Journal of Entrepreneurship Education*, **1** (1), 25–64.

APPENDIX 1A

Table 1A.1 Description of variables

Variable	Question	Scale used
Cooperative attitude variables		
Cooperative attitudes regarding strategic partners Cronbach-alpha = 0.74	A scale was formed from averaging the following four items (adapted from Steensma et al., 2000a): 1. Both large and small companies will have to 'network' increasingly, i.e., enter into strategic partnerships to achieve success 2. Creating strategic partnerships can be an alternative to being acquired 3. For businesses interested in growth, strategic partnerships offer excellent opportunities 4. In the future, both large and small companies will be required to enter into strategic partnerships to achieve success	(1 = Strongly disagree; 6 = Strongly agree)
Attitudes towards partner diversity (Acceptance of) Cronbach-alpha = 0.76	A scale was formed from averaging the following three items: 1. In a strategic partnership cultural value differences benefit both parties 2. In a strategic partnership heterogeneity should be favoured above homogeneity 3. In a strategic partnership one should favour cultural dissimilarity	(1 = Strongly disagree; 6 = Strongly agree)
National culture variables		
Individualism	Respondents were asked their country of origin. This country was matched with the Individualism Index as provided in Hofstede (2001)	A higher score = a more individualistic culture
Uncertainty avoidance	Respondents were asked their country of origin. This country was matched with the Uncertainty Avoidance Index as provided in Hofstede (2001)	A higher score = a more uncertainty-avoiding culture
Masculinity	Respondents were asked their country of origin. This country was matched with the Masculinity Index as provided in Hofstede (2001)	A higher score = a more masculine culture

Table 1A.1 (continued)

Variable	Question	Scale used
Control variables		
Cross-functional experience	Respondents were asked the following question: According to you, to what extent do the employees in your company have experience in more than one function?	(1 = Very little; 6 = Very much)
Sector	Respondents were asked the following: My company focuses on: Manufacturing Providing services	(Manufacturing = 0; Providing services = 1)
Gender of respondent	Respondents were asked: What is your gender? Female Male	(Female = 0; Male = 1)
Number of partnerships	Respondents were asked: How many strategic partnerships has your company engaged in?	Higher number = more partnerships
Industry dynamism Cronbach-alpha = 0.55	A scale was formed from averaging responses to the following four items (adapted from Covin and Slevin, 1989): 1. How do you judge the rate at which products/services become obsolete in the sector? 2. How do you judge the rate at which production/service technology changes in the sector? 3. How do you judge the R&D intensity in your sector?	(1 = Very low; 6 = Very high)
Company size	Respondents were asked: How many employees does your company have (including yourself)?	Higher number = larger company

2. Entrepreneurship in a high-tech venture: psychological and social methods of survival assessment in the aerospace sector

Moniel Verhoeven, Arjen Verhoeff, Dominique Drillon and Jan Ulijn

INTRODUCTION

> When I first succeeded my father, for me entrepreneurship was making ideas work in a technical sense. Nowadays it is much more how we – my partner Nico van Putten and me – can deal in a constructive way with the qualities that this community offers. (Raoul Voeten, engineer/entrepreneur of Bradford, December 2005)

This chapter analyses the performance and survival of familial companies in the domain of a techno-venture. What is the common ground between Bill Gates, Michael Dell, Larry Ellison and Steve Jobs? Every one of them has created his own company from scratch. Furthermore, these founders have built an empire in the domain of information technology, telecommunications and the grey matter of the brain. Why and how did these companies develop in such an impressive way, in a technological and especially economic perspective? How can we understand this success? First, behind such industrial mega performances emerge some remarkable persons – their founders. What are the determinants that stimulated them to create and develop their business? Apparently, they have the talent to organize and sustain the growth of their business. The way the community created by founders acts can be another explanation of such success. Is the community effective because it adopted the spirit of the founder, or has the community developed its own dynamics and used the talents of the founder as a stepping-stone to implement its own effective working patterns? In other words: what is crucial in a successful entrepreneur in a high-tech venture? Is it the intuition and experience of the founder or is it the opportunity-driven perception of the community? More specifically, regarding

the engineer/entrepreneur, the frequently asked question arises whether he or she is a little autistic by nature or a team player at heart.

The exploration will be illustrated by the case of the Bradford company. We have focused on the aerospace industry to illustrate a case of a start-up in a technological sector. Bradford's evolution will be analysed from the moment of its founding. We could have studied other sectors such as the food industry, automotive industry or services. However, we have chosen the European aerospace sector because it connects the traditional industrial world with the knowledge society. A recent study from Harvard in this sector (Wasserman et al., 2001) shows that during the last 19 years some 532 high-tech companies have been founded. This is certainly a substantial amount of techno-start-ups that is worth investigating. Despite the large literature on leadership on the question, 'Does leadership matter?', Wasserman concludes that previous studies have diverged in their assessments of the impact of chief executive officers (CEOs) on company performance. Therefore Wasserman focuses on the reframed question: 'When does leadership matter?'. The study shows that the influence of the CEO in the high-tech sector is more important in comparison with other sectors. This outcome is important for our study on cooperation as we want to investigate whether cooperation does matter in a high-tech venture and what is the influence of the entrepreneur.

An exploration of cooperation opens various methodological issues. First, what is the most interesting focus of research? Will it be the individual entrepreneur, or the community? Do we need to explore the conscious part of the mind, or the unconscious domain where we might find the intuitive and emotional context of reason? Will there be issues of masculinity or femininity? Of course, we could start our analysis from the idea that is embodied in the tradition of René Descartes, Immanuel Kant and many others to view the entrepreneurial mind as prior to, and independent of, language. Given that the object of study is at the crossroads of many sciences we prefer an approach from the grounded theory of interactions between mindsets and physical states of individuals. However, the most original contribution in this chapter might be to look at a high-tech venture from the perspective of human sciences. Traditionally, the success or failure of a high-tech venture is first and foremost seen as an issue of technology. Furthermore, the question could be: what is the right mix of 'human' and technology for sustaining the success of a high-tech venture?

In sum, we tell a story of the myth of the Bradford high-tech venture. However, we are aware that our approach demands a good deal of patience from the reader as we want to use the 'myth' of Bradford as an example within a framework of analysis. First, the narrative approach is an analytical method as such. To understand Bradford as a case we further need to under-

stand the rather complex context of European aerospace policy. Moreover, by using psychological and sociological methods, the scientific framework focused on cooperation is hybrid by nature. And last, but not least, these methods and frameworks have not been used before, and therefore a series of relevant scientific methodological issues should also be explored.

High-tech Venture and Cooperation

The first association one might have about an engineer/entrepreneur who is involved in a techno-start-up is with an innovative product. For instance, some engineer has a brilliant idea and succeeds in designing a product and making it reproducible. Then, he (or she) realizes that other people are needed to produce and sell it. He has found investors that believe in the profitability of launching the product in a certain market. As a founder of a company he hires the first employee. This last step can be qualified as a critical incident (Flanagan, 1954). Of course, this marks the moment when statisticians will say that another company has succeeded in climbing the high entry barrier of a high-technology sector, and the European Commission would conclude that another network of knowledge creation has been added to a strategic sector, while economists could evaluate whether this milestone might affect one of the five competitive forces as used by Porter (1990).

However, those are not the reasons to label the hiring of personnel as a 'critical incident'. The reason is hidden in the expectations of both entrepreneur and employee on what the labour relation is about. In most cases, the entrepreneur thinks that she/he is hiring 'hands' or 'knowledge' when hiring her/his first employee. This is the first pitfall. To a founder it might be obvious how to behave to obtain the results aimed for, while an employee is just offering his/her skills, without even being aware of the personal drive of the founder. This situation could result in a perpetual monologue of the entrepreneur or it could lead to some kind of dialogue between employer and employees, accompanied by some sort of negotiation process. Which of the outcomes will become reality is more dependent on how the entrepreneur is managing the expectation in the relation than on the focus on the technical dimension of the product or on the system of reproduction (AWVN, 2005). In terms of a negotiation process, the process of hiring personnel can be seen as follows: initially, the entrepreneur will be focused on enlarging the capacity of content in know-how or show-how. When the entrepreneur is not aware of the need to distinguish between content (the product) and relation (the expectations of the employee), the chances are great that he/she will neglect the relational aspect. However, even in these conditions, with only a few employees the chance that a constructive

dialogue will eventually develop is quite high. As soon as the number of employees starts to grow, the direct influence of the entrepreneur on the individual manager or employee will diminish. Instead, his/her intentions and beliefs will be heard indirectly using the voices of hierarchy and the available systems of communication. In this stage, a more professional corporate culture is developed. In some companies with a long history, such as Siemens, Stora Enso or the Rabobank, the original ethos of the founder is still alive, while in other companies other cultural beliefs have developed. Here, the relevant question is whether the founder/owner can manage to be a team player or develop such skills by nurturing them within the company.

This chapter explores the mechanisms through which the entrepreneur and his/her managers or employees interact. This means that we have to deal with personal traits, that is, the psychological dimension and the cultural settings, which are typical sociological dimensions. In order to specify a research question we have to focus further on what precisely is the interaction between the person of the engineer/entrepreneur and his/her community of practice. Here we shall exclude from the exploration the interaction based on economic motives, that is competition. What we shall look for are patterns of cooperation. But where does cooperation start? Is it already in the brain or the heart of the engineer/entrepreneur?

Is Cooperation a Necessary Condition for Success?

First, at the founders' level the creation of a start-up can be explained as a means of survival (Drillon, 2005). This can be the result of an innate drive. If this is the case, then cooperation would start in the brain or the heart of the individual, an orientation that is dictated by the way in which the brain operates (see the subsection on the psycho-analytical approach). A critical incident that is equally important in the survival of the company is hidden in the transfer of power from the founders who have created the firm to the successors who will take care of its further development. The selection of successors is crucial for the survival of the firm. In the high-tech sector, where the longer term is filled with uncertainty and risk, you must be able to imagine the future, be decisive in complex matters, and be radical in shifts, given the changing context of the company. This requires capabilities that are related to know-how (content) and also to the know-who (relation).

Second, between the different stakeholders, cooperation can be seen as a process that occurs when people meet. Here the interaction is leading. In order to explore this, we shall describe how a community of practice operates regarding cooperation. How does cooperation contribute to success? From the first step of the creation of a start-up the founder is surrounded

by people who are involved in the initial activities, the relevant network, the availability of human resources and the regional conditions of an economic, political or technological nature. The force of a team of founding fathers is well known. For example, Bill Gates formed a duo with Paul Allen, Bill Hewlett with David Packard. With their complementary competences such teams can be very productive. Thus people with complementary competences can handle a larger spectrum of leadership than they would be able to do on their own. This complementarity develops from family relations or can grow between colleagues or former members of a team in a company. Of course, complementarity in a team is not simply a natural gift; the positive relations between founders can deteriorate and then become a source of conflicts.

The roots for cooperation are not limited to the immediate neighbourhood of the engineer/entrepreneur. Stakeholders such as the employees, the customers or the suppliers are highly relevant in the social panorama of cooperation. From the perspective of cooperation we want to investigate further the question that Wasserman posed: 'When does leadership matter?'. In order to do this we look at entrepreneurship in a high-tech venture from the psychological as well as the sociological viewpoint. The research question on cooperation can be formulated as follows: is (internal and external) cooperation between stakeholders a necessary condition for success in a techno-venture? To explore this question we use the narrative analysis of the myth, supported by methods of survival assessment from psychology and sociology. To apply this to practice, we conducted a series of interviews with the two directors of Bradford.

Relevant Relationships in Cooperation

As we noted in the introduction, this study applies some complex methodological issues. While we do not know in advance what will be relevant or important for the analysis, we approach the history and growth of Bradford as a 'modern myth of origin'. To understand the evolution of Bradford we try to tell this story from different perspectives, in order to obtain an enriched story and to start the scientific quest from grounded theory. A myth is expressed in the group itself as a point of reference and is explained in the setting of an oral tradition: the history has to be told. Several characteristics can be distinguished in a myth. First, a myth tells about a 'founding hero': a remarkable person, often with masculine characteristics, who introduces rules and regulations for the people who are going to support him during the growth of the techno-venture. Second, it explains how a specific group developed and what its roots were. When the social structure is called a 'myth' it also makes clear how everybody should

behave: habits, ways of living together and a specific morale (moral) are explained. The myth shows and transmits a particular mirror of a technical and political 'lifestyle'. Finally, a myth seems to sustain the organization in a more powerful way when the founding hero is no longer part of the community that he founded. In a techno-venture the founder is often eliminated. The myth about Bradford will be told from the viewpoint of the founders and from the viewpoint of the working community. We try to be systematic in our analysis by making use of insights from different scientific domains. This also offers the option to combine such methods rooted in sociology and psycho-analysis in a triangular way, although only in an intuitive way, which brings us to the question of what relationships are at stake here.

In order to explore this research question, we shall focus on the relations that are needed to manage a successful techno-venture. First, there is the relation between the (un)conscious motivation of the engineer/entrepreneur and the employees, which is of a psycho-analytical nature. The development of talent, high potential and competencies of employees in general is a necessary condition for further growth. In organizations where brains are more critical than hands, where information is more important than raw material, it is necessary to attract, control and keep talent. The orientations of managers and employees have become different from those in the classical industrial organization. The values no longer stem from authority and obedience (Ghoshal and Bartlett, 1997). Employees need autonomy and responsibility to offer the maximum of added value. As soon as a start-up has developed a certain volume in employment, the management is confronted with yet another challenge: how to cope with different generations: the first team of pioneers, the first generation of regular employees, and the youngest generation. They all bring their own expectations, modes of education and the societal values of their generation. In other words, each generation brings its own perspective of time, work space and life rhythm. As the time perspective of one generation will differ from another, this might introduce a certain distortion, as viewed from the perspective of another generation, which can be a source of mental stress.

Apart from such and other intercultural differences, the question arises how to stimulate cooperation across generations and professions. Here, a second relationship comes to mind – that between the people inside the company, who act as a community: the supervisors and employees. The rapid movements in global competition leave the start-up no room for moments of rest. In each stage of development the start-up has to refocus on the changing context of its market position to increase competitiveness. This not only requires a collective shift for the community of practice as a whole, but also sets a burden on the individual capacity to adapt to

changing circumstances. A third relation now becomes relevant: that between the working communities and the business environment. A fourth relation emerges from the interaction between the community and other parts of human society. Here, the balance between work and private life becomes relevant. Differences in national cultures can also be at stake. In sum, we distinguish between four types of relations:

1. that between the (un)conscious motivation of the engineer/entrepreneur and the expectations of the employees;
2. that between the people inside the company, who act as a community;
3. that between the working community and the business environment; and
4. that between the working community and other parts of human society.

The first relation is of a more psycho-analytical nature, while the next three tend to be characterized by a sociological signature. The four relations are represented in Figure 2.1.

Influences from evolutions in generations and revolutionary changes in the economic context put a tremendous mental pressure on managers and employees. To explore how such changes can be 'decoded' we make use of two different and complementary scientific disciplines: psycho-analysis and sociology. Psycho-analysis is interested in the individual. This discipline will go beyond what looks apparent and will investigate the unconscious mind of the individual. Sociology is interested in groups, in how a team or an organization behaves and what are the underlying patterns and interactions. The interpretation of the behaviour of individuals and groups will

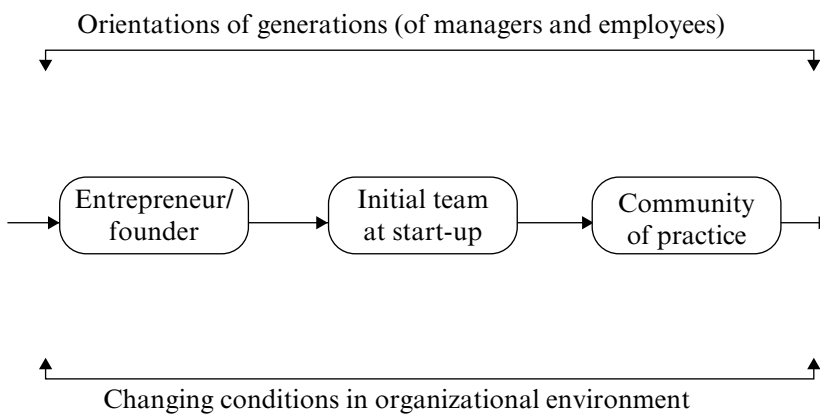


Figure 2.1 The relevant relations in the development of a start-up to a community of practice

open up the possibility of analysing the implicit, the tacit, and the things that are hidden in and between minds. This means that we have to deal with a hybrid methodological approach. As far as we know, this dual approach is new in the assessment of entrepreneurship survival. We shall therefore combine a new method of psycho-analysis with a sociological analysis. This will be explained in the next subsection.

Methodological Validity

The analysis in this chapter is primarily based on narrating a myth of entrepreneurship. The first methodological issue is whether a myth by nature is suitable for further analysis. Is it not the strength of a myth that one should draw one's own conclusions from such a story and leave the myth as it is? Here we want to develop the methodology further in order to analyse how the intuitive and rational dimensions of entrepreneurship contribute to success. A criterion for judging the narrative on its merit might at best be based on face validity (Miles and Huberman, 1994). To support the description of the development of a myth we use the psycho-analytical and anthropological approach. Here, other scientific criteria can be applied. The two methods should show some internal validity: do the results make sense? Are they complementary in their conclusions? Do we have an authentic portrait of what we are looking at? In further research the criterion of reliability will also become relevant: is the process of study consistent over time and across researchers? Then the issue of external validity should reveal whether the results can be transferred to other contexts. Another criterion that is relevant is the ecological validity: is the approach relevant for companies other than the case at hand? Apart from the methodological criteria there is a more profound layer in the discussion on methodology, which concerns the awareness that more is going on than just another analysis, albeit a hybrid one. This relates to the feeling expressed already by many authors that a new shift in paradigm is in process. Peter Drucker (1993) wishes for a paradigm change: the metaphor of the army rooted in the military–agricultural complex should give place to the musical metaphor of the symphony orchestra or the 'jazz combo' (p. 84). He sees the re-engineering of the team cooperating like a jazz combo, because 'organizations will work more and more with other organizations in a bewildering variety of alliances and partnerships' (p. 87). Power, command and control should change in the direction of social responsibility of organizations. The modality to implement this is by seeing the organization as a learning environment. For us, the Bradford case is an exploratory study in which we try to illustrate this methodological approach for further studies.

EUROPEAN AEROSPACE AND THE POSITION OF BRADFORD

The European Aerospace Sector

A lot of technical information is available about the aerospace industry. However, for the framework of this chapter, this is less interesting than the sociological aspect. Some general statistics about employment are necessary in order to get a feel of the importance of the sector for the European and Dutch economy. Direct employment in the European aerospace industry surpassed 429,000 in 2000. It is estimated that the European aerospace industry generates twice this number of jobs in related industries within the aerospace supply chain. Between 1995 and 2000, direct European aerospace employment grew steadily at 2 per cent annually, adding 42,000 jobs (Faux, 2002). Of the total number of 420,000 jobs in 2000, some 11,000 are clustered in the Netherlands (Niosi and Zhegu, 2005).

The European aerospace sector is both a generator of wealth and a driver of innovation. In the perspective of managing relationships two aspects are relevant:

1. The industry is organized through an extended supply chain, including many small and medium-sized companies located in all of the 27 countries of the European Union (EU). Prime manufacturers are linked to a network of second- and third-tier specialist companies to meet their needs. These firms, operating at many different levels of the industry, are home to the key technologies essential for the future of Europe. This complex industrial structure makes aerospace a leading contributor to wealth and employment all across the EU. Here, the management of complex relations is at stake where cooperation and heavy competition are both present.
2. The aerospace industry is a powerful driver of innovation in the economy as a whole. It makes extreme demands on its products, simultaneously requiring safety and reliability, low weight, good economics and minimal environmental impact, enhanced power and high efficiency. The technologies developed for aerospace products create spin-offs in many different sectors (ibid.: 12). To meet the requirements, coordination – and therefore cooperation – is vital.

These economic properties are only a starting-point to characterize the external relations of the aerospace market. There is also the political environment. The Lisbon conference in 2000 expressed a commitment to strengthen Europe's technical capabilities. The Lisbon European Council

concludes, for example: 'The Union has set itself a new strategic goal for the next decade: to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable growth with more and better jobs and greater social cohesion'. This message was reinforced at the Barcelona Council, which called for a significant boost in the overall research and development (R&D) and innovation effort in the EU: 'In order to close the gap between the EU and its major competitors, there must be a significant boost of the overall R&D and innovation effort in the Union, with a particular emphasis on frontier technologies' (STAR 21: Strategic Aerospace Review for the 21st century: 10). More recently still, the Thessalonika European Council decided that the time has come to take concrete steps in the defence field. A globally competitive aerospace industry is central to the achievement of Europe's economic and political objectives. The government sets not only the strategic agenda, but also the constraints of the market, for instance by dictating that the profit margin cannot exceed 8 per cent. Apart from the economic and political context, there is another aspect: the military and safety domain. The European Advisory Group on Aerospace report, STAR 21, has identified five main areas that deserve specific attention: (i) competing on world markets; (ii) the operating environment for European aerospace; (iii) European governance of civil aviation; (iv) the vital need for European security and defence capabilities; and (v) safeguarding Europe's role in space (ibid.: 11). To complete the complexity of the aerospace market, this means a mutual fertilizing exchange between the defence and civic productions, which includes the complexity of exchanges at a transatlantic level. In conclusion, industrial restructuring combined with the development of relevant common political programmes within a coherent political framework across European borders is the context for success of an individual company in the aerospace sector. Also, the smallest company has to be aware of the complexity of such relations and be able to manage these in order to sustain continuity. This rather complex framework of the European aerospace sector sets the scene for research on cooperation within a firm. It reveals that despite traditional rivalry between companies, cooperation is vital for an entrepreneur to ensure survival.

To understand the case of Bradford we can now grasp the rather complex context of European aerospace policy.

Bradford in Transition

In 1984, Ed Voeten founded the family-owned Bradford company at Heerle in the southwest of the Netherlands. It started with 10 employees and a contract in the nuclear energy segment for the welding of piping

systems. After the Chernobyl disaster, the nuclear sector offered little perspective for Bradford, so at the beginning of the 1990s a transition was made to specialize in the space industry. In this market a main product was the so-called 'glove box' for the Space Shuttle. Various versions of the glove box were successfully developed during that decade. When the space shuttle *Columbia* was lost, Bradford was again faced with the need for reorientating its products and communicating its values. And once more the community of practice at Bradford had the courage and capacity to do so. Ed Voeten demonstrated his personal leadership style in accomplishing these transitions, with many 'masculine' traits in his behaviour that did not always make him popular with employees or customers. In 1994 the shares were transferred to the second generation, Mariol Wildeman-Voeten and Raoul Voeten. In the same year the foundation was laid for the space components division, which after 10 years resulted in a catalogue containing over 20 innovative products. Raoul Voeten, together with Nico van Putten, who joined the firm in 2001, are the current directors. Raoul Voeten studied engineering while Nico van Putten's education was grounded in economics. At that time the Noord-Brabant Agency (N.V. BOM) took an interest in Bradford, which enabled the expansion of the production capacity. With the recent founding of Bradford Instruments B.V., concrete steps have been taken to transfer the know-how to earth-based markets and applications, for example, the spin-off of a new generation of sterilization devices and technology for the medical market with the so-called 'ionizer'. With these major transitions in business development, Bradford has grown to a yearly turnover of about €8 million and nearly 70 employees, and is the second-largest player in the Dutch aerospace industry. Bradford is a remarkable company not only because of the industrial facts, but also because of the interesting way in which the organization acts as a community. For example, after *Columbia* exploded in such a dramatic way, Bradford offered condolences on its website. Furthermore, in their external presentation, a specific openness and humour becomes visible. In its messages the approach it adopts for business development is characterized by words such as: 'flexibility', 'possibilities', 'self-initiative', 'involvement', 'diversification', 'smaller projects', 'partnerships', 'resourcefulness' and 'creativity'. These are not just buzzwords, but terms that seem to reflect modern lifestyle trends. In fact such words have a high 'feminine' content. The messages published by the suppliers and partners of this enterprise in its 20th anniversary magazine suggest healthy and cordial mutual relationships. Finally, it is remarkable how engaged and cooperative the employees of this enterprise are, either during phone or face-to-face conversations. An appealing mix of dignity, hospitality and curiosity is transferred to the

visitor, which makes one feel instantly at home. One wonders how the industrial profile and the characteristics of the community contribute to the success of Bradford. This study aims to illustrate how the entrepreneur, the community of Bradford and their interaction contribute to the business development. The bases for the description and analysis of this narrative were offered by the information kindly made available by Bradford in various ways.

This basic description of Bradford allows us to get a first insight into the question of why both the psychological and the sociological dimensions are relevant for our analysis.

METHODS OF SURVIVAL ASSESSMENT

The techno-venture is embedded in a social system including the entrepreneur and other actors. To further develop a successful start-up, the process agents – entrepreneur, manager, employee – have to interact with one another in order to shape an effective social system (Groen, 2005). Within this common ground we distinguish between the psycho-analytical and the socio-cultural approaches.

What makes the Bradford company special is not merely the technical figures in business development, but the way in which Bradford behaves as a community. In order to describe and analyse the Bradford case we use a narrative approach. In other words, the way the community behaves is described as a myth. The analysis is executed by tracing the patterns regarding how they act on (un)common interests, how they communicate and what are the symbols and symptoms of the Bradford community as a whole. Of course we could have used other disciplines. When it comes to analysing a mix of rational–irrational, conscious and unconscious elements, then the approach where personal preferences and the social panorama are investigated will be more suitable than to take into account just the technical or economical aspects. This is illustrated in Figure 2.2.

Before expanding on the methodology, the relations between cooperation and concepts such as the brain, entrepreneurship, start-ups, corporate entrepreneurship, entrepreneurial spirit, business development and regional economic development are explored. Cooperation is a vital competence in order to survive in the knowledge-intensive playing field of competition in this century, as the Lisbon agenda shows. What does this mean for the necessary conditions for successful internal and external cooperation in business development? This research question will be analysed using the narrative of Bradford as an example.

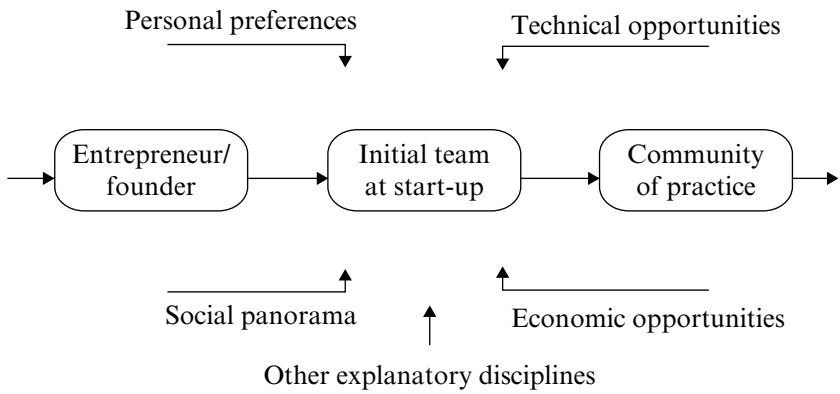


Figure 2.2 Overview of relevant disciplines to analyse a techno-start-up

Defining Related Concepts

As an entrepreneurship in a techno-venture can be associated with various related concepts, we shall first explore some relevant definitions. For a long time the concept of the entrepreneur has been used in many scientific disciplines. According to Schumpeter (1934 [1942]) the entrepreneur can be defined as a person who is capable of bringing about frame-breaking change. In the decades after Schumpeter the frame breaking was mainly related to technical innovation, that is, primarily based on the control of manufacturing systems in order to exploit products or services. From a psychological and sociological angle – the disciplines on which this chapter is based – entrepreneurship could be associated with opportunistic behaviour of the individual who has identified new opportunities. In this strict sense, the only thing that would matter is how the brain of the individual entrepreneur is functioning. Is it functioning differently from the average manager or employee? However, this individual entrepreneur cannot be seen in isolation from his/her environment. The expression 'frame-breaking change' that Schumpeter used becomes more interesting in this context. Frame breaking for whom – for the customer, for the competitor, or for the existing manufacturing routines and the employees who execute them? In the past the consumer might not have been used to radical changes on the scale that we experience nowadays. Also, the competitors of today have become accustomed to looking for the competitive advantage as introduced by Ansoff (1965) and elaborated by many others. Today, frame breaking might be much more related to strategic management issues as seen by Teece (1988). One of the 10 issues he has formulated is concerned with the question of how organizations must be structured and managed

to be efficient and innovative: 'To what degree are efficiency and innovativeness in conflict?'. From the viewpoint of this economic paradigm of competitive forces this indeed might be seen as a conflict. In the 1990s, many researchers such as Bolwijn and Kumpe (1990), Porter (1990) or Quinn (1991) showed even more tensions developing among competitive forces. How to control so many variables under rapidly changing and globalizing economic conditions? Here, a new paradigm of competitive forces emerged, based on the structure–conduct–performance triangle of Bain (1959) and Mason (1939). With these approaches in mind we can say that the business development in a modern high-tech venture can be expressed through coordinating the external opportunities with the internal qualities of the enterprise. The paradigms mentioned above can be interpreted from the perspective of the individual, say the traditional person of the entrepreneur/owner. In high-tech ventures it can also apply to the engineer/owner or to the management in general.

In contrast to a start-up, a (high-tech) venture is a company that has already established a product–market combination. Here, the entrepreneur somehow has to cooperate with the people that he/she needs to source goods or services. This is where the concept of corporate entrepreneurship (Saly, 2001) becomes relevant. This concept focuses on questions such as: what are the characteristics of entrepreneurship in the context of a (large) company? Along with the paradigms already mentioned, a renewed paradigm can gradually be developed. This new approach, represented by Nahapiet and Ghoshal (1998), among others, has as its starting-point the fact that an enterprise can be understood as a social community. Social innovation along with creation and transfer of knowledge can be considered as the compass for management. The concept of competitive advantage is now replaced by the organizational advantage, which comprises various elements such as the recognition that the employee is the critical factor in achieving added value for the customer. The employee embodies scarce, durable talents that are hard to imitate or to trade. Also, such talents can hardly be controlled using the traditional focus on systems in the industry-based leadership styles. The organizational advantage can be seen as an institutional setting that is conducive to the development of talent and when exploring relevant internal and external networks. Consider also the way in which many enterprises are currently organized these days: highly individualized and with short report lines. This implies that the individual employee should be the subject of research as well. Another reason to incorporate the viewpoint of the employee has been put forward by Hofstede and Pedersen (2002): dissatisfaction with society and life in general seems to be a distinguishing factor across nations to explain the preference of employees for entrepreneurship.

All of the above elements add up to the so-called 'social capital' of the

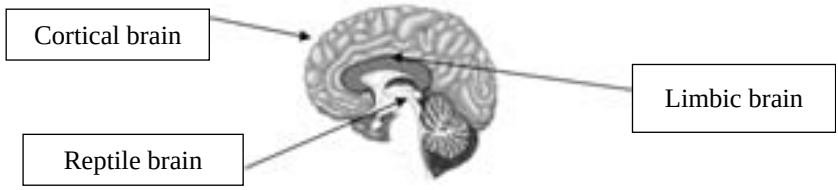
company. Here it is the challenge for the engineer/entrepreneur to pursue the effective coordination of his/her personal opportunistic preferences and create the conditions for the development of talent. Already in the late 1990s, AWVN, the Dutch employers' association, had developed the so-called 'social innovation strategy'. Social innovation primarily stems from the interactive exploration of interests of stakeholders and (re)creating added value for customers as a learning community (AWVN, 2005; Verhoeff et al., 2005). This definition of social innovation can be a source of misunderstanding. For instance, social innovation is not primarily about being nice to employees, although it is unmistakably also related to the domain of feelings. In many enterprises the (original) entrepreneur is no longer present. A value-driven leadership style presupposes that leadership is organized in a consistent way in the 'management–employee–human resources' responsibility triangle. Here, it is evident that all these stakeholders have a certain mindset in entrepreneurial spirit. Entrepreneurial spirit is the propensity of the manager or employee in knowledge-intensive enterprises to identify opportunities for innovation and organize various resources, in order to create added value that meets a solvable demand. This definition of entrepreneurial spirit opens up the possibility of researching the reasons why managers or employees in some companies can cope better with innovation than those others. In this resource-based approach the above-mentioned causal logic of structure–conduct–performance of the competitive forces paradigm comes into the discussion. The talent of the entrepreneur, manager or employee gives an extra theoretical degree of freedom and their conduct does not necessarily follow from the (cultural or organizational) structure but can be an intermediate variable. In their study on cooperation between European start-ups, Ulijn and Fayolle (2004) explored several aspects of these choices of entrepreneurs. The resource-based approach is taken further by Teece et al. (1988), de Geus (1997) and Gaspersz and Verhoeff (2001) by exploring the dynamic aspects of capabilities in order to create the knowledge and skills for a learning approach focused on how to cope with ever-changing internal and external conditions. This raises the question of how entrepreneurs themselves learn, and how they create a learning community of practice like Gielen et al. (2003) have fostered. Florida (2002) extended this approach with research on what the conditions in regional development need to be in order to establish a flourishing 'creative class'.

The above brief sketch is not meant as a historical perspective but just shows how various paradigms are related to entrepreneurship. It makes clear that there are different angles from which to study the entrepreneur: the brain of the entrepreneur/owner, the entrepreneurial spirit of the engineer/entrepreneur, manager or employee, or the interaction between them or with other relevant stakeholders. In a high-tech venture all the

stakeholders have to find a common ground to be successful, a way to cooperate. In order to cooperate effectively, individuals need to have some complementary personal characteristics. According to Herrmann's research (1992) on the model of brain preferences, a person would be predestined for certain types of activities. This can be seen in connection with the work of Sperry (1984) on the specialization of the two halves of the brain. Sperry distinguished between the left and the right hemispheres. The left half contains functions like language, time, abstract thinking and logical reasoning, while the right half is more orientated towards imaging, intertemporal events, irrationality, concrete or intuitive matters. Sperry's insights have been taken further by MacLean (1985), who believes that our head contains not one, but three brains: a 'triune' brain. Like the layers of an archaeological site, each brain corresponds to a different stage of evolution. Each brain is connected to the other two, but each operates individually with a distinct 'personality'. Herrmann has shown that each individual filters information or stimuli depending on his/her own brain preferences. This will have an effect on the way people react, their behaviour, their choices in action, in other words, on the direction that their actions take according to their natural orientations. The development of the brain thus can be seen as a series of critical incidents by which the things that are closer to our nature will probably lead to more specialization of one half compared with the other, for example, control will be organized in the left half, while creativity stems more from the right half. Whether this really leads to an entrepreneur by nature can be further analysed psycho-analytically. If we refer to neuroscience theories, in particular to the works of Sperry, MacLean and Herrmann, the behaviour of individuals – their actions, choices, decisions – are related to their dominant characteristics or their cerebral preferences. To take Wasserman's question 'When does leadership matter?' even further, we have to look into new methods of survival assessment and the brain itself might be a promising domain. As already indicated, Herrmann (1992) has elaborated on the model of brain preferences, completing the research made by MacLean (1985). The triune brain of MacLean – three separate brains – is shown in Figure 2.3.

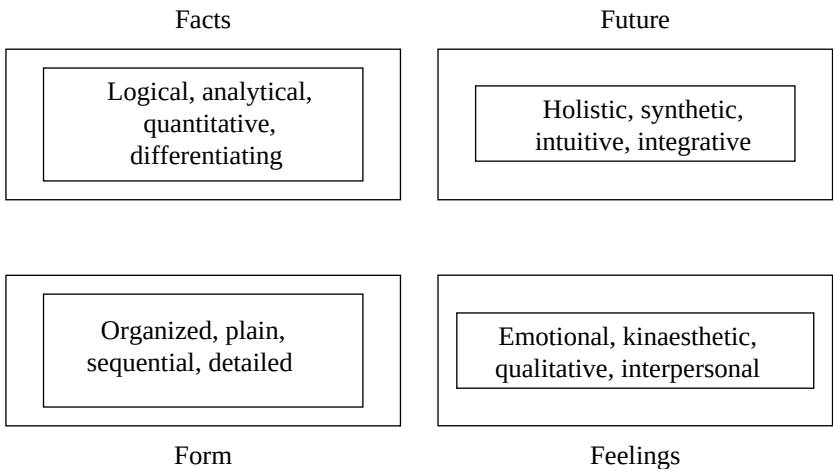
In pursuit of the brain functions, Herrmann analysed the way in which different parts of the brain interact and how they handle information. Herrmann distinguishes four brain functions: facts, future, form and feeling. The various functions are shown in Figure 2.4.

This short introduction makes it clear that neuro-science is not completely disconnected from psycho-analysis. For example, the three identities of Sigmund Freud (*Es*, *Uber-Ich* and *Ich*, or: id, superego and ego) can be found in the three brains of MacLean. The id is the home of our drive, corresponding to the reptile brain. The superego can be seen as our collective



Source: MacLean (1985).

Figure 2.3 The three brains of Paul MacLean



Source: Adapted from Herrmann (1992).

Figure 2.4 The four brains of N. Herrmann

culture and refers to the limbic brain where our memory and emotions are controlled. Finally, the ego looks after the connection of the individual to the real world and can be associated with the cortical brain. The four elements of the brain can be associated with a high-tech venture and Figure 2.5 is a first attempt to mirror this.

The concepts as described might be known in themselves. Within the framework of our analysis the exploration of interrelationships between the psychological and social domain is also relevant.

The Psycho-analytical Approach

The psycho-analytical approach is especially interesting because the start-up of a company is often a very individual act realized by an individually

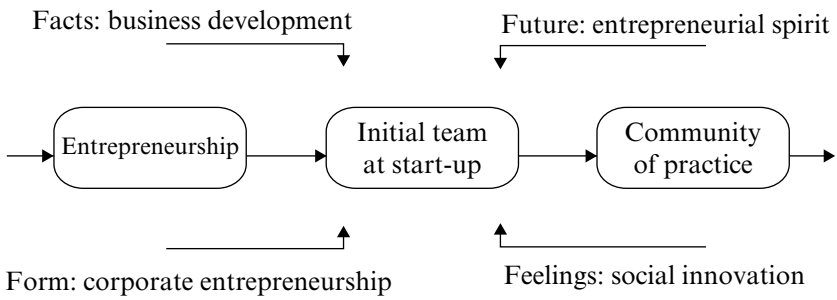


Figure 2.5 How the various elements of the brain can relate to a high-tech venture

driven entrepreneur. The founder or engineer/entrepreneur will act or react because of different parameters, for example, economic, political or environmental. What we tend to forget or underestimate in most research are the human variables of a more unconscious nature that are influencing the acts of the founder. According to psycho-analysts, the personal history, our history, is determined by the way we think and perceive the world around us. The way our life has developed since birth has left an indelible track in our memory and it will continue to influence our daily life without our being conscious of it. Our history feeds us daily with critical incidents that we encountered without visible causes. The first years of our development are particularly dominant as they form the basis for future decisions. Whether they are common or original, prosperous or stressful, they will leave an imprint in our beliefs and on our brain. It is somewhat like a computer hard disk. The more-explicit competences on this 'hard disk' of an entrepreneur are well known: develop your innovation until it is feasible and make a business plan. Man is not just a 'homo economicus', but is also a 'homo impulsivus'. In other words, intuitive acts will lead to experiences of knowing oneself better. By looking at brain functions, psycho-analysis is integrating the most recent insights of the neuro-sciences.

In the above respect, the hypothesis for the psycho-analytical part is focusing on the development of cooperation depending on the characteristics of each member of a team and can also be applied to a situation where one or more entrepreneurs work together. This hypothesis was tested on young graduate engineers who started to work together in a project for entrepreneurship. The first results show excellent cooperation in a situation where the founders have complementary profiles in their competences, but the small number of participants in this study does not yet allow generalizations to be made. Temperament, a psychological concept from origin, is

the equivalent of stimulus in physiology. In opposition to the stimulus is the temperament that is not connected to the outside world, but is endogenous. It will be quite impossible for an individual to escape from it. Our temperament forces us to react in a certain way, while our conscious mind might do its utmost to exercise control. Therefore people at work will try to control their working relations, especially the entrepreneur who has explicit beliefs about this. Control will be organized in a conscious way by constructing a planning table, multiple indicators before and after the action, a planning cycle in order to rule out all possible errors. In most cases, such actions are designed only to serve a rational way of organizing the primary process. No one will tell entrepreneurs to be introspective about their more unconscious motivations to create a business, or ask them why they want to make this specific idea become reality. We simply are convinced that a business plan with all the necessary rational information will suffice to succeed.

In Europe, and particularly France, the share of female founders of enterprises has increased notably in the last few years. However, the absolute number still lags far behind the number of males. The typical profile of a founder is a man of 35 years who has experienced a first leadership position, such as the one of middle manager (INSEE, 2000). Among the most important motivators to create a business is to have more freedom: 'be your own boss'. For a woman this is often related to a better match between personal and professional life. Men explore the advantage of self-confirmation in entrepreneurship, while women look for the advantage of being able to be better balanced in life. Having an ear to the unconscious in your organization, to what is not expressed, and thinking of how to bring hidden expectations or experiences to the surface, opens the way for another interpretation of an event, a relation or a critical incident. The function or dysfunction of a company can be translated into processes of unconscious minds. The manager or even better the founder can project his/her personal beliefs and unconscious pattern upon the organization. The decision making of a manager or a management team might look rational, but a closer look can reveal that this individual or group will also take into account all kinds of irrational aspects of their own past. The rationalization to justify a decision is one of the most effective defence mechanisms. An observed situation is always subjective or intersubjective at the most. To explain this in a rational way has many characteristics of a decoy bird, as human history cannot be reduced to an equation. The sports metaphor can help us understand further the hypothesis on cooperation. It is difficult to imagine, for example, a 15-strong rugby team, where the physical characteristics of each team member are identical. Are the criteria that are valid for the physical

characteristics convertible to the personal characteristics or to cerebral preferences? Are they convertible from the sport to the domain of the company? One cannot say that diversity and complementarity are the only guarantees for good cooperation among the team members; possible additional elements are as follows (Drillon, 1995):

- a leader or a coordinator, or a pilot;
- clear objectives which are well understood by each person;
- a reciprocal confidence between the team members and the manager;
- (each person's) full consciousness of his/her role within the team; and
- the necessary competencies for its (or: his/her field of) action, which are quite often linked to the formation.

Vassal (2005) argues that the effectiveness of an individual within an organization results today above all (or: particularly) from the quality of the interactions and from the connections he/she manages to develop. These are a number of essential elements where one needs to add the perception of the stakes and the environment of the assets, and finally a last specific element: the collective and the individual motivation. One of those in charge of a workshop of a company that we visited told us (or indicated): 'I am quickly aware of those who are hungry and the others, among those we recruit'. The globalization and increasing mobility of people in the last decades have contributed to the development of multicultural companies. This is an irreversible fact and deserves all the attention of researchers because it has an impact on the way a community of a company interacts. Among various interactive aspects we can consider age, gender, ethnicity, religion and regional differences. Will it lead to a greater added value of managers and employees for the company? Or will it be a barrier to better results? The elements as mentioned above can be summarized in Figure 2.6.

These insights into the conscious and unconscious aspects of leadership can be related to the development of the myth of Bradford. Ed Voeten can be seen as the 'founding hero' who initiated the framework for the Bradford community. After Ed Voeten left, the myth gradually changed. Instead of a founding hero, he is seen as something of a 'religious' figure. His son illustrates this when he says: 'As soon as I was in charge, employees told me that Ed would have done things differently'. With such critical incidents the founding father can become a person vested with 'sacred' elements. In this sense, the history of Bradford can be understood as a myth. The identity of this company remains vivid in the stories told by the employees about its origins: there was a founding father who recruited capable and specialized employees to develop a rather successful company that holds second place

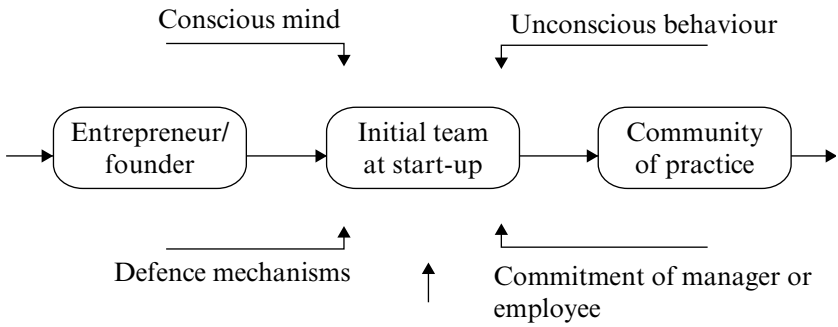


Figure 2.6 The elements of the psycho-analytical method

in its segment in the Dutch market. Since his retirement, Ed Voeten is often the starting-point when employees talk about 'their' company.[1] Besides, the identity of this company as a community shows another mythical element that often reflects how is it possible that this company is so well known in foreign countries and barely has a resonance in its own? How can this company feature more realistically in Dutch society? The founder and former owner of Bradford can, on a symbolic level, be seen as the father: with a love for his employees and for his product, he has brought this company to an original place in the Netherlands and in a specific segment – aerospace.

The Sociological Approach of Nisbet

When we look upon companies as vivid institutions in a society, we can reflect upon the possible patterns of community that might lead to satisfactory ways of cooperation. We can also wonder whether we live in a kind of void when we reflect upon new possibilities to connect the concept of community to the different relationships implied. Healthy working relationships among employees, partnerships with clients, well-balanced concepts of sharing in the dynamics with stake- and shareholders; are these only buzzwords, or stimuli for renewal in the current process of globalization? In any case, these words should be touched upon when elaborating our research question from a sociological point of view: how can companies function as a community and what are their longings, inspirations and aspirations?

The sociologist Robert Nisbet (1970) sees a community as 'a social organization that gives legitimacy to authority, functions, membership and loyalty'. He shows how the concept of community has known three

important periods, and in each of these the concept of cooperation has known specific forms. First, he speaks about family or kinship systems. These are characterized by a basic structure that is rooted in tribes and lineages in which the power and authority was ascribed to the oldest men and women, who transmit the traditions and explain the defined life rules. The social organization is based on cellular principles: each person is a member of one of these cells. The place in the community is based on birth and the position a person has inside the family. It is not possible to change this. Family values are at the heart of this system. Ancestor worship was intrinsic and in a certain way these systems can be seen as closed ones. To develop more communication with the outside world the kinship system had to 'break open'. This is how, according to Nisbet, the military systems developed. In this system, people are first of all linked to a specific territory and not to blood ties. Individuality is important in the sense that each person can be a source of initiative, in ever-changing alliances. This system applies the concept of 'youth', in the sense that traditions can be broken. Force, efficiency and new rules can be introduced; through competition one can acquire a better place. Instead of family status, the concept of a 'contract' is introduced. This can define one's position and contracts can be broken or changed. The principal idea in a military system is that war leads to moral unity and a collective purpose. The principal values to express are courage, being a hero, sacrifice and enjoyment of rewards. Danger associated with enemies from another territory leads to the definition of goal orientation. This military system represented only an intermediary step towards a more stable system: the political community of the nation-state. This system has two sides: the perspective of progress is presented to suggest that all inhabitants of a specific territory have a right to individual freedom, equality and justice. The other side is that this risks developing into a system of political absolutism and racial superiority, and ultimately a totalitarian state. Another way of looking at this political community is as a so-called 'high commitment' community, whose members share the same values or beliefs. In Nisbet's opinion, for the Western world the second form is dominant, anchored in democratic and industrial revolutions. The attributes of the three communities can be arranged such that they can be used as a framework for analysis, as shown in Table 2.1.

In conclusion, for Western society Nisbet sees three principal forms that continued to evolve until the twentieth century:

1. family or kinship systems, based on locality and ancestral worship;
2. the military-national state; and
3. the religious communities, also referred to as 'high-commitment' communities.

Table 2.1 Typology of the communities with attributes according to Nisbet

	Family or kinship	Military state	High commitment
Basic structure	Member of a specific family (group)	Individuality	Community
Member	From which family are you a member?	To which territory do you belong?	To which community do you belong?
Continuity	Old age: the eldest transmit the tradition and explain the codified life-rules	Youth: breaking with tradition; efficiency, construct new rules	Continuity by collective learning
Perspective of progress	Non-competitive: your position is defined by birth, through the place of and in a family	Goal orientation Competition: you can win your place	Growth as a community
Status of relation	Status: you are son/daughter and you will always stay like that	Contract: you define your place and you can also break that	Friendship
Principal values	Family values	Courage, being a hero, sacrifice	Individual freedom, equality and justice
Risk	Only trust within a family, instability between families	Instability of the system in the longer term	Political absolutism

With these principal forms it becomes possible to articulate differences on the level of basic assumptions on cooperation. In addition to these basic types of communities, Nisbet also allows for so-called 'counter-communities' that serve to 'encounter' debates about how communities develop. The elements of the sociological method are shown in Figure 2.7.

As with the psycho-analytical method, Nisbet's approach is also relevant for our myth of Bradford. According to the study by Girard (1961) about how ways of storytelling change in European history, the role model of the hero is approaching that of a 'real person' and the distance between the reader and the protagonist seems to diminish. However, this does not mean that the mimetic rivalry that exists between the different heroes in a story disappears. The different community systems offer a way to explain the positions that the founding hero of a company can hold from the viewpoint of

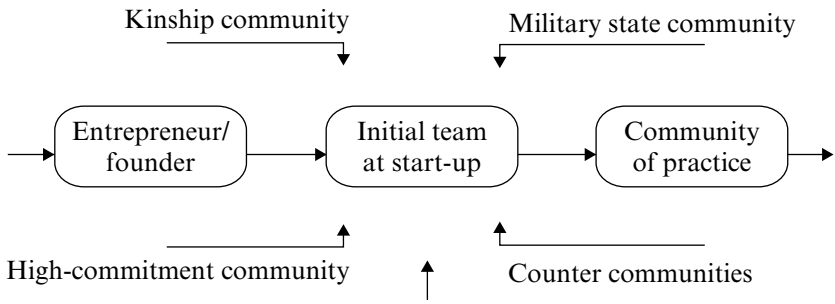


Figure 2.7 The elements of the sociological method

the participants of a community. In the analysis of the Bradford case (see below) this insight can be of added value. Ed Voeten defined the primary task of this company: the production of glove boxes. In this sense we can say that he constructed something that looks like a 'kinship community', where the oldest generation leads the younger ones and where the others have their clearly defined places, until the context of the community changes.

The Pluralistic Community

The three archetypes of communities as mentioned above are a crude but effective way to analyse an existing company or a community of practice. In reality a community is always developing, because of internal forces or changes in the external context. In which direction? The era of blueprints in a stable context is behind us. Nisbet wonders what alternatives and possibilities we can find, and answers: counter-communities. The principal paradox, according to him, is the fact that two tendencies develop in parallel. On the one hand decentralization, regionalism, localism and voluntary autonomous associations are proposed as pathways to give space to this desire for pluralism. On the other hand he sees an accent on centralization of power, collectivism and bureaucratization of functions. In his view, Western societies are monolithic in the sense that they are based on the military–political and revolutionary powers. Western societies tend to grow into pluralistic communities, but it is not easy to imagine how this can take a further form. For Nisbet, the pluralistic community is an example of a 'counter-community' in respect to the three archetypes; in other words, a community that every stakeholder might have his/her own private dream of. But no-one knows what road will lead there, and every-

body tries to get there in his/her own way. Here, a time-based relation can be seen between the current community and a future one. In this sense, the myth of Bradford can have several meanings, dependent on the interests of the stakeholders.

As described in the introduction, we want to use the myth of Bradford as an example within a framework of analysis. We have described the context of European aerospace policy. Next we developed a scientific framework with psychological and sociological methods and we explored the relevant scientific methodological issues. With these insights, albeit still fragile in their scientific competence, we shall now analyse the Bradford case.

THE ANALYSIS OF BRADFORD

> 'Those three men,' said he, 'have carried into space all the resources of art, science, and industry. With that, one can do anything; and you will see that, some day, they will come out all right.' (Jules Verne, *From the Earth to the Moon*)

The Entrepreneurs: Ed Voeten, Raoul Voeten and Nico van Putten

The case of Bradford starts as a family business in 1984. One could say that the original founder, Ed Voeten, had the profile of a true engineer. The love for the perfection of the product sometimes made him forget that the customer matters or that its employees had their professional limitations. Raoul, his son and successor, said:

> It was a specific kind of entrepreneurship that really fitted the small size Bradford had in those days. The masculine dominance of the leader was also the type of leadership that was quite common back then. One did not expect something else from an entrepreneur in society; neither in our company nor at the other side of the table at the seat of the customer.

It appeared difficult for Ed Voeten to adapt to the other role that was expected of the entrepreneur in the second phase of the company, the lift-off: the role of director or coordinator. In his original role model he inspired many employees to do as he did: to show personal excellence. And some continue to do so even today. This role–values cooperation is about how and when the individual will communicate with the team, and preferably not the other way around – how the team inspires the individual. At the same time, this original strength was needed again and again to ensure the unavoidable revolutionary changes in market orientation. One could say that in the first 10 years the company was controlled according to the cultural framework – intentions, beliefs and values – as initiated by the founder. The type of cooperation that developed from this was not only

applicable for the internal affairs but also for the contacts with third parties, like customers and suppliers.

In 1994, partly because of health problems, Ed Voeten relinquished control to his two children, with Raoul Voeten as the executive director/owner. In 2001, Nico van Putten started working as a financial director. Raoul and Nico are quite explicit about their complementarity in co-direction: 'We do not differ that much in character, it is our background that is different. We both have the same kind of drive to make the best out of it, although neither of us is ever thinking in extremes'. The co-direction from 2001 illustrates how complementary characters can lead to a very powerful development of the 'span of innovation'. It offered the management the possibility not just to be a part of the bandwagon compared to competitors, but also to create new market combinations building on their own strengths. They could also have more confidence in how to restructure the internal organization to fit future needs. The succession of control from the founder brings up the question of legitimacy. There will always be supervisors or employees who only recognize the leadership of the founder. It is like getting married again – the children can make life hard for the new parents. In fact this is exactly what Raoul and Nico felt and expressed in their words during the interview. It illustrates that cracking the founder's 20-year-old code is not that easy. Raoul expressed this in the following way:

> At first I was simply working as an employee at Bradford. At that time I frequently heard emotional cries such as 'If only Ed Voeten was able to listen to the company!' After I took over control I was often confronted with the opposite: 'If only your father was still here.' Somehow this makes me feel kind of relaxed about the emotional dimension in our community.

From 2002 to 2003, the company faced some major problems concerning the need to match new competences with the existing ones among the personnel. Experts with other national backgrounds had been hired, and these appeared to have a stronger attitude to work compared to many of the Dutch personnel who had joined Bradford earlier. These movements also revealed some inconsistencies in work attitudes and remuneration. All this was temporarily counterproductive in terms of cooperation. One could say that the original start-up team have been succeeded by several generations, each with their own ideas about work, quality and feelings towards the customer. The original start-up team finds it hard to cope with the structural changes that are needed to adapt to the changing market context, while the newer generation of employees has knowledge only about the current situation. This creates a whole new dynamics in the Bradford community as the more feminine aspiration and

satisfaction levels of the newer generations do not match those of the original team.

Now the question is, how can various generations create the conditions for cooperation? The inspiration of the individual talent can now develop as a 'product' of shared beliefs, which means that the management has to reflect on the pluriformic context of the community as a whole, in relation to the outside world. As Raoul and Nico said: 'At first we were not taken too seriously by the outside world. Then people started to think we had plain luck. Only lately do we get the feedback that we are seen as a professional duo'.

The Dynamics of the Bradford Community

When we take a closer look at the evolution of Bradford as an enterprise, one aspect becomes immediately obvious: the dynamics between the family character and the growth to a more open and complex organizational structure. The first steps were realized when Ed Voeten relinquished control to his son and to his colleague, Nico van Putten. One aspect to 'reform' was the 'amateuristic love' for product development towards a form of more professional process and product management. We shall now analyse the Bradford community by describing several paradoxes that become visible in the critical incidents as experienced in the Bradford community. A paradox can be defined as a seemingly contradictory situation.

1. *Creativity and solidarity* A strength of the Bradford community is personal creativity. At the same time, a striking common ground between the employees – a feeling of solidarity – can also be experienced. How do these relate to each other? How is the transfer of innovation from the individual to the community expressed? There must be unwritten rules to enable this process, which have the character of a kinship system, like the maverick that is allowed to roam as long as it finds water when it is needed. It is important to know and understand such rules in order to cherish the creativity process and understand how relations add up to effective cooperation. In this respect one could say that there is hierarchy at Bradford but still within the limits of an organization of professionals. What does all this tell us about cooperation? From the sociological viewpoint, without intensive cooperation the community of practice at Bradford would not have been able to make the frame-breaking changes in product market positions that they have done several times already.
2. *Partnerships with clients* The community at Bradford knows how to communicate with the customer. In fact they have the competence to develop the interaction with the customer into a process of 'mutual aid'. For decades now, the teamwork of the community members with

customers forms a keystone of the innovation process. It is a necessary virtue to build trust in a hostile and competitive market. Oddly enough, the various internal players in the service chain – development, production and aftersales – seem to act with a consistent set of beliefs, with some representatives of a generation that are less committed to this process. The commitment in the value chain for the customer has many properties of the 'high-commitment' community. It certainly cannot be forced by the military hierarchy. Here, some unwritten 'causal chain' of beliefs might explain this behaviour; this is the type of belief that could be induced by the role model of the founder.

3. *Leadership and followers* The Bradford management faces a difficult dilemma. Should the family values of the founder be cherished? Or does the development of a professional organization need to stimulate another dimension? In terms of the military organization, the question can be formulated as: how can the hierarchical skills of middle management be improved? A dilemma would force the managers to choose between these two. And the choice of one would imply the negative effect of the other as a free gift. Maybe it is just a paradox. The metaphor of the 'tent' might integrate the opposites: the value chain can be seen as a journey where people are floating freely, being attracted and repelled by each other at the same time and the tent – the organization – is only a temporary shelter.
4. *Responsibility for profit and towards the wider society* These days a company is seen as a multi-goal assignment: management is supposed to bridge investment in People and capital, Profit and the interests of the Planet (PPP). In the aerospace industry this is not an easy task. Here it is important to be aware of the specific responsibilities of management and employees. Management is supposed to communicate about the 'next practice', and employees are supposed not to wait until they hear about it. It requires a dialogue to transform this into a positive spiral. An interesting aspect is the relation of the employee that is confronted with different interests at work and at home. On an individual basis this also appears to be a vital relationship that is somewhat tense in terms of expectations.

The above paradoxes can be analysed using the Nisbet framework, presented in the previous section. In the first instance we have taken the various intentions, examples and activities at face value and tried to label them in terms of the three types of community. Table 2.2 summarizes these initial results.

The results could be interpreted as a transformation from a family to a military state metaphor. However, the analysis also offers many loose ends

Table 2.2 Overview of possible attributes of the Bradford community

	Kinship community	Military state community
Basic structure	Family owned	Family owned, professionally controlled
Member	Manager and employee: I feel like a family member	I belong to a division
Transition over generations	Founder sets tradition and explains the codified life rules	Breaking with tradition; efficiency, construct new rules
Perspective of progress	Non-competitive community of professionals	Competition in a professional organization: you can and should win your place
Status	Your know-how belongs here	Show that your know-how belongs here

that would not fit in such a metamorphosis. In a third interview with Raoul Voeten and Nico van Putten this was discussed further. It appeared that for them, the elements that fit in the military state community are merely seen as a means to make the organization act more like a professional organization instead of an organization of professionals. The other loose end was that the community is dominantly driven by the values of the customer, which does not automatically relate to the kinship or the military state community. This is more like a natural property of the high-commitment community. The conclusion can be that Bradford is and will be first and foremost a kinship community. Here it would be interesting to see how the members of the Bradford community experience the intentions of the directors. The trend that many small companies make the transition from a family-like community to the anonymity of the military state community can serve as a mirror that can easily be looked into by the average employee or a work council. In the case of Bradford it would be a pitfall in the quest for a pluralistic community where the interests of directors and employees can stay rooted in common ground. In the context of the structural growth, Bradford is aiming to develop an interesting and kaleidoscopic dialogue that will emerge between directors and employees in the years to come. The myth of Bradford might then enter its third phase.

The Interaction between Entrepreneurs and Community

With the analysis so far we have gained insight into how the directors behave and the patterns of cooperation in the community of practice. This subsection will look at the interaction between the directors and the

community of practice. The relation between Ed Voeten and his employees was a very dynamic one in the sense of personal interaction. After Raoul's succession, the pattern of interaction changed rapidly. First, because Raoul intends to rely on the expertise of the employee much more than his father, he is inclined to trust that the employee will do the job properly, even with the risk that this can work out wrongly. The new control element that Nico van Putten initiated was to align responsibilities and workflows. Planning the work on the basis of a yearly forecast was quite new, and many of the older generation still have to get used to it and might experience this as growing bureaucracy. While the organization was growing in all respects it is obvious that more professional tools of control were needed. In these conditions, the role of middle management becomes more important. While Raoul and Nico do not see middle management as 'clones' of themselves, they struggle with the question of how the competence of supervisors can be further developed. In the past few years, the two directors have managed to interact with the supervisors and employees in a rather fluid and open way, to take the company to a next stage of development. Of course, this goes hand in hand with rational or emotional ups and downs that stem from individual preferences of employees, leadership issues of supervisors, differences in expectations of the various generations of employees or the changing preferences of customers.

In terms of interaction we really can see a pluralistic community on the move at Bradford, like the metaphor of the tent as described above. At the high-tech venture in aerospace Bradford, entrepreneurship is built on cooperation in a threefold interactive way: the entrepreneurs stimulate cooperation in the community; the various generations in the community are orientated towards internal cooperation by nature, and both express a cooperative drive towards the customer in the institutional context. Where Taylor (1913) once enriched organizational effectiveness with rules on division of labour and terms like 'span of control', now another concept is dawning, the span of innovation. This can be defined as the ability to stimulate, design, control and evaluate innovation processes. While the span of control is mainly task orientated, the span of innovation is based on human relations. Cooperation can be seen as a powerful driver to enlarge the span of innovation of a company.

Relational Patterns that Make the Difference

The analysis of the Bradford case leads to an evaluation of the four basic relations:

1. The relation between the (un)conscious motivations of the founder and the engineer/entrepreneur, and the expectations of the employees have

developed from an intuitive way of working in a situation where differences in expectation over generations become visible. Where the founder had a rather unconscious motivation with related problems in communication, the present duo of entrepreneurs is more able to put their unconscious drives into words, communicate about it and work on conditions to make a dialogue feasible.

2. For some 10 years the relation between the persons inside the company, acting as a community, has been based on trust within the family of insiders. Gradually this type of trust is changing into a kind of conditional trust, with varying expectations over generations.
3. The relation between the working community towards the business environment is based on a sound mutual challenge. Here, there is an explicit orientation in external reference towards the customer.
4. The relation of the working community towards other parts of the human society is of a hybrid character. The management intends to combine profitability with societal spin-offs, within a framework of small margins, while the personnel are struggling with the differences in belief systems at work and at home, frequently leading to work–home conflicts.

The analysis of these relations leads to the conclusion that from the viewpoint of the engineer/entrepreneur, cooperation can enlarge his/her span of innovation. For the employees, cooperation can be interesting because it confirms their membership in the community and the appraisal of their individual competences. Cooperation over generations can stimulate the learning process, under the condition that the participants in the learning process have the intention to develop in a community that has pluriformic properties. In this more feminine-orientated business context, the individual participants will be able more than ever to contribute to their own myth of a small company that is able to show a steady growth under competitive and complex market conditions.

CONCLUSIONS, QUESTIONS, LIMITATIONS AND PERSPECTIVES

In this chapter the properties of cooperation are explored with the myth of the high-tech venture Bradford as an example. In the process of defining the research question a variety of methodological issues were raised. The assumption that looking at a company as a myth is rather unusual for the participants of a community in a high-tech venture appeared to be true in the Bradford case. The research question of this chapter was whether (internal and external) cooperation between stakeholders is a necessary

condition for success in a high-tech venture. We have explored the case of Bradford on the basis of an intuitive research framework from a psycho-analytical and sociological viewpoint. During the analysis more questions arose. How to see the myth – as a conscious logical framework or as intuitive storytelling? From the viewpoint of the founders it might be a well-considered company policy. However, they have to deal daily with all kinds of 'not so logical' symptoms of the various generations of employees. So is the myth in the head or in the heart? Here, an interesting paradox occurred; how can a community behave with so many feminine characteristics given the rather masculine behaviour of founder Ed Voeten? Another matter concerns the way in which the myth is developing. It started as a supply-driven community with professional welding capability. In the meantime, the company has made several shifts that were market driven. What does this mean for what the community of practice stands for? To be able to formulate these and such questions might be the greatest yield of this chapter, apart from the conclusions that are related to the content of the case.

The psycho-analytical viewpoint led to the insight that the duo of Raoul Voeten and Nico van Putten is successful mainly because of their complementary backgrounds. Thus they have a larger innovation span than the founder of the company. Also, this trustful relationship enables them to reflect on important issues in leadership or management. From the sociological viewpoint the community of practice would not have been able to make the various frame-breaking changes in product market positions without intensive cooperation. Furthermore: for decades, the teamwork of the community members with customers formed a keystone of the innovation process. The entrepreneurs have managed to interact with the community of supervisors and employees in a rather fluid and open way to take the company to a next stage of development. Inevitably this is accompanied by rational or emotional ups and downs, but the underlying constructive pattern of cooperation is unmistakable. A tentative conclusion can be that cooperation between stakeholders is indeed a necessary condition for success in a high-tech venture. In the perspective of this conclusion we have illustrated that the personal traits of the entrepreneur are really relevant in the development of a high-tech venture. As stated above, the two methods used to support the analysis of the myth should show some internal validity. Do they? Combining the psycho-analytical and the sociological methods leads to the observation that both pathways are necessary to develop the myth of this company. In fact this very mix is responsible for the enlarged abilities in the span of innovation.

A second conclusion can be drawn from the research method of the myth. The findings in the Bradford case have to be seen as an exploratory study. In

this chapter, we have no ambitions except to present the company operation and evolution through the manager's decisions, and the cooperation between the employees. The cross-analysis between psychoanalysis and sociology, in terms of sciences, brings us a particular clarification of the situation. They are both human sciences, the science of man in relation to other things, of which job and company offer a privileged place of life and observation. We are aware of the difficulty of this exercise, and we have proceeded because it may give an original and innovative contribution that would enlarge the researchers' viewpoint and knowledge in this topic. This takes us back to what a myth is about. As described above, a myth tells about a 'founding hero' – in the case of Bradford, Ed Voeten and his successors Raoul Voeten and Nico van Putten. Psycho-analysis helps us to bring their profiles to life. The myth also explains how the community of Bradford developed and what its roots were. The social structure is identified according to the insights of Nisbet. Finally, in the still developing myth of Bradford, the founding hero is no longer part of the community that he founded. To systematically describe the phases of a myth we need an additional methodological criterion. Here the approach of Takahiro Fujimoto (2004) on multi-path system emergence is interesting, offering an evolutionary framework to analyse process innovation. This raises the question whether and how the evolution of a community of practice is related to radical changes in products or in the market positioning of a company. Can the development of a working community be seen as a necessary condition for sustained technological innovation? The answer to these questions would require a longitudinal approach.

As for the practical aspect of our study, both directors have fully recognized our case description and were astonished by the precision of our analysis of their personal leadership and the community of practice. As Raoul Voeten stated: 'It is a way of looking at our company that we would never have thought of ourselves and we can learn a lot from it. We really are going to discuss these insights in our community'. This at least gives confidence in the face validity of our dual approach. It is also a sign of internal consistency of the methods used. In addition it can be concluded that there is an ecological validity: this kind of study is relevant for the innovative power of companies. The limitations of this exploratory study are manifold. In this chapter we have no other ambitions than to explore the phenomenon of cooperation from the viewpoint of psycho-analysis and sociology. As is usual in such an early stage of research we end up with more questions than answers. These are both human sciences that allow the study of work and enterprises. We were aware of the difficulties of this exercise, but nevertheless tried to contribute in an original way to broaden the view and the knowledge. We need to be more specific in our

further analysis, both qualitatively and quantitatively. More focus is also needed on the differences between corporate and professional culture. This analysis indicates that professional culture might be more relevant than it is often thought to be. In this study we limited the analysis of a high-tech venture to the phenomenon of cooperation. We did not extend the analysis to related or even competing concepts such as rivalry. We used approaches that have only a small scientific basis, but in this first effort this is not a handicap. For instance, one of the main limitations is the fact that we do not know whether the insights can be generalized to other sectors.

The external validity of our approach is as yet unknown. In order to elaborate on this, we shall have to extend our investigations to other lines of business. Then, a hybrid approach might also be useful, in a qualitative and quantitative respect. In future studies the scientific validity has to be grounded further. Another limitation is that we have presented only one snapshot in time. To observe the underlying patterns more thoroughly would require a longitudinal study, which would comprise a longer period of observation for the evolution of an organization. Of course, the geographical boundary of the European cultural space is a limitation. It would be interesting to see how entrepreneurship with high-tech ventures in other cultural blocs would manifest itself, such as in Asia, the United States or South America. With regard to the time perspective of our results, a longitudinal study would certainly enrich the analysis. Then, it would become possible to investigate a statement such as 'everybody can adopt an entrepreneurial spirit under the appropriate circumstances' which can be associated with Hofstede's study on being self-employed because of dissatisfaction. A longitudinal angle would also allow us to study the so-called 'backwash effects'. It seems clear, however, that a 10-year longitudinal study would represent real progress in research on this topic. A short cut would consist in taking some comparable companies (size, line of business, environment and so on) and observing them at different junctures (such as creation, development, rupture, crisis, transfer, closing).

Another difficulty can also emerge – the cultural differences – and we would have to consider, in each case, the constitution of the management spirit, and what determinant links the manager, the interactions and the environment. Furthermore, the differences in gender, age, cultural or regional background could be investigated. We hope to organize an exchange of facts and projects in order to achieve a more systematic research plan, providing insights into the conditions for innovation. The creation of the SURVIE group is a step towards an answer to this problem. We want to organize the exchange of data, researchers and projects and constitute an active research network in these company issues. At the

horizon of our research, but not beyond our scope, cooperation cannot be seen as a stand-alone process within companies. In a society that is individualizing more and more it is not self-evident that cooperation is a natural property of citizenship. This puts solidarity between generations at risk and endangers the trust of the individual in processes that are needed to ensure a safe and learning society. Basically it reflects the signs of our time, especially of the new generations, including those teenagers who engage in anti-social behaviour, and who are aggressive towards all those who represent authority and the government, such as the police, firefighters and even doctors. The dual methodological approach that is used in this chapter might even be used to analyse these kinds of societal processes. So let us, as researchers, focus on what we can influence, that is, the development of a European research network. Coordination between economic, human and geographic fields, with their own particularities, will enrich the knowledge of the world that we have. Such insights can give food for thought, for instance, about the genus and their respective place in the organization, or about how a concept like cooperation is related to feminine or masculine properties.

The aerospace of the European member states seems to have progressed in its ability to cooperate, but with real important disparities. On the basis of such research and reflections, as representatives of a scientific community we can mirror political priorities and what is becoming a reality of the political agenda be it Lisbon, Stockholm, Barcelona or Paris. The expansion of the research network in the rest of the world will be advantageous for our work. Here, a challenging research agenda might be the best compass for cooperation. This brings us back to where this chapter started: the analysis of the influence of the entrepreneur in a high-tech venture shows that cooperation is as vital to survival as other entrepreneurial competences. Individualistic behaviour or monomanic focus on business statistics can become more meaningful for survival within a framework of constructive internal and external relations. Some guidelines for practice in human resources management can already be derived from our exploratory analysis. The first guideline is that cooperation between individuals, and on the level of the community as a whole, can be seen as a powerful driver to enlarge the span of innovation of a company. A second guideline concerns the need in high-tech ventures to invest in the conditions that favour cooperation. Unlike high-tech gadgets that can be bought at the drop of a hat, cooperation is a virtue that needs time to develop. Finally, not only can entrepreneurs themselves stimulate the abilities for survival of the myth, but also supervisors as well as individual employees play their own role, and in this sense they are part of the venture capital. To sustain a myth needs solid ground.

NOTE

1. We do not know exactly how the relationships were in the past: this remains partially obscure and so also shows a mythical character.

REFERENCES

Ansoff, H.I. (1965, 1995 revised edn), *Corporate Strategy*, London: Penguin Books.
AWVN (Dutch employers' association) (2005), *Social Innovation* (in Dutch), Haarlem, The Netherlands: AWVN.
Bain, J.S. (1959), *Industrial Organisation*, New York: John Wiley and Sons.
Bolwijn, P. and T. Kumpe (1990), 'Manufacturing in the 1990s – productivity, flexibility and innovation', *Long Range Planning*, **23**(4), 44–57.
Brown, T.E. and J. Ulijn (2004), *Innovation, Entrepreneurship and Culture*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Cameron, K.S. and Quinn, R.E. (1999), *Diagnosing and Changing Organizational Culture*, Reading: Addison-Wesley.
de Geus, A. (1997), *The Living Company*, London: Nicholas Brealey.
Drillon, D. (1995), 'Motivation, environnement et performance', doctoral thesis in the human sciences, University of Paris X Nanterre.
Drillon D., F. Lasch and M. Merdji (2004), '*Itinéraire de jeunes entrepreneurs*', 3rd Congrès de l'Académie de l'Entrepreneuriat, EM Lyon, 31 March–1 April.
Drillon, D. (2005), *Les apports potentiels de la Psychanalyse au Management*, Document de synthèse de HDR, University of Montpellier III.
Drucker, P.F. (1993), *Post Capitalist Society*, Oxford: Butterworth-Heinemann.
Faux, J. (2002), 'The aerospace sector as a national asset', Economic Policy Institute, www.epinet.org/content.cfm/webfeatures_viewpoints_airspace_natlasset.
Flanagan, J.C. (1954), 'The critical incident technique', *Psychological Bulletin*.
Florida, R. (2002), *The Rise of the Creative Class*, New York: Basic Books.
Fujimoto, T. (2004), 'On multi-path system emergence: an evolutionary framework to analyse process innovation', in Brown and Ulijn (eds), pp. 233–48.
Gaspersz, J. and A.A. Verhoeff (eds) (2001), *New Choices in Work* (in Dutch), Dordrecht: Kluwer.
Ghoshal, S. and Bartlett, A. (1997), *The Individualized Corporation*, London: Heinemann.
Ghoshal, S. and C.A. Bartlett (2000), *The Individualized Corporation: A Fundamentally New Approach to Management*, London: Random House.
Gielen, P., A. Hoeve and L. Nieuwenhuis (2003), 'Learning entrepreneurs as experts', working paper, Wageningen (NL): Stoas.
Groen, A.J. (2005), 'Knowledge intensive entrepreneurship in networks: towards a multi-level/multi-dimensional approach', *Journal of Enterprising Culture*, **13**(1), 69–88.
Herrmann, N. (1992), *Les Dominances Cérébrales et la Créativité*, Paris Ed. Retz.
Hofstede, G.J., P.B. Pedersen and G. Hofstede (2002), *Exploring Culture: Exercises, Stories and Synthetic Cultures*, London: Nicholas Brearley.
INSEE (2000), *L'Économie Française: Édition 2000–2001*, Paris: Livre de Poche.

MacLean, P.D. (1985), 'Brain evolution relating to family, play, and the separation call', *Archives of General Psychiatry*, **42**(4), 405–17.
Mason, E.S. (1939), 'Price and production policies of large scale enterprise', *American Economic Review*, 61–74.
Miles, M.B. and A.M. Huberman (1994), *Qualitative Data Analysis*, Thousand Oaks, CA: Sage Publications.
Nahapiet, J. and S. Ghoshal (1998), 'Social capital, intellectual capital, and the organizational advantage', *Academy of Management Review*, **2**(23), 242.
Niosi, J. and M. Zhegu (2005), 'Aerospace clusters: local or global knowledge spillovers?', *Industry and Innovation*, **12**(1), 1–25.
Nisbet, R.A. (1970), *Social Change and History: Aspects of the Western Theory of Development*, Oxford and New York: Oxford University Press.
Nisbet, R. (1974), *The Social Philosophers. Community and Conflict in Western Thought*, London: Heinemann.
Porter, M. (1990), *The Competitive Advantage of Nations*, Basingstoke: Palgrave Macmillan.
Quinn, R.E. (1991), *Beyond Rational Management*, San Francisco: Jossey Bass.
Saly, A.W. (2001), 'Corporate entrepreneurship: antecedents and consequences of entrepreneurship in large established firms', Rotterdam: Thela Thesis.
Schumpeter, J. (1934 [1942]), *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle*, Cambridge, MA: Harvard University Press.
Sperry, R.W. (1984), 'Consciousness, personal identity and the divided brain', *Neuropsychologia*, **22**, 661–73.
STAR 21 Strategic Aerospace Review for the 21st Century (2002), 'Creating a coherent market and policy framework for a vital European industry', European Commission, European Advisory Group on Aerospace.
Taylor, F.W. (1913), *The Principles of Scientific Management*, New York: Harper & Brothers.
Teece, D.J. (1988), 'Technological change and the nature of the firm', in G. Dosi, C. Freeman, R. Nelson, G. Silverberg and L. Soete (eds), *Technical Change and Economic Theory*, New York: Pinter, pp. 256–81.
Ulijn, J.M. and A. Fayolle (2004), 'Comparing entrepreneurial and innovation cultures: the European perspective of French, German and Dutch engineers, some empirical evidence about their technology vs market orientation', in Brown, T. and J. Ulijn (eds), *Entrepreneurship, Innovation and Culture*, Cheltenham, UK and Northampton, MA: Edward Elgar, pp. 204–32.
Vassal, O. (2005), *Crise du sens, défis du management*, Paris: Village Mondial.
Verhoeff, A.A., H. Menzel and J. Ulijn (2005), 'Using role-play simulation to study entrepreneurship, theoretical grounding and first empirical insights', paper presented at the 2nd Symposium on Entrepreneurship, Innovation and Marketing, University of Stuttgart, 6 October.
Wasserman, N., N. Nohria and B. Anand (2001), 'When does leadership matter? The contingent opportunities view of CEO leadership', Harvard University Strategy Unit, Cambridge, MA.

3. Incubating technology entrepreneurship in Slovenia: do the nation's institutions foster cooperation?

Mateja Drnovšek, Patricia Kotnik, Valentina Nahtigal, Janez Prašnikar and Aleš Vahčič

INTRODUCTION

Slovenia has successfully transformed from a socialist to a market economy. However, at the start of the twenty-first century and following a successful entry into the common market of the European Union (EU), the key developmental challenges are becoming ever more important. *The Global Competitiveness Report* (Porter et al., 2004) provides ample evidence that the drivers of economic development in the twenty-first century differ substantially from those relevant to the twentieth century. Accordingly, the global competitiveness reports have for some time (2001–04) been highlighting the intensity of knowledge transfer as one of Slovenia's key competitive disadvantages.

Thus, the challenge for transition economies in particular is to evolve and possibly leap-frog from the intermediary to the knowledge, technology and know-how societies. For such a transition to be effective and sustainable, the key success factors are innovation and knowledge clusters linking public and private research and technological development (OECD, 2001). Technological development that is successfully commercialized is driven through intangible resources such as knowledge and social capital, which are proving to be the coal, oil and diamonds of the twenty-first century (Carayannis and von Zedtwitz, 2005). Indeed, the Lisbon strategy recognized entrepreneurship as a key area to be developed in order to achieve sustainable economic growth.

The next section of this chapter reviews theoretical paradigms on economic growth, innovation and entrepreneurship. The rest of the chapter focuses on empirical data to illustrate the evolution and trends of the devel-

opment of an entrepreneurship-supportive environment in Slovenia. Past and future trends in technological entrepreneurship evolution are estimated through the characteristics of national innovation system and industrial policy measures for high-tech ventures. They are further illustrated by qualitative survey data from personal interviews with Slovenian high-technology spin-off ventures. Finally, implications and conclusions are discussed at the end of the chapter.

TECHNOLOGY, INNOVATION AND ECONOMIC GROWTH

Background Paradigms

There is a solid consensus among practitioners that economic growth depends on investment in education, the protection of individual ideas and the development of entrepreneurship, which is especially the case of an intermediary economy[1] like Slovenia. The development of aggregate growth theories has seen technological progress as a main determinant of long-run economic growth with different attempts at explaining the mechanisms of technological progress. Up until the 1980s, Solow's neo-classical growth model and its reinterpretations played the dominant role. Solow's (1956) model assumes labour-augmenting technological progress that raises the productivity of the workforce and the marginal productivity of capital along with that.

This slows down or reverses the diminishing marginal productivity of capital as capital accumulates, creating incentives for further investments and leading to long-run economic growth. Technological change is seen as a necessary condition for sustained growth. Solow's model introduced technological progress as an exogenous variable, leaving it unexplained. But only some technological progress can be accounted for by random scientific discoveries, which would then justify its exogenous nature in the model. The lion's share of it results from the decisions of economic subjects in response to certain factors and should thus be regarded as endogenous.

Indeed, it was the endogenous growth theory that dropped the standard neoclassical assumptions and drove the explanation of technological progress the furthest. A key paper that started this wave of research was by Romer (1986). He introduced a model in which long-run growth is driven primarily by the accumulation of knowledge by forward-looking, profit-maximizing agents, thereby bringing in innovation as an endogenous factor. While Romer's theory brings in some of the institutional factors affecting innovative activities, a number of other authors have put more emphasis on

the importance of the environment for the rate of innovation and growth. Clear answers as to the contribution of institutionalizing to economic growth are lacking, yet a plausible assumption is that through overinstitutionalizing, the effect of decreasing marginal economies of scale occurs.

National innovation systems consist of the generation of new knowledge, the absorptive capacity to exploit this knowledge (Yencken and Gillin, 2002) and an external environment that is not prejudicial to innovation (Hindle and Yencken, 2004). For the technological innovation that results from the commercial exploitation of new knowledge, the ultimate objective is wealth creation, whether it is through the creation of a new business entity or by the establishment of a new venture within an existing company. The exploitation of such new knowledge leading to the discovery of a commercial opportunity essentially changes the production function (Schumpeter, 1962).

Knowledge enters technology development via codified and tacit knowledge (Hindle and Yencken, 2004). Codified knowledge consists of the published knowledge base of the science or engineering involved in the 'discovery', new knowledge contained in patents, copyrights, registered designs, and the codified content of postgraduate or undergraduate training in entrepreneurship and/or technology management. Tacit knowledge inputs to technology development are no less important and include the ability to find ideas that can be converted into opportunities (Fiet and Migliore, 2001), the technology and scientific background brought to new ventures by the ongoing involvement of the original inventors (Thorburn, 2000), familiarity with the particular product/industry sector (Cooper et al., 1994), and entrepreneurial experience including start-up management, risk management, established access to business networks and raising finance (Legge and Hindle, 1997).

Consequently, even when knowledge is codified in publications or patents its full exploitation will require the transfer of a component of tacit knowledge that is possessed only by the producer(s) of such knowledge (Dasgupta and David, 1994). Correspondingly, the knowledge resources needed for a technology transfer to occur are derived from entrepreneurial capacity. Other codified knowledge includes the disciplinary learning of the inventor and the entrepreneurship training of the entrepreneur. The tacit knowledge brought in by the various players starts with the technological understanding of the inventor in relation to the development of the specific new knowledge or technology being commercialized. The final ingredient in the process is entrepreneurial capacity: the experience and skills of the entrepreneur as both a manager of new technological ventures and a key informant in the business sector in which the venture will operate (Hindle and Yencken, 2004).

The Role of Technology Entrepreneurship in the Knowledge Transfer Process

The key drivers of technology entrepreneurship are technology entrepreneurs. Drawing from Schumpeter's seminal work where he stated that economic growth is the result of the successful innovating of entrepreneurs, regarded as the '*persona causa*' of economic development, technology entrepreneurs are nowadays the widely acknowledged key catalyst in the process of industrial formation and growth (for a review, see Oakey, 2003). Industrial history confirms that the birth of new industries has usually depended on the revolutionary skills of one or more of these key technical innovators who make the critical pioneering scientific discoveries (and/or innovations in management) that trigger the birth of new industrial sectors (for a review, see ibid.) and new jobs through the establishing of new high-technology-based firms (NTBFs). Major candidates for high-technology technical entrepreneurship are scientifically qualified staff who have 'spun off' from either public sector research establishments (including universities) or existing (usually large) industrial firms (ibid.).

Advocates of public intervention in favour of NTBFs point out that these firms are a source of radical innovation based on unconventional technical approaches. Such innovations challenge existing technological paradigms dominated by large established industry leaders and have the potential for revolutionizing industries, technology acquisition, transformation and diffusion within innovation networks (Autio, 1997), and opening up new industry segments (Colombo and Delmastro, 2002). Altogether, the benefits to society arising from the innovative activity of NTBFs largely exceed those that can be appropriated by them. Hence, such positive externalities justify governmental support (Oakey, 1995).

Taken altogether, research commercialization, entrepreneurship and technological innovation are closely linked phenomena that are vital to the creation and maintenance of national wealth (Hindle and Yencken, 2004). Ample empirical evidence supports the salience of technology transfer with technical entrepreneurs and their spin-off firms as key transmitters in the process.

Technology Transfer and Spin-off Firms

Technology transfer is the application of information (a technological innovation) for use (Gibson and Rogers, 1994). The accumulated tacit knowledge and culture of the entrepreneur are resources essential for creating wealth from research commercialization leading to technological innovation and the creation of NTBFs (Hindle and Yencken, 2004). The

technology transfer process usually involves moving a technological innovation from a research and development (R&D) organization to a receptor organization (such as a private company). A technological innovation is fully transferred when it is commercialized into a product that is sold in the marketplace. The mechanisms of technology transfer (Rogers, 2001) are spin-off companies, licensing, publications, meetings and cooperative R&D agreements.

A spin-off is a technology transfer mechanism because it is usually created in order to commercialize a technology that originated in a government research laboratory, a university research centre or a private research organization. In a further elaboration of the NTBFs' role, Autio (1997) believed that NTBFs are part of a 'technological articulation process' through which generic scientific knowledge is transformed into application-specific technological knowledge. Chiesa and Piccaluga (1998; see also Fontes, 1998) expanded on this issue by pointing out that one important contribution of spin-off entrepreneurs is to take technologies that are often 'shelved' in a research organization and to test them in terms of industrially related issues – such as production, market and regulatory aspects – thereby uncovering their commercial potential. Hence, spin-offs tend to emerge as a response to system gaps regarding the exploitation of academic research (ibid.).

Founders of spin-off companies are usually individuals who were former employees of a parent organization, and have a core technology that is transferred from a parent organization (Rogers and Steffensen, 1999). As such, spin-offs are categorized as university spin-offs and corporate spin-offs (Lindholm, 1994). Empirical research among spin-off firms showed that their founders, highly specialized professionals, are generally driven by the aspiration of owning a business; they are often retrenched or unhappy with their current working environment or seek a comfortable and satisfying way of life. In the specific case of public research organizations, the motivation for creating spin-off companies can also embrace the desire to market specialist skills and tacit knowledge held within the host organization through consulting and research contracts (Stanworth and Curran, 1986). The taxonomy of spin-off companies includes (Hindle and Yencken, 2004): (a) direct research spin-offs (DRSOs) are created in order to commercialize intellectual property arising out of a research institution where intellectual property is licensed; (b) technology transfer companies (TTCs) are companies set up to commercially exploit the university's tacit knowledge and know-how, usually but not solely in the area of process rather than product innovation, where no formally protected (for example, patents) intellectual property and/or exclusive licensing is involved; and (c) start-ups or indirect spin-off companies (ISOs) are companies set up by

former or present university staff and/or former students drawing on their experience acquired during their time at the university, but which have no formal intellectual property licensing or similar relationships with the university.

The Role of Support Infrastructure for Technology Entrepreneurship

Are the marginal costs of establishing high-technology firms in some sectors ultimately higher than in others? Recent research on academic spin-off firms has shown that in some fields, particularly science-based ones such as biotechnology, the utility of high-technology-based firms involved in the transfer of public research results to the market is higher than in others (for example, Kenney, 1986; Fontes, 2001). Due to its specific proximity to scientific research, the biotechnology field is particularly appropriate for the transformation of academic knowledge into productive knowledge.

Experience has shown that a research scientist without entrepreneurship training and experience, while competent as the initial technology champion, is often not well suited to the 'jockey role' needed to drive the NTBF forward (Daniels and Hofer, 1993; Samsom and Gurdon, 1993). Technology parks can facilitate the development of critical knowledge resources for bringing high-tech products to the market: the founder's unique awareness of opportunities, the ability to acquire the resources needed to exploit the opportunity, and the organizational ability to recombine homogeneous inputs into heterogeneous outputs. Empirical data show that start-ups involved in the process of technological innovation usually do not stem from the one person (Hindle and Yencken, 2004).

It has been shown that technological parks can generally be defined as property-based initiatives aimed at supporting innovative firms through the provision of technological and other business services. The following factors are crucial for the support of tenants in technological parks: (a) proximity to university laboratories and other research centres (Acs et al., 1992), which contributes to innovation spillover effects; (b) technology parks enable easier access when exploring the opportunities for the commercialization of innovations of academic and research personnel; (c) agglomeration economies related to the close clustering of firms in a relatively small geographical area; and (d) networking opportunities. In spite of the recent diffusion of technology parks in Europe, whether they have been successful or not in supporting NTBFs is still unclear since empirical studies have provided mixed results (Colombo and Delmastro, 2002). Clarity on the nature of the bridging role of technological parks in fostering cooperation and networking between tenant firms is also lacking.

THE STATE AND TRENDS OF TECHNOLOGY ENTREPRENEURSHIP IN SLOVENIA

Methodology

The methodology used in the chapter includes quantitative and qualitative approaches at the micro level of analysis. The innovative behaviour of Slovenian firms was analysed by applying a quantitative methodological approach. We used data on the innovation activities of firms gathered by the Statistical Office of Slovenia which is harmonized with international recommendations for measuring innovation activities (OECD, 1997) and Eurostat's recommendations for community innovation surveys (CISs).

The innovative firm in the sample is defined as one that has introduced or implemented new or significantly improved products and/or processes. The sample includes manufacturing firms with 10 or more employees and captures those firms which contribute more than 90 per cent of the employment of manufacturing firms of this size. The results we present later in the text form part of a broader study of innovation activities by Kotnik (2004). Regression models were used to assess the factors that determine innovative inputs and outputs and the effects of innovations on firms' economic performances. The impact of cooperation in innovation and technological opportunities on innovation inputs and outputs was also examined.

By using a qualitative methodological approach we analysed the evolution and development of a support infrastructure for technology entrepreneurship in Slovenia. The first elements of a support infrastructure appeared in the early 1990s, however their presence became meaningful a decade later when the Ministry of the Economy established systematic measures for facilitating entrepreneurship and competitiveness. Since most programme measures focusing on stimulating technological start-ups are still in formation, it is hard to estimate the effectiveness of government support in this regard or to make an objective estimation of the success of incubators and technology parks so far. Hence, we conducted several structured interviews with technology entrepreneurs whose firms are currently resident in the major Slovenian technology park. Among 59 members and associated members of the Ljubljana Technology Park we contacted 20 tenant companies. The response rate was relatively poor since the majority of the founders were not interested or refused to talk about their firms, saying: 'it is not worthwhile since Slovenia has adopted a stepmother attitude to our problems'. Material from in-depth interviews with three business founders are included in the chapter.

Overview of Enterprise Development in Slovenia

These days technology entrepreneurship represents a small yet crucial market niche of the small business sector. Slovenia has emerged as one of the most developed countries of Central Europe, partly as a result of its previous relatively liberal economy under self-management. The importance of entrepreneurship for growth, new job creation, innovation and general prosperity was then widely accepted, particularly in intellectual circles.

Small- and medium-sized companies (SMEs) now outnumber large enterprises to a great extent (99.7 per cent of SMEs compared to 0.3 per cent of large enterprises) (see Table 3.1). This is similar to the size structure of all 19 European member states (Europe-19) enterprises (99.8 per cent of SMEs). However, differences exist when comparing job shares according to the size of enterprises. Whereas in Slovenia the biggest employers are large enterprises, in Europe most employees (39.4 per cent) work in micro enterprises. This is mainly due to the greater share of large enterprises among all enterprises in Slovenia in comparison to Europe. Nevertheless, SMEs together can still be described as more important employers compared to large enterprises regarding shares of employment. Next, according to average sales per enterprise SMEs in Slovenia achieved far better results compared to Europe-19 than large Slovenian enterprises. The same is obvious when looking at average value added per employee, where Slovenian large enterprises lag far behind the 19 European countries included in our dataset (for more details, see Table 3.1).

Innovation and Technology Entrepreneurship in Slovenia

We begin our analysis of the role and development of technology entrepreneurship by examining data on the innovative activities of Slovenian firms in the sample compiled by the Statistical Office of the Republic of Slovenia described above. The data on inputs and results of innovation activities are shown in Table 3.2.[2]

Compared to the EU, the share of innovative firms is relatively low (21.1 per cent in 2002; see Table 3.2); during 1998–2000 the propensity to innovate in the EU-15 was 44 per cent.[3] In addition, the share of innovative firms in Slovenian manufacturing has not improved since 1994–96, the period for which the first round of the innovation activities survey was carried out (up until 2000, only manufacturing firms were included in these surveys). The average innovation intensity of manufacturing enterprises, measured by innovation expenditures as a percentage of total sales, was 3.1 per cent

Table 3.1 Employment and added-value potential of the Slovenian business sector

Variables		Size of firm (by number of employees)					
		Micro 0–9	Small 10–49	Medium 50–249	SME total	Large 250 +	Total
Number of firms	Slovenia	85,240	4,708	1,107	91,055	297	91,352
	Europe-19 (in '000)	17,824	1,261	185	19,270	40	19,310
Share of firms (%)	Slovenia	93.3	5.2	1.2	99.7	0.3	100
	Europe-19	92.3	6.5	1.0	99.8	0.2	100
Number of employees	Slovenia	142,925	93,705	116,309	352,939	203,136	556,075
	Europe-19 (in '000)	55,038	24,275	18,105	97,418	42,297	139,715
Share of employees in individual size class	Slovenia	25.7	16.9	20.9	63.5	36.5	100
	Europe-19	39.4	17.4	13.0	69.7	30.3	100
Average sales per firm in 1000 €	Slovenia	125	2,093	10,333	351	69,603	576
	Europe-19	440	3,610	25,680	890	319,020	1,550
Average value added per employee in 1000 €	Slovenia	17,186	24,351	23,653	21,219	28,673	23,942
	Europe-19	40,000	60,000	90,000	55,000	120,000	75,000
Labour costs (as % of added value)	Slovenia	54	62	66	61	61	61
	Europe-19	57	57	55	56	47	52

Source: Žakelj (2004, p. 42).

Table 3.2 Inputs and outputs of innovation activities of Slovenian firms

	Slovenia, 2000	Slovenia, 2002	EU-15, 2000
Share of firms with innovation activities* (%)	21.7	21.1	44.0
Innovation expenditures (as % of all turnover), manufacturing (%)	3.4	3.1	3.5
Share of sales of 'new to the firm but not new to the market' products (%)	4.9	N/A	17.1
Share of sales of 'new to market' products (%)	5.3	N/A	5.9

Note: * The data on the share of firms with innovation activity refer to 1998–2000.

Sources: European Innovation Scoreboard (2003 and 2004); Innovation in Europe (2004); Rapid Reports (Research & Development, Science & Technology) (2004).

in 2002 which reveals a negative trend compared to previous surveys. A comparison with average innovation intensities for EU countries' manufacturing sectors shows that Slovenian firms cannot be said to be falling behind when it comes to innovation inputs.[4]

The results of product innovation (measured as a share of sales; Table 3.2) are less favourable. Firms that reported introducing innovative products new to the firm but not new to the market in the period from 1999 to 2000 on average generated 4.9 per cent of their total sales with those products. The share of sales taking into account innovations which were also new to the market reached 5.3 per cent on average. Benchmarking against the average EU results shows that differences in the share of sales due to products new to the market are not that large (with the EU average being 5.9 per cent) but we have to take into account that only 11 per cent of Slovenian firms introduce 'new to the market' innovative products, (Kotnik, 2004) and that firms' interpretations of 'new to market' might differ according to the markets they sell in (Thuriaux and Couchot, 2000). When it comes to sales of 'new to the firm' innovative products, the share for Slovenian enterprises is much lower than for EU enterprises (4.9 per cent as compared to 17.1 per cent of sales). Results of consecutive innovative activities surveys also show that the share of innovative sales in manufacturing has dropped since 1996 and that the number of firms with a larger share of innovative sales is decreasing (Kotnik, 2004). We can conclude that a relatively small share of firms introduce innovations. Of those manufacturing firms that innovate, the intensity of their innovation inputs is

comparable to that of the average EU firm. However, the data indicate that they are falling behind in creating innovative output on the basis of these expenditures.

Firms' Cooperation in the Innovation Process

Regarding knowledge transfer issues, two factors that influence the innovative behaviour of enterprises are of special interest: cooperation in innovation and the exploitation of technological opportunities. As we have shown above this is undertaken through activities such as licensing, publications, meetings and cooperative research and development agreements (see Kirwan et al., ch. 12 in this book).

Cooperation might entail innovating with other firms or research institutions, whereas technological opportunities refer to the knowledge stock outside of the boundaries of the firm which increases with scientific discoveries and can thus contribute to the knowledge stock of the firm itself. Their effect on innovative inputs and outputs was estimated with a regression model of the determinants of innovation intensity using a group of explanatory variables X_1, whereas X_2 was used as a group of variables explaining innovation output (measured as the share of sales due to innovative products):

$$X_1 = \{SIZE, D_{FINANCE}, D_{COOP}, SCIENCE, D_{D-PULL}, EX, D_{GROUP}, D_{I_1}, ..., D_{I_{11}}\},$$

$$X_2 = \{INN\_INT, SIZE, |D_{PERMANENT}, D_{COOP}, SCIENCE, D_{D-PULL}, EX, D_{GROUP}, H, D_{I_1}, ..., D_{I_{11}}\}.$$

$SIZE$ represents the size of a firm; $D_{FINANCE}$ is a dummy variable for financial constraints (referring to the lack of financial resources for innovation activities), D_{COOP} is a dummy for cooperation in innovation, $SCIENCE$ stands for technological opportunities, D_{D-PULL} for the demand–pull effect (referring to the inducement to innovate by market demand), INN_INT for innovation intensity and H for human capital (referring to the skills and qualifications of the employees). Other variables control for additional characteristics of the firm that might affect innovation activities: EX represents export intensity, D_{GROUP} is a dummy for a firm being part of a group of firms, $D_{I_1}, \ldots, D_{I_{11}}$ are dummies for industry, and $D_{PERMANENT}$ is a dummy for firms with R&D activities being organized as permanent activities. Cooperation in innovation was measured as a dummy variable with a value of 1 if a firm innovated in cooperation with other firms or research institutions.

To create a variable for technological opportunities principal components analysis was used on data showing the importance of various sources of information for innovation. One of the factors combined universities and research institutes as important sources of information so this was used as a proxy for technological opportunities. The equations were estimated with ordinary least squares (OLS), using a robust variance estimate in the case of the innovation input equation. Cross-section data for 2000 were used, with the sample including 344 firms for the first equation and 235 for the second. The results of this econometric model are reported in Table 3.3.

Our results do not support the premise that cooperation in innovation encourages a firm's own innovation expenditure. Additional analysis with

Table 3.3 Innovation input and output equation estimates, 2000

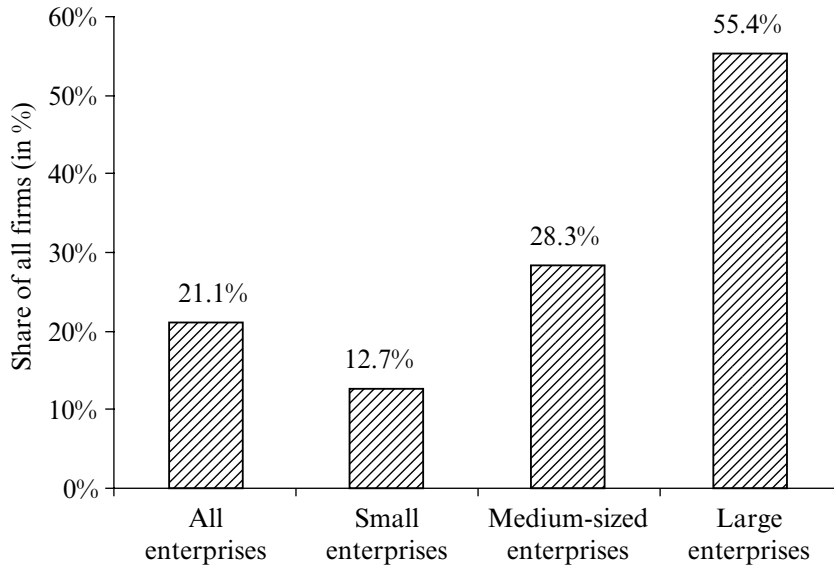
	Innovation intensity	Innovation output
Innovation intensity		0.1277
		(1.99)*
No. of employees	−0.1435	0.1568
	(2.32)*	(1.96)*
Human capital †		−2.5863
		(2.05)*
Technological opportunities	0.1428	0.07930
	(1.98)*	(1.04)
Dummy for demand–pull	0.2542	0.3887
	(1.69)	(2.38)*
Dummy for cooperation in product innovations	−0.2072	−0.3172
	(1.23)	(1.69)
Dummy for cooperation in process innovations	0.2574	0.0651
	(1.66)	(0.35)
Export intensity	1.28e–07	−6.11e–07
	(0.47)	(1.54)
Dummy for financial constraints	0.2463	
	(1.69)	
Other controlling variables ‡	√	√
Controls for industry	√	√

Notes: * Significant at $\alpha = 0.05$. † Since the values of the variable are expressed as (1-share of employees with a higher education), a negative coefficient indicates a positive relationship between explanatory and dependent variables. ‡ Other controlling variables: a firm being part of a group of firms; a firm having its own R&D department.

Sources: Calculations based on Statistical Office data; Kotnik (2004).

panel data found a statistically significant impact of cooperation on innovation intensity but it turned out to be negative, which implies a substitution effect. This corresponds to the fact that, within this kind of cooperation, the one with customers is most common for Slovenian firms. It might also indicate that the absorptive capacity of firms is weak. Veugelers (1997) concluded that cooperation in R&D increases a firm's own R&D expenditure only when the firm's absorptive capacity is sufficient. The effect of cooperation in innovation on innovation output also could not be confirmed by the results, which raises the question of the effectiveness of this kind of cooperation. Technological opportunities were confirmed as a statistically significant determinant of innovation intensity. Whereas larger technological opportunities encourage the innovation expenditures of the firms, the same cannot be confirmed for their effect on innovation output. Evidently, a larger stock of knowledge outside the firm affects the innovation activities of the firm indirectly, through larger innovation expenditures, but without these the firm's knowledge stock does not increase. This might also be a sign of insufficient absorptive capacity.

The innovation behaviour of SMEs reflects their size.[5] As evident from Figure 3.1, larger firms are more innovative (55 per cent of all large firms were innovative in 2001–02, compared to 28 per cent of medium ones and only 13 per cent of small ones). The empirical analysis of the innovative activities of manufacturing firms confirms the role of size in determining the innovative status of a firm, even when controlling for other firm characteristics. The probability that a firm will invest in innovative activities is greater the larger the number of employees, the larger the export propensity of the firm and the smaller the financial constraints the firm faces. These results are consistent with conclusions from the literature that uncertainties surrounding innovation activities are smaller for larger firms (Symeonidis, 1996); together with the greater availability of financial resources, this increases the propensity to innovate with the size of a firm. However, in the EU these differences are smaller, while in Slovenia the data show a lack of R&D activities in the small business sector (Vidrih, 2002: 58). One can find an explanation in the (non-)existent infrastructure aimed at supporting the development of new technology enterprises and the scarce financial resources available to smaller enterprises since smaller companies still largely rely on bank financing whereas risk capital and business angels represent only a negligible share (Žakelj, 2004: 18–19). Further, political and social pressures have slowed down new venture creations and the government has also discontinued tax facilities and other advantages for small entrepreneurs that resulted in the stalling of knowledge-based small firm development (Glas and Drnovšek, 2003).

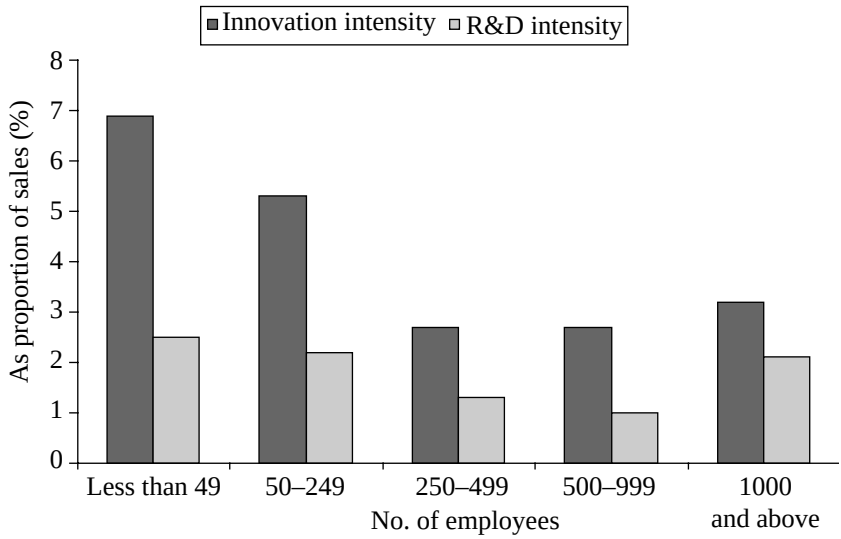


Source: Rapid Reports (Research & Development, Science & Technology) (2004).

Figure 3.1 Innovating firms as a share of all firms by size group, Slovenia, 2001–2002

However, once a firm decides to invest in innovative activities the effect of its size varies. As shown in Figure 3.2, innovation and R&D intensity fall with the size of a firm. SMEs are less likely to invest in innovative activities but, once they do decide to invest, the innovation (and R&D) expenditures represent a larger share of their sales. This agrees with part of the empirical literature on the impact of size on innovation intensity, a possible explanation being that the sales of smaller firms only starting to develop or market innovations are relatively low compared to the cost of innovating (Freeman and Soete, 1997). Other explanations include the arguments that larger firms are less flexible, more bureaucratic and have less effective internal communication within departments which all decreases the incentives to innovate (Symeonidis, 1996). Compared to differences in innovation intensity, the differences in R&D intensities between firms of different sizes are not that large. A reason for this is the structure of innovation expenditures.

Figure 3.2 shows that the share of R&D in total innovation expenditures increases with size. SMEs devote a larger part of these expenditures to purchases of the machinery and equipment needed for innovations. Yet the relationships change when it comes to the effectiveness of innovation

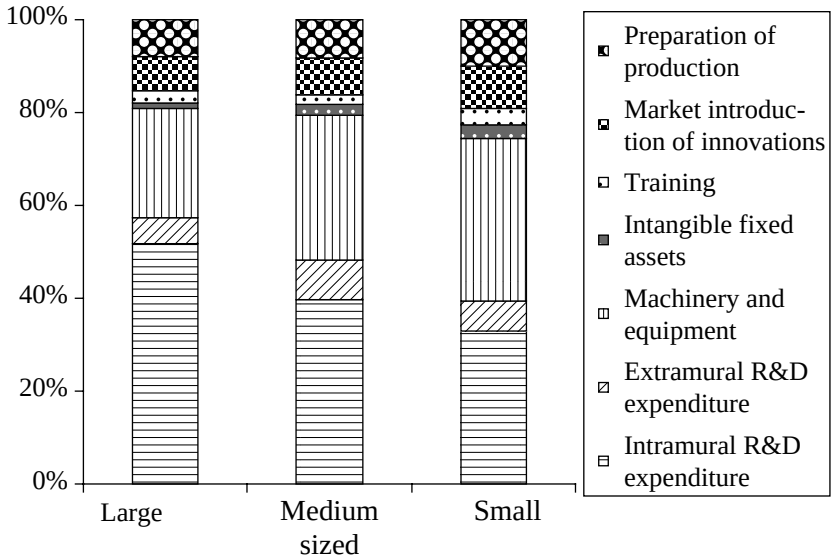


Source: Calculations based on Statistical Office data; Kotnik (2004).

Figure 3.2 R&D and innovation intensity by firm size, 2000

expenditures in creating the output of innovation activities. Empirical analysis of innovation output controlling for other determinants (Figure 3.3) confirmed that the productivity of innovation activities increases with firm size. This result is consistent with a study that took into account not only the number of innovations but also their economic value (measured by the value of sales) and showed that their value is increasing with a firm's size (Tether, 1998). Other possible explanations for the advantages of larger firms in creating innovation output are economies of scale in the production of innovations and the greater diversification of larger firms that offers a better position to exploit unforeseen innovations (Symeonidis, 1996).

The knowledge created by innovative activities should increase the economic performance of firms. The comparison of innovative and non-innovative firms based on descriptive statistics of the data on the innovative activities of manufacturing firms shows that they differ in the level of labour productivity and in the share of sales created by exports (Table 3.4). The sample data show that in 2000 the average labour productivity (measured by value added per employee) was €154,000 for innovative firms and €137,000 for non-innovative ones, with the difference being statistically significant. Something similar holds for export propensity where innovative firms created around half of their sales through exports while non-innovative



Source: Calculations based on Statistical Office data; Kotnik (2004).

Figure 3.3 Structure of innovation expenditures by firm size, 2000

firms only had a third. But the same cannot be said for the growth of labour productivity, value added, employment and sales in this period, which raises questions about the effects of innovation efforts. The same question can be brought up when studying the country's ability to commercialize the results of research and innovation in international markets, as reflected by exports of high-tech products (Figure 3.4). The comparison of countries studied in this book shows that Slovenia has the lowest concentration of high-tech products in its exports.

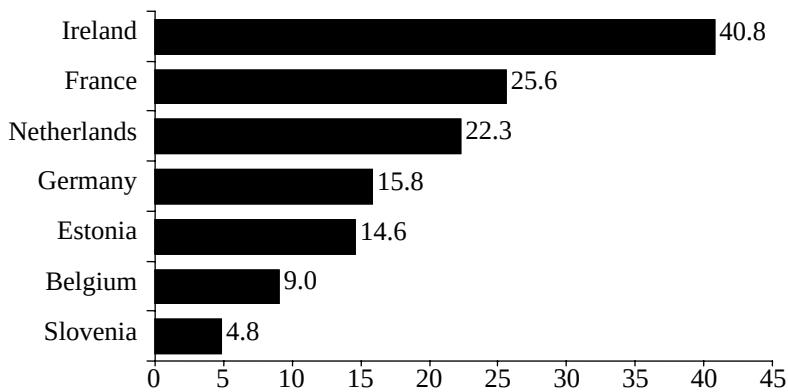
The question of the effective use of inputs in the innovation process is also raised by the results of an analysis of the impact of introduced innovations on firm performance (Kotnik, 2004). The analysis used information on firms' current accounts and balance sheets, together with data on innovation activities to estimate the production function of manufacturing firms. The production function was augmented by knowledge capital approximated as the share of a firm's innovative sales (that is, innovation output). The results show that the positive effects of knowledge capital on productivity can be confirmed only for medium- and high-tech industries. The estimated elasticity of value added with respect to knowledge capital for these industries was relatively low when compared to the results of similar studies for other countries. A positive effect could not be proved for

Table 3.4 Comparison of the economic performance of innovative and non-innovative firms, 2000

Variables	Mean		*t*-value
	Innovators	Non-innovators	
Level of productivity (in '000 SIT, 1996 = 100)	3683	3296	2.78**
Average growth rate of productivity	6.23	5.81	0.19
Average growth rate of value added	13.01	11.50	0.62
Average growth rate of employment	6.80	7.10	0.19
Average growth rate of sales	12.47	12.44	0.01
Exports as a share of total sales (in %)	51.35	32.86	8.53**

Note: ** Significant at the 5 per cent level.

Sources: Calculations based on Statistical Office data; Kotnik (2004).



Source: Key Figures 2003–2004 (2003).

Figure 3.4 High-tech exports as a % of total exports, 2001

low-tech industries. Slovenian firms thus seem to be falling behind in their ability to increase their productivity through innovation efforts.

Cross-border Cooperation in Research and Innovation

For Slovenia as a small open economy with an internal market of only 2 million people, the geographical dimension of the national innovation system holds special relevance. Firms and industries have strong ties with

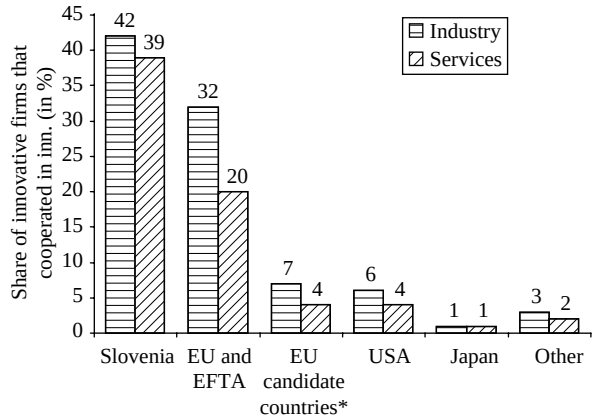
foreign markets – exports represent more than 60 per cent of Slovenia's GDP. The EU is the most important of these markets and this was the case even before Slovenia became a full EU member in May 2004. This milestone did not change the situation for most firms significantly since the Slovenian economy, especially its tradable sector, had already largely adapted to the demands of the common market in the pre-accession process with trade being largely liberalized in 1996 when the Europe Agreement was signed. On average, between 1996 and 2004 EU countries represented 69 per cent of Slovenia's exports of goods and 76 per cent of its imports of goods (Bednaš, 2005). But there are some signs of a change in the regional structure of external trade following full membership. A comparison of foreign trade data for the first two months of 2005 with that for the first two months of 2004 shows that exports increased by 15.6 per cent to EU-15 countries and by 25.2 per cent to EFTA (European Free Trade Association) countries, whereas they only increased by 4.9 per cent to former Yugoslav countries and by 2 per cent to other countries (SURS, 2005). These changes can be accounted for by the lifting of customs formalities with the EU, the improved recognition of Slovenia in some markets that were not traditional external trading partners before membership, and – to a smaller degree – the expiry of free-trade agreements with the countries of former Yugoslavia (Bednaš, 2005).

When it comes to the cross-border cooperation of firms in innovation, most of it is already focused on the EU. Figure 3.5 shows that around one-third of innovative manufacturing firms are involved in innovation cooperation with partners from the EU (and EFTA) countries, whereas only 7 per cent of them cooperate with candidate countries and only 3 per cent with the last category of countries (the category 'Other' in the figure) that also includes ex-Yugoslav countries. Cross-border cooperation in innovation is on the whole less strong for firms in services industries, but the location of partners shows similar patterns with EU partners prevailing.

Given the established ties with EU markets and the trends of an even stronger reorientation of foreign trade towards these markets, strengthening the ties with the European Innovation System should become a stronger priority of public policy.

Development of Support Infrastructure for Technology Entrepreneurship

Because of the great innovation potential that SMEs demonstrate and the fact that they need to purchase expensive machinery and equipment if they want to innovate, most governments provide some kind of publicly financed support environment to technology development and innovation commercialization. The early beginnings of the development of entrepreneurial



Note: *EU candidate countries include countries that joined the EU in May 2004, as well as Bulgaria, Romania and Turkey.

Source: Rapid Reports (Research & Development, Science & Technology (2004).

Figure 3.5 Proportion of innovative firms involved in innovation cooperation by location of partners, Slovenia, 2001–2002

support infrastructure in Slovenia date back to the establishment of consulting services, training organizations and business incubators in conjunction with the existing networks of the Chamber of Commerce and Industry and the Chamber of Craft in the 1990s. During the early stages of transition (1988–94) the government strongly promoted entrepreneurship, especially through self-employment programmes. The main institutions for promoting entrepreneurship, including the Small Business Development Centre, the Small Business Development Fund, local entrepreneurial centres and funds, were also created at this time. Unfortunately, the initiatives did not receive appropriate financial support as the government's first priority was macroeconomic stabilization and the restructuring of large socialist conglomerates to keep them solvent in order to avoid social conflicts resulting from mass lay-offs. Although the Small Business Development Strategy was written under the EU-PHARE programme it was not fully and consistently implemented (for an extended review, see Glas and Drnovšek, 2003).

A systematic approach to the development of support infrastructure in Slovenia was initiated only in the late 1990s. Recognizing the fact that the speed at which the country is able to improve its competitive position depends on how successful it is in providing an environment conducive to the creation and acquisition of knowledge as well as its transfer, in 1999 the Slovenian government drew up a new concept of industrial policy con-

ducive to enterprise reorganization and competitiveness: 'Programme of Measures to Promote Entrepreneurship and Competitiveness'. The programme's main focus is on the development of partnerships among universities, research institutions and the business sector (Petrin, 2003). It also promotes the generation of social capital in the form of knowledge acquisition, and networking between firms and between universities, research institutions and the business sector. The legal framework regulating technology entrepreneurship's development in Slovenia is the Act on Research and Development Activity (first draft 1991, harmonized with the EU legal framework in 2002) and the Industrial Property Act (2002). This legislation provided the necessary legal foundations for the systematic development of an infrastructural environment for supporting entrepreneurship with the objective of transferring knowledge, research results and technology to economic use (Vidrih, 2002).

The development of the infrastructure was supervised by the Ministry of the Economy through public tenders as the main instrument of technology entrepreneurship support. The first public tender was initiated in 2000 to stimulate improvements in technology processes, followed by a public tender for technology renovation in the textile industry in 2001. In subsequent implementation of the programme, public tenders stimulated: the development of common education and research infrastructure; activities to accelerate the transfer of knowledge and methods to the economy; activities related to technology parks and incubators; technology networks; technology centres of excellence; and the development of an innovative environment, including technology parks, business incubators and university incubators (ibid.). This programme establishes the goals and priorities for the 2002–06 period as well as the conditions and criteria for allocating government funds among enterprises. It is divided into three subprogrammes: (a) enhancing the creation of knowledge (the development of the university incubators, cooperation in EU programmes); (b) improving enterprises' competitive capacity (technological centres, parks and incubators, encouragement of the internationalization of SMEs, encouragement of foreign direct investment, stimulation of Slovenian investments abroad, stimulation of a system of continuous improvements in Slovenian companies, stimulation of networking among companies and specialization in production centres, stimulation of clustering, industrial research and pre-competitive development activities in companies, encouraging the development of technological networks, investments in new technologies); and (c) promoting entrepreneurship and the utilization of entrepreneurial opportunities.

Table 3.5 summarizes the allocation of financial resources. Rows 2 and 3 represent financial resources which can be most closely related to R&D activities and technology entrepreneurship. The figures in the table show

Table 3.5 Direct development initiatives through public tenders: 2001–2003 (in €)

Objective/measure	Granted finance 2001	Share (%)	Granted finance 2002	Share (%)	Granted finance 2003	Share (%)
Textile, apparel, leather industry (1)	4,248,632	17	2,972,075	14	4,804,421	18
Knowledge transfer from academic & research institutions to enterprises (2)	0	0	345,326	2	52,836	2
Pre-competitive technology development and innovativeness (3)	4,083,457	16	3,841,767	19	7,968,053	30
Internationalization of enterprises (4)	7,922,529	31	3,860,088	19	4,629,229	17
Productivity enhancements (5)	88,253	0	1,238,636	6	371,308	1
Network and cluster development (6)	3,371,407	13	3,767,854	18	5,214,622	19
Sum: Competitiveness strengths (3–6)	*15,465,646*	*60*	*12,708,345*	*62*	*18,259,161*	*68*
Promotion of entrepreneurship and development of a support environment (7)	2,248,869	9	1,512,571	7	1,222,785	5
Development of tourism (8)	3,495,928	14	2,965,368	14	2,111,667	8
Sum: Enhancing and exploiting entrepreneurship opportunities (7–8)	*5,744,796*	*23*	*4,477,939*	*21*	*3,334,452*	*13*

Note: 2001: €1 = 221 SIT; 2002: €1 = 231 SIT; 2003: €1 = 237 SIT.

Source: Ministry of the Economy (2005).

that there was a substantial decrease in the funds granted in 2002 (€20.5 million) in comparison to 2001 (€25.4 million). A year later the funds granted were at approximately the same level, namely €26.9 million. The estimate of funds granted in 2004 was expected to be at a level of around €18.8 million. The scope of projects supported by government grants is structured within three subprogrammes: (a) enhancing knowledge creation, with projects such as the development of university-based incubators and cooperation and integration in EU programmes; (b) improving enterprises' competitive capacity with projects such as the development of technology parks and business incubators, direct foreign investment, the introduction of systems of constant improvements into companies, support of intra-company cooperation, business cluster developments, support of the development of new technologies, technological renewal within companies and product renewal within companies; and (c) promoting entrepreneurship and the utilization of entrepreneurial opportunities included the support of new domestic and foreign investments in tourist infrastructure.

Along with implementing the programme the existing legislation was also amended. New legislation for the development of infrastructure that supports business innovation was endorsed and friendlier operational requirements for SMEs were introduced (Petrin, 2003).

Most of the funding in the 2001–03 period was given to large companies (38 per cent) followed by medium-sized companies (33 per cent). Thirty per cent of total financial help was given to small enterprises (Ministry of the Economy, 2005). However, it is necessary to point out that in the case of small enterprises more projects were approved but they involved smaller investment amounts. A further analysis of technology entrepreneurship at the level of individual public tenders is presented in Table 3.6.

Table 3.6 shows that the largest public tender in the 2001–02 period was to support R&D projects in firms (€4.1 million and €3.1 million), whereas in 2003 most funds were granted for the enhancement of technology investments. The development of supporting infrastructure was also relatively strong. Most of the funds were given to technology centres (€1.37 million) and technology parks and incubators (€1.15 million), whereas university incubators are a relatively new concept and still in the starting phase (€298,000).

Implementation of the programme generated substantial implications for the domain of technology entrepreneurship. Among the most important results were four technology networks – biotechnology and pharmacy; information and communication technology; precision processes; and new materials and environmental technology – which were initiated in 2003. Networks emerged in those industries where a competitive advantage was identified with regard to the existing level of production/innovative

Table 3.6 Direct development initiatives through public tender: 2001–2003 (in €)

Public tender	2001	2002	2003
Grants to R&D projects in firms (key for competitiveness)	4,083,457	3,192,417	
Enhancement of research core in firms	88,235		
Grants to technology centres	633,484	737,551	
Grants to technology parks and incubators	588,235	562,771	
Public tender for the development of common education and R&D infrastructure		215,543	
Public tender for the development of university-based incubators		129,784	168,803
Public tender for systems of continuous improvements ('20 keys')		928,571	
Public tender for the development of innovative environment: technology centres, parks and incubators			
Public tender for technology projects related to the R&D activity of firms			
Public tender for the development of technology networks			537,975
Public tender for the enhancement of technology investments			4,172,817

Note: 2001: €1 = 221 SIT; 2002: €1 = 231 SIT; 2003: €1 = 237 SIT.

Source: Evaluation of public tenders for the promotion of entrepreneurship and competitiveness enhancements, Ministry of the Economy (2005).

capabilities and the potential for their further development so as to network 43 enterprises, 15 R&D institutions and some 30,000 jobs in total. The building of other support infrastructure included three new technology parks with approximately 100 small firm tenants, 27 technology centres with 200 research projects for enterprises and three university-based incubators (Petrin, 2003).

The comparison table shows that the projects most crucially in need of government sponsorship were technology parks and centres and soft measures of technology entrepreneurship support – initiatives for technology networks and business cluster developments. The last column in Table 3.7 reveals a project success measure which was estimated based on interviews with the recipients of government funds in the 2001–03 period for the

Table 3.7 A comparison of projects by measure, funds granted and estimations of projects that would not have been implemented without government support

Measure	Measure target	Share (%) of government funds 2001–2003	Share of projects that would not have been implemented without support
Development of university-based incubators		1	50
Cooperation in EU programmes		1	36
Technology centres, parks and incubators		6	68
Internationalization of enterprises		7	30
Direct foreign investments		4	33
Direct investments of Slovenian enterprises abroad		5	27
Systems of continuous improvements		2	58
Cooperation and specialization of enterprises		8	51
Business clusters		6	75
Pre-competitive technology development		17	21
Technology networks		1	100
Development of new technologies		6	58
New domestic investments and tourist infrastructure		19	21
Modernization and human resource management		8	38
Technology renewal of enterprises		6	52
Product renewal within companies		3	36

Notes:

 Support for the development of an innovation environment which supports knowledge transfers and investments into infrastructure for innovation

 Support for the development and knowledge transfer

 Support for the openness and internationalization

 Support for investments into assets

Source: The evaluation of public tenders for promotion of entrepreneurship and competitiveness enhancements, Ministry of the Economy (2005).

purposes of an evaluation study of public tenders. As we shall show later, such a focus should continue in the future because the infrastructural part of the technology entrepreneurship support framework is already largely developed and at times overlapping.

The Pillars of Entrepreneurship and Competitiveness Support Infrastructure in Slovenia

Today, there are three key players in support infrastructure which channel public policy instruments and measures: the Slovenian Technology Agency, technology centres and technology parks:

- *Slovenian Technology Agency* The establishment of the Slovenian Technology Agency was included in the Act on Research and Development Activity in order to strengthen the link between education, science and the economy. Nevertheless, setting up the agency was well behind the plans. The agency only became operative in 2004. Today it faces several problems regarding its mission, competencies and financial support (Dovč, 2004b). The main purpose of the agency is to increase cooperation among educational and science institutions on the one hand and the economy on the other in order to accelerate the transfer of knowledge into practice and to thereby contribute to technological development in Slovenia. Although the agency has not operated at full strength yet, there exist heavy and at times conflicting interests regarding its work and activities among institutions, enterprises and others (ibid.). Some of the agency's operational roles include: carrying out measures to encourage technological development and innovation within the national research and development programme and other national programmes supporting enterprises and competition; the preparation of an expert base and materials to give directions for national development policy in the field of technological development and innovation; the organization of activities to promote innovation and technological development; bridging the international cooperation of enterprises; evaluation of the implementation of programmes and investments in R&D activities to enhance the competitiveness of the economy; and the national coordination of other agents in the field of technological development.
- *Technology centres* enable enterprises to access the most up-to-date technologies and stimulate innovativeness. They are especially aimed at helping smaller firms which, by themselves, do not have sufficient knowledge, human resources and adequate infrastructure for them to

develop new modern technologies (see Wakkee et al., ch. 9 in this book). There were some 27 technology centres operating throughout Slovenia in 2002 (Vidrih, 2002).

- *Technology parks* offer infrastructure and consulting services to high-tech start-up firms. There are four technology parks in Slovenia. Finally, there are five business incubators and three university-based incubators across Slovenia with the main goal of spreading an entrepreneurial culture and facilitating the formation of entrepreneurial intentions. They aim to develop mechanisms for the faster establishment of new enterprises that seek business opportunities in the fields of development and marketing of new technologies and technologically advanced products and services.

In what follows we examine in more depth the role that technology parks have played in the promotion of technology entrepreneurship. University and business incubators have so far not contributed any significant results to facilitate high-tech entrepreneurship since they are themselves financially struggling to survive because the government has lately been largely inefficient in administering the granted financial support from the EU. The three biggest technology parks (see Table 3.8) are regionally based: the Ljubljana Technology Park covers the central Slovenian region, the Styria Technology Park focuses on the eastern region and the Littoral Technology Park is in the coastal and Karst area.

The Ljubljana Technology Park was established in 1995 through a public–private partnership of research institutions, enterprises, banks and municipalities. It is a full member of the International Association of Science Parks and cooperates closely with several Slovenian institutions and organizations that support entrepreneurship. The management of the park also has substantial experience from its cooperation in international projects. It was established for the main purpose of building an entrepreneurial culture. It is geographically embedded in the part of the city that is home to most major research institutions and life science faculties. In this regard, the park acts as a focal point for links among education, science and the economy and as such offers incubating services to its members. In 2004, 59 companies are included in the park, making it the largest technology park in Slovenia. The majority of companies here are active in the area of information technology and systems, biotechnology, energy and industry automation.

The Littoral Technology Park was established in 1999 through the cooperative initiative of a school of higher education (Nova Gorica Politehnika), three private companies and two municipalities with the main objective of establishing mechanisms to encourage the foundation, development and

Table 3.8 The three technology parks at a glance

	Ljubljana Technology Park	Littoral Technology Park	Styria Technology Park
Year of foundation	1995	1999	1994
The founders (structure in %)			
a) Government	30% (public research institutes)	0%	0%
b) National authorities	60%	75.6%	100%
c) Private companies	10%	24.4%	0%
Number of full-time employees	3	4	4
Education structure (of employees)			
a) High school	–	1	2
b) Bachelor diploma	2	4	2
c) Graduate (MBA)	1	–	–
d) PhD	–	–	–
Number of (outside) professional consultants	70 consultants (annual average 40 contracts)	N/A	Approx. 30 consultants
Annual budget	€1 million	€0.67 million	€0.18 million
Sources of financing (%) approximations			
a) government	36	15	35
% municipality	2.4	40	0
% in-house activity	60	25	45
% projects	1.60	20	20
Coperation with other technology parks	AREA and BIC Trieste, LakeSide and TP Klagenfurt, SGF and TP Graz, TP Zagreb, TIC Rijeka, Vega Mestre	AREA Trieste, Kaernten TP	Tech Park of the Future (PHARE project) Interreg Slovenia – Austria, Craft goes digital (PHARE)
Projects	TECH-PARK-NET	PRO PLUS, IN PRIME	-II-
Space	5,456 m^2	1,400 m^2	2,600 m^2
Current number of tenant companies	59	23	16
Industries	Information technology, biotechnology, industrial automation	Information technology, electronics, process automation	Automation, ecology, electronics

Source: Own research.

growth of (innovative) technology enterprises in the region. Following its objective, the park developed a broad network of well-educated and skilled workers, stimulating working places and a range of support services for its tenant companies. In contrast to other technology parks in Slovenia, it also undertook the initiative of spreading its activities to several other Slovenian towns so as to accelerate the development of local innovation milieus. In 2004 there were 23 member companies in the park with their dominant activities encompassing information technology, electronics and process automation. The park is integrated into cross-border projects with the AREA Park in Italy and the Kaernten Technology Park in Austria.

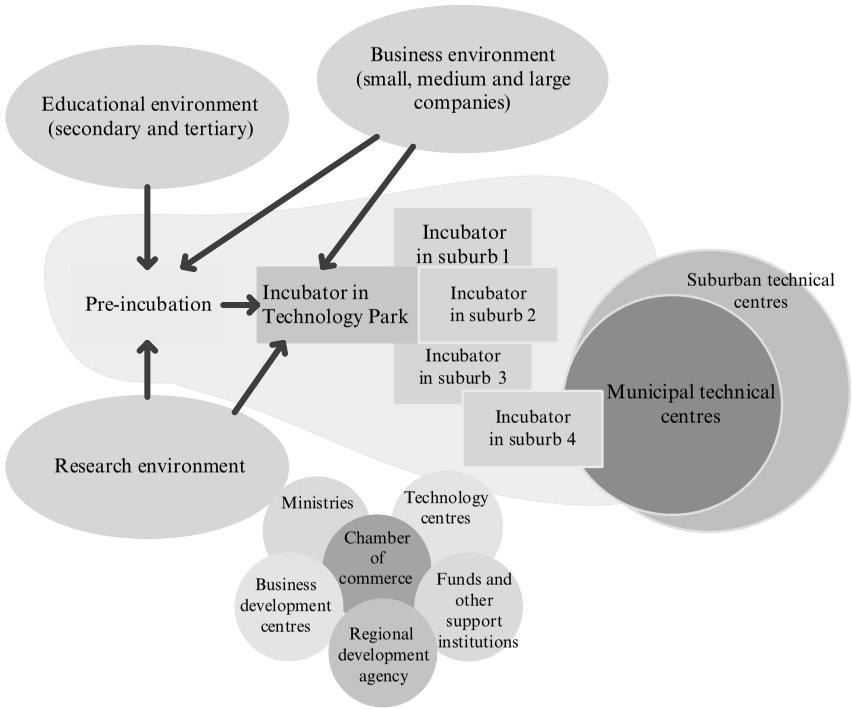
The Styria Technology Park was established in 1994 by the local development agency. It is located just outside the City of Maribor, in close proximity to the Austrian border. The location was chosen because of the well-developed traffic infrastructure. In 2004 there were 16 tenant companies from various industries (automation, electronics and environmental technologies) although many companies did not fit high-tech criteria. Hence, the park faces long-term problems of unused capacity mainly because of the local community's low level of interest in the park's activities.

In addition, the Technology Park for Construction was founded in 1998 as an autonomous department of the Slovenian Institute for Construction. Unlike the other Slovenian technology parks it was established mainly due to deregulation of the construction industry. It offers the following services: management of the transfer of R&D results to the market, the transfer of new materials, products and technologies, and providing the infrastructure and necessary services to new, technology-advanced enterprises. Since its foundation it has helped in the start-up of three companies.

Ultimately, although the four Slovenian technology parks share common elements in their missions – providing support for technology companies by incorporating them within a favourable environment and assisting them in the development of new technologies, products and services and in accessing the marketplace – it is only the Ljubljana Technology Park and to some extent the Littoral Technology Park that have truly helped to develop some high-tech start-ups.

Although it seems that Slovenia has established a truly supportive infrastructure for the improved development of technology entrepreneurship, one can still critically claim that there is too much inconsistency and especially non-cooperation between different institutions and government.

The network of business zones, technology parks and incubators (see Figure 3.6) represents the infrastructural and innovatory environment for new and existing companies. The conditions for joining the network are based on the following directions: modern technologies, growth, quality workplaces, high value added, focus on global markets and strategically



Source: Adapted from Lesjak (2003).

Figure 3.6 Conceptualization of the endogenous entrepreneurship support framework

important areas (tradition, sources, market). Most micro and small firms in the network are new companies, whereas medium-sized companies in technology or marketing that support strategically important areas (automation, informatization, telecommunication and biotechnology) are older. The newer members of the network are mostly from three areas (industry, research institutions and universities), whereas the existing companies come from different industrial sectors. However, the figure above also warns of potential threats coming from overlapping in building such a dense support network. Such institutionalization may lead to the redundancy and decreasing marginal returns of publicly financed support, which brings up the hot political question of the effectiveness of public spending. First-aid help in more effective budget allocation decision making in Slovenia will involve achieving a national consensus on the definition of a (high-)technology enterprise's distinctive characteristics and publicly financed institutions ceasing to act as competitors and enemies in their mutual goals of helping the start-up and growth of techno-entrepreneurs. Finally, a key barrier to the efficient functioning of such a network relates to its dependence on politics, which intervenes in its sustainable development.

Ultimately, a strong innovation system that achieves the goal of encouraging technology entrepreneurship and thereby economic growth is one with systemic linkages between internal and external sources of knowledge production and the existing innovation infrastructure. If these systemic linkages are insufficiently developed, the goal cannot be achieved in full. In our opinion, the effectiveness of innovation infrastructure in this framework may be hindered by the relatively weak knowledge production within firms and research institutions and by providing for the supply of innovation infrastructure ahead of demand.

Case Study: Technology Entrepreneurship in the Ljubljana Technology Park

The structured interviews, which were approximately one-hour long, were based on a questionnaire focusing on aspects related to the process of starting up a technology venture and the process of technology transfer. The three companies interviewed were started by researchers at that time employed by the University of Ljubljana and other government-sponsored research organizations. The intensity of their present cooperation with their prior employers varies between the case firms: from none to extensive. All firms operate in global markets in well-established market niches. The size of target niches varies; however, all of the founders claim that their companies are the leading innovators in the markets identified. The services provided in the technology park are commercially based and include premises and general administrative facilities. No research laboratories are

provided by the technology park itself. The tenants either equip their own laboratories or rent services from university-based laboratories.

The first company interviewed (*alpha*) specializes in the design of semiconductor architecture. Four researchers founded it in 1996 and it is privately owned. It currently employs 13 full-time and five part-time workers. Three employees are doctors of science, three are engineers with a bachelor's degree and the rest have a master's degree. The technology they use was developed at the Faculty for Electrical Engineering at the University of Ljubljana. The researchers tried to get funding for the further development of this specific technology in 1995. However, they were not supported by the university which in turn pushed them to start up their own spin-off company. The technology was already developed at the start-up, so the company focused on mastering the knowledge and creating marketable applications. By mastering knowledge and in-house technological developments, the firm's main commercial achievement resulted in the design of a chip that is today used in computer hardware production (computer pointing devices – 'mice') and is protected by five global patents. The founders' initial financial investment totalled some €4000 in 1996, whereas in the period 2003–04 the company realized €400,000 in annual sales. The founders believe that the technological knowledge developed in the laboratories of the Faculty of Electrical Engineering would not have been commercialized or otherwise commercially used had it not been for the spin-off company. After leaving the university, the founders did not retain any research collaboration. The founders believe that there are almost no limitations to the further growth potential of the spin-off since some 30 per cent of annual sales are reinvested in R&D.

The second company interviewed (*beta*) is a spin-off company from another biotech company started earlier within the Ljubljana Technology Park. The company has developed its own technology and tools for the separation of large protein molecules for production and purification processes and diagnostics purposes. Its products are still in the process of commercialization and the company has still not hit break-even point. The project was started with €2 million as a private–venture–capital fund partnership. The research activities were also funded by government (40 per cent; €160,000) and with EU funds (60 per cent; €240,000). In the period 2003–04, some 60 per cent of sales were still reinvested in basic technological research, and the company employed 33 people, six of whom held doctorates, seven had a master's degree and 10 had undergraduate degrees, with the rest representing technicians and administrative staff. Prior to employment in *beta*, most of the founders worked in some other high-tech company and some at the university, with two of them being recruited through the venture capital fund. The company owns four international

patents with customers which are leading international pharmaceutical companies. The founder's main motivation for creating the company was a passion to create new products and technologies. He believes that technology-based entrepreneurship is about creating new products and technologies that benefit society's well-being.

A researcher from Slovenia's largest publicly financed research institute established the third company (*gamma*). The average age of employees there is 25 years, with nine part-time employed undergraduate students and 10 full-time employees. The firm develops and produces a diversified high-tech product range, ranging from software and hardware for nuclear particle accelerators, geographical information systems and the development of electronic components for the automotive industry. The company's genesis goes back to 1996 when the founders were students working on a project to develop software for a German particle accelerator. When they graduated in 2001 they started up their own firm. In so doing, they kept a good relationship with the research institute and the ongoing transfer of technology and knowledge developed at the institute. The company manages to obtain research funds from the government and is also successful in getting funds from European projects. Today, devotion to constant innovation is the leading motto of the company.

The interviewed founders all expressed some bitterness when reflecting on the support they got from the environment during the developmental stages of their ventures. Their assessment of the support infrastructure for high-technology entrepreneurship in Slovenia is negative since entrepreneurs face bureaucracy, unpredictable changes in regulations and a tax system which does not promote in-company research. High-technology entrepreneurs do not have access to direct financial support from the government and they recommend the reallocation of financial resources directed to support research at universities and research institutes to potentially profitable marketable projects in start-up companies. The founders acknowledge that some of the benefits gained through their membership in the Ljubljana Technology Park such as support facilities, lower rents and the vicinity of other technology-based ventures created a special environment in which it is easier to operate. Regardless of the support received through the public infrastructure, the three cases clearly show that all of them transferred technology and knowledge from science to commercial use.

IMPLICATIONS

Entrepreneurship played an important role during the transition period in the early 1990s in Slovenia. More recently, public policy has once again

recognized it as an important actor in the process of improving the nation's competitive position. Indeed, global competitiveness yearbooks such as the *World Competitiveness Yearbook 2004* (IMD, 2005) persistently demonstrate the overall national perception that the current business environment is not supportive of entrepreneurship. The broader business and entrepreneurship environment characteristically lacks business literacy, is often envious, and harbours extremely negative attitudes to business failures. This research has aimed to illustrate the building of the institutional framework to foster the development of technology entrepreneurship in Slovenia. Throughout the chapter we have identified several obstacles which may eventually depress the facilitative role of a publicly financed entrepreneurship support environment. We discuss each in turn.

First, the perception of general public support received during the early development of high-technology-based firms is particularly low because there are no accessible leverages to direct financial support from the government to the most productive employment. We suggest the partial reallocation of financial resources directed to support research at universities and research institutes to potentially more profitable marketable projects in start-up companies.

Second, a relatively small share of firms is introducing innovation and the lack of innovative activities is especially evident among smaller firms. For those firms that do innovate, the effective use of inputs in the innovation process seems to be a problem. The statistical data indicate that firms are falling behind in their ability to increase value added through innovation efforts. Cooperation with other firms and research institutions seems to have no effect on the knowledge stock of firms and questions are being raised regarding the absorptive capacities of firms. Whereas the innovation intensity of SMEs is higher than that of large firms, the latter are more successful in creating innovation output. Moreover, there is a substantial gap between Slovenia and the old EU when comparing this output. To improve the absorptive capacity of the firms and increase the effectiveness of innovative expenditures in creating innovative output, two competencies need to be strengthened. The quality of human capital should be improved by encouraging the availability of highly skilled individuals with technical knowledge, by supporting their employment and the training of other employees by designing a supportive tax system, and by stimulating universities to provide applicable knowledge to students (see Wakkee et al., ch. 9 in this book). In addition, the knowledge stock of firms should be complemented by knowledge generated in research institutions. These linkages should be strengthened and rethought in the light of the financing of publicly funded research institutions and by encouraging universities to be more open to collaboration with industry.

Third, although technology entrepreneurs and public policy agree that further cooperation among education, training institutions, engineers and production managers should lead to an increase in the stock of entrepreneurial knowledge and techno-entrepreneurial capabilities, they disagree on the design of public policy measures and their implementation to achieve such goals. Techno-entrepreneurs suggest that innovation policy should aim to strengthen the absorptive capacity of firms and create mechanisms encouraging successful projects for cooperation in innovation. A potential solution may lay in the development of a national innovation system that acknowledges and embeds the national cultural determinants of inter-firm cooperation and the existing ties with the EU markets. In the last 15 years, Slovenian firms have largely built research cooperation and business relationship networks with business partners from these markets. With Slovenia becoming a full EU member, firms should focus even more strongly on their relationships with European markets in order to profit from EU-sponsored programmes for building national, regional, sector and technological innovation systems.

Finally, global polls on social values such as the *Global Competitiveness Report 2004* (IMD, 2005) highlight the importance of achieving a social consensus on the need for the faster pace of change in Slovenia. Moreover, Slovenian society has to attribute a greater social value to entrepreneurship to encourage risk taking and to reward the social contribution of entrepreneurial ventures. Overall, public policy has designed an extensive entrepreneurship support environment which at times even appears to be overinstitutionalized, however its effectiveness and marginal returns largely depend on the soft, culture-related determinants of the level of entrepreneurial activity.

NOTES

1. An intermediary economy is best described as being in an investment-driven phase of development. Efficiency in producing standard products and services becomes the dominant source of competitive advantage. Heavy investments in efficient infrastructure, a business-friendly government administration, strong investment incentives and better access to capital allow major improvements in productivity. Technology is accessed through licensing, joint ventures, foreign direct investment and imitation (Porter et al., 2004).
2. A few notes on the terminology used when describing the firms' innovation activities are in order. Innovation activities include R&D within the firm and R&D contracted out, acquisition of the machinery and equipment needed for innovations, the preparation of production and the accompanying training of employees, and marketing activities needed to introduce the innovation. Expenditures regarding these activities (innovation expenditures) can be considered as innovation inputs and are referred to as innovation intensity when calculated as a share of total sales of the firm. When only R&D expenditures are taken into account, R&D intensity is used. The results of innovation activities are innovative products.

They are new or significantly improved products, based on the results of new technological developments, new combinations of existing technology or the utilization of other knowledge acquired by the firm. Product innovations should be new to the firm concerned, but do not necessarily have to be new to the market. To enable a comparison between the firms, the results of innovation activities are depicted as innovation outputs, calculated as the share of sales due to innovative products in total sales (OECD, 1997).

3. Note that direct comparisons of the results between the Slovenian innovation activities survey and those published for EU countries have to be treated with caution: the methodology and data processing might differ slightly. In addition, the averages for a country are affected by the structure of manufacturing industry (with some industries having a greater propensity to innovate than others and larger firms having a greater propensity to innovate than smaller ones).
4. Since the data on innovation expenditures in services are less reliable they are not presented here.
5. The relationship between the innovative activities and the size of a firm also depends on the industry conditions, but the analysis controlled for that with the use of industry dummies.

REFERENCES

Acs, Z.J., D.B. Audretsch and M.P. Feldman (1992), 'Real effects of academic research: comment', *American Economic Review*, **81**, 363–7.

Act on Research and Development Activity, Uradni list RS, 96/02.

Autio, M. (1997), 'New, technology-based firms in innovation networks: simplistic and generative impacts', *Research Policy*, **26**, 263–81.

Bednaš, M. (2005), 'Učinki vstopa Slovenije v EU na gospodarska gibanja v letu 2004', working paper 5/2005, Ljubljana: UMAR.

Carayannis, E.G. and M. von Zedtwitz (2005), 'Architecting glocal (global–local), real–virtual incubator networks (G-RVINs) as catalysts and accelerators of entrepreneurship in transitioning and developing economies: lessons learned and best practices from current development and business incubation practices', *Technovation*, **25** (2), 95–110.

Chiesa, V. and A. Piccaluga (1998), 'Transforming rather than transferring scientific and technological knowledge – the contribution of academic "spin-out" companies: the Italian way', in R. Oakey and W. During (eds), *New Technology-Based Firms in the 1990s*, Vol. 5, London: Paul Chapman, pp. 15–31.

Colombo, M.G. and M. Delmastro (2002), 'How effective are technology incubators? Evidence from Italy', *Research Policy*, **31** (7), 1103–22.

Cooper, A.C., F.J. Gimeno-Gascon and C.Y. Woo (1994), 'Initial human and financial capital as predictors of new venture performance', *Journal of Business Venturing*, **9** (4), 371–95.

Daniels, C. and C. Hofer (1993), 'Characteristics of successful and unsuccessful entrepreneurial faculty and their innovative research teams', *Frontiers of Economic Research*, Princeton, NJ: Princeton University, pp. 598–609.

Dasgupta, P. and P.A. David (1994), 'Toward a new economics of science', *Research Policy*, **23** (5), 487–521.

Dovč, F. (2004a), 'Finski tehnološki zgled', *Gospodarski vestnik*, **4**, 29.

Dovč, F. (2004b), 'Mreže za nove tehnologije', *Gospodarski vestnik*, **43**, 12.

European Innovation Scoreboard (2003, 2004), Brussels: European Commission.

Fiet, J.O. and P. Migliore (2001), 'The testing of a model of entrepreneurial discovery by aspiring entrepreneurs', in W.D. Bygrave, E. Autio, C.G. Brush,

P. Davidsson, P.G. Green, P.D. Reynolds and H.J. Sapienza (eds), *Frontiers of Entrepreneurship Research*, Wellesley, MA: Babson College Press.
Fontes, M. (1998), 'The role of entrepreneurial firms in the transfer of public research to the productive sector', in W.D. Bygrave, E. Autio, C.G. Brush, P. Davidsson, P.G. Green, P.D. Reynolds and H.J. Sapienza (eds), *Frontiers of Entrepreneurship Research*, Wellesley, MA: Babson College Press.
Fontes, M. (2001), 'Biotechnology entrepreneurs and technology transfer in an intermediate economy', *Technological Forecasting and Social Change*, **62** (1), 59–74.
Freeman, C. and L. Soete (1997), *The Economics of Industrial Innovation*, London: Pinter.
Gibson, D.V. and E.M. Rogers (1994), *R&D Collaboration on Trial: The Microelectronics and Computer Technology Corporation*, Boston: Harvard Business School Press.
Glas, M. and M. Drnovšek (2003), 'Small business in Slovenia: expectations and accomplishments', in A. Watson and D. Kirby (eds), *Small Firms and Economic Development in Developed and Transition Economies: A Reader*, Transition and Development Series, Aldershot, UK and Burlington, Vermont: Ashgate, pp. 131–51.
Hindle, K. and J. Yencken (2004), 'Public research commercialisation, entrepreneurship and new technology based firms: an integrated model', *Technovation*, **24** (10), 793–803.
IMD (2005), *World Competitiveness Yearbook 2004*, Lausanne: Institute for Management Development.
Industrial Property Act – revision. Uradni list RS, 21/95, revised 2002.
Innovation in Europe, data 1998–2001 (2004), Luxembourg: Eurostat.
Kenney, M. (1986), 'Schumpeter's theory of innovation in capitalism: a case study of the genetic engineering industry', *Research Policy*, **15** (March), 21–31.
Key Figures 2003–2004: Towards a European Research Area, Science Technology and Innovation (2003), Luxembourg: Directorate General for Research, Office for Official Publications of the European Communities.
Kotnik, P. (2004), 'Inovacijska dejavnost podjetij: Njene determinante, vpliv na produktivnost in pomen za mednarodno konkurenčnost', a Doctoral dissertation, Faculty of Economics, University of Ljubljana.
Legge, J. and K. Hindle (1997), *Entrepreneurship: How Innovators Create the Future*, London and Melbourne: Macmillan.
Lesjak, I. (2003), 'Spin-offs in the Ljubljana region', in *The Slovenian Experience: Best Practice in the Development of Entrepreneurship and SMEs in Countries in Transition*, Geneva: United Nations, p. 70.
Lindholm, L. (1994), 'The economics of technology-related ownership changes. A study of innovativeness and growth through acquisitions and spin-offs', a Doctoral dissertation, Department of Industrial Management and Economics, Chalmers University of Technology, Gothenburg.
Ministry of the Economy (2005), 'Evaluation analysis of public tenders in the sector of entrepreneurship and competitiveness, 2001–2003', Ljubljana: Ministry of the Economy.
Oakey, R. (1995), *High-Technology New Firms: Variable Barriers to Growth*, London: Chapman & Hall.
Oakey, R. (2003), 'Technical entrepreneurship in high technology small firms: some observations on the implications for management', *Technovation*, **23** (8), 679–88.

Organization for Economic Cooperation and Development (OECD) (1997), *Oslo Manual*, Paris: OECD.
Organization for Economic Cooperation and Development (OECD), (2001), *Innovative Clusters: Drivers of National Innovation Systems*, Paris: OECD.
Petrin, T. (2003), 'The role of science for competitiveness of Slovenia. Third talk to the President', President of the Republic, Ljubljana, 10 December.
Porter, M.E., K. Schwab, X. Sala-i-Martin and A. Lopez-Claros (2004), *The Global Competitiveness Report*, Geneva: World Economic Forum.
Rapid Reports: research, development, science and technology (2004a), Statistical Office of the Republic of Slovenia, Ljubljana.
Rapid Reports: trade and foreign exchange (2004b), Statistical Office of the Republic of Slovenia, Ljubljana.
Rogers, E.B. and M. Steffensen (1999), 'Spin-offs', in R.C. Dorf (ed.), *Handbook of Technology Management*, Boca Raton, FL: CRC Press and IEEE Press, pp. 145–9.
Rogers, E.W. (2001), 'A theoretical look at firm performance in high tech organizations. What does existing theory tell us?', *Journal of High Technology Management Research*, **12** (1), 39–61.
Romer, P. (1986), 'Increasing returns and long run growth', *Journal of Political Economy*, **94** (October), 1002–37.
Samsom, K.J. and M.A. Gurdon (1993), 'University scientists as entrepreneurs: a special case of technology transfer and high-tech venturing', *Technovation*, **13**, 63–71.
Schumpeter, J.A. (1962), *Capitalism, Socialism and Democracy*, New York: Harper Torchbooks.
Solow, R.M. (1956), 'A contribution to the theory of economic growth', *Quarterly Journal of Economics*, **70**, 65–94.
Stanworth, J. and J. Curran (1986), 'Growth and the small firm?', in J. Curran, J. Stanworth and J. Watkins (eds), *The Survival of the Small Firm: Employment, Growth, Technology and Politics*, Aldershot: Gower, pp. 70–99.
SURS (Statistical Office of Republic of Slovenia) (2005), www.stat.si/tema_ekonomsko_zunanja_msi.asp, 2 July 2005.
Symeonidis, G. (1996), *Innovation, Firm Size and Market Structure: Schumpeterian Hypothesis and some New Themes*, Paris: OECD.
Tether, B.S. (1998), 'Small and large firms: sources of unequal innovations?', *Research Policy*, **27**, 725–45.
Thorburn, L.J. (2000), 'Knowledge management, research spin-offs and commercialisation of R&D in Australia', *Asia Pacific Journal of Management*, **17** (2), 257–75.
Thuriaux, B. and E. Couchot (2000), 'Overview (of conference proceedings)', paper presented at the Conference on Innovation and Enterprise Creation: Statistics and Indicators, Sophia Antipolis, 23–24 November.
Veugelers, R. (1997), 'Internal R&D expenditures and external technology sourcing', *Research Policy*, **26**, 303–15.
Vidrih, A. (2002), 'Dejavnost raziskovanja in razvoja v Sloveniji', Working Paper No. 9, Faculty of Economics, Ljubljana.
Yencken, J. and M. Gillin (2002), 'Australian university spin-off companies. Attitudes, policies, and the companies', AGSE Research Paper, Australian Graduate School of Entrepreneurship, Swinburne University of Technology, Melbourne.
Žakelj, L. (2004), 'Razvoj malih in srednje velikih podjetij v Sloveniji in Evropski uniji', Working Paper No. 6, Faculty of Economics, University of Ljubljana.

4. The knowledge marketplace: understanding interaction at the academic–industry interface

Michael C. Brennan and Pauric McGowan

INTRODUCTION

The widely reported importance of high-tech-based start-up firms (Tidd et al., 2005) is based on the observation that such firms contribute disproportionate added value to national and regional economies when compared to conventional start-ups. Such a contribution can be measured in a variety of ways – for example wealth creation, job creation and export performance. Such performance is based in part on the knowledge competence of the individual entrepreneurs who create such firms and in particular the often implicit or hidden relationships between high-tech entrepreneurs and academia. While the merit of researching such a relationship initially appears counterintuitive – in that such entrepreneurs would appear to gain little from a relationship with large, often traditional bureaucratic organizations – there is evidence that this relationship is extremely important in high-tech and knowledge-based firms (Cooper, 2000).

Academia and individual academic institutions are a primary source of new knowledge production and innovation. High-tech entrepreneurs interact with academia in subtle and informal knowledge exchanges that are not always identifiable or appreciated by university managers. This knowledge exchange activity is becoming increasingly important given the changing role of universities within modern economies. We suggest that understanding knowledge exchange activity as part of a knowledge marketplace is an important foundational research activity in supporting high-tech start-ups at a regional and national level. The research domain that encompasses such foundational research can be broadly defined as academic entrepreneurship. Further, that the investigation of academic entrepreneurship between European regions and nations is of immense importance given the competitive pressures that the European Union faces from other global blocs and fast-growing economies.

In this chapter we consciously attempt to make sense of academic knowledge and entrepreneurship *within* academic institutions as the basis for better understanding interaction with the wider knowledge market. This is important as there is a reported lack of interaction between academic institutions and their regions in terms of high-tech entrepreneurship (see Lasch et al., ch. 5 in this volume, concerning the situation in France). Certainly within the United Kingdom (UK) interest in academic entrepreneurship has grown exponentially over recent years and in particular since the year 2000.

Such interest can be attributed to a large extent to government policy and funding priorities. For example, the University Challenge Fund that provides venture capital for university-linked entrepreneurial ventures and the Science Enterprise Challenge aimed at promoting entrepreneurship among science, engineering and technology students (OST, 2001). Of particular interest is the predicted outcome of the Science Enterprise Challenge and the anticipated growth in academic entrepreneurship in the UK: an estimated 40,000 students to receive some form of entrepreneurship education and the creation of 700 spin-out companies. Such targets take place within an overall aim of increasing 'awareness of the importance of business enterprise at all universities' and 'to legitimise commercial activity as a valid aspect of academic life' (ibid.: 1)

We believe that the stated policy objective of moving to a 'third stream of funding' (that is, enterprise funding in addition to traditional teaching and research funding), will involve a much greater number of academics and students becoming involved in entrepreneurship and interaction with high-tech ventures, for example, through:

- consultancy;
- public sector contracts;
- private sector contracts;
- joint ventures;
- spin-out firms;
- spin-in firms; and
- intellectual capital management.

Such interaction and venturing activity has clear implications for the knowledge marketplace in regional and national economies. Indeed, the above takes place within a wider debate concerning the role of universities in society and in particular the relationship among universities, industry and government – the so-called 'triple helix' (Etzkowitz, 2003) for fostering innovation.

The aim of this study was to investigate entrepreneurship among established and prospective academic entrepreneurs. In particular, we were

interested in the dynamics of the knowledge marketplace within which such academic entrepreneurs operate. The study also builds on our previous work (Brennan et al., 2005) which more fully explores the streams of research literature that contribute to the domain. The following summarizes the key parts of the chapter and the research process. In the literature review section, an attempt is made to define the scope of academic entrepreneurship with reference to three streams of complementary research. Of necessity the literature cited is representative and 'genealogical' rather than broad based and comparative. The methodology section details the three-stage process used to investigate academic entrepreneurs and prospective academic entrepreneurs in a single university setting. In the discussion and management implications section, the results are explored and the implications of the study discussed in terms of how they add to an understanding of the knowledge marketplace.

Given that little theoretical work has been done on academic entrepreneurs within universities (as opposed to academic spin-out firms) it was decided to focus exclusively on one university rather than include relationships with other parts of innovation clusters in the wider regional or national economy. This is clearly a limitation but one that is justified in an attempt to understand knowledge use within one institutional setting. As such it might be considered as investigating a subliminal phenomenon that adds to previous research on university spin-out firms (Birley, 2002; Shane, 2004).

In terms of outcomes, the chapter suggests different ways in which academics can better understand their own approach to academic entrepreneurship with regard to how they use knowledge and their relationship with their host university. Such an understanding is clearly also of interest to high-tech firms in how they interface with academics who are located within universities. This has implications for university managers and the practical ways in which they can promote entrepreneurship – or at least reduce barriers to entrepreneurship taking place. At a theoretical level, the proposed typology of academic entrepreneurs is offered as a clarification of what to date have been contradictory definitions of the academic entrepreneur.

LITERATURE REVIEW

In attempting to make sense of the possible knowledge relationships between high-tech start-ups and academia, the authors conceptualized the overarching domain of academic entrepreneurship as three distinct but interrelated fields of research. It is suggested that these fields can be

understood as converging to form a coherent domain for the study of academic entrepreneurship. The first research stream is readily identifiable as the study of technology-based firms (Oakey, 1984 et seq.). The second research stream relates to the field investigating the commercialization of academic knowledge (Gibbons and Wittrock, 1985). The third and final field is that which explores the changing role of universities in society and indeed the emergence of the 'entrepreneurial university' (Etzkowitz, 1983 et seq.). By conceptualizing the three streams of research as overlapping fields (Figure 4.1) it is possible to visualize one understanding of academic entrepreneurship that explicitly encompasses the phenomenon of high-tech start-ups.

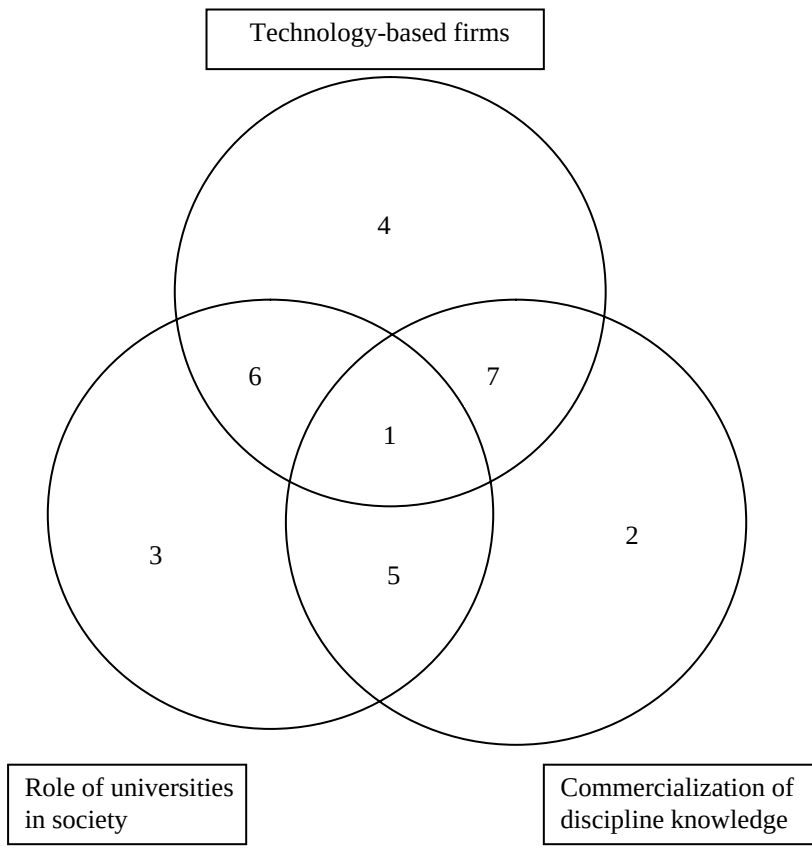


Figure 4.1 The domain of academic entrepreneurship

The overlapping fields of interest allow the identification of seven component parts:

1. The academic entrepreneur who balances the disciplinary considerations with the technology transfer strategy of a host university institution and opportunities arising from exploiting intellectual capital through technology-based firms (Jones-Evans, 1987; Dickson et al., 1998; Birley, 2002; Laukkanen, 2003; Shane, 2004).
2. A discipline context that determines academic credibility especially in terms of innovation (Faulkner, 1994; Csikszentmihalyi, 2001; Birley, 2002).
3. A university context that increasingly recognizes organizational knowledge capital as well as individual capital (Collins, 1993; Blacker, 1995; Askling et al., 2001; Etzkowitz, 2003).
4. Technology-based firms with a competence based on specialist knowledge (Roberts, 1991; Oakey, 1995; Autio, 1997; Storey and Tether, 1998).
5. University interventions to commercialize organizational knowledge (Jones-Evans, 1998; Etzkowitz, 2003).
6. University interventions to create/support/own science-, engineering- and technology-based firms (Kinsella and McBrierty, 1997; Ferguson, 1999).
7. Academics who engage with technology-based firms independent of a host university (Samsom and Gurdon, 1993; Carayannis et al., 1998; Cooper, 2000).

The above takes place in the entrepreneurial environment in which universities exist and markets and policy makers operate (Gibbons et al., 1994; Spilling, 1996; Nowotny et al., 2001; Neck et al., 2004; Shane, 2004).

The overarching domain of academic entrepreneurship described above and illustrated in Figure 4.1 is useful in that it creates conceptual bins within which previous research can be located and grouped. Perhaps more importantly it visually illustrates how such research is juxtaposed with other, complementary research areas to create new research stream combinations. For example, the central conceptual bin (identified by the number 1 in Figure 4.1) draws together different typologies of entrepreneur who can be identified as having a knowledge relationship with academia in a number of different permutations. These are detailed in Table 4.1.

Previous research on academics involved in entrepreneurship has tended to focus on those from science- or technology-based disciplines. For example, in a study of technical entrepreneurs, Jones-Evans (1987) found that the occupational/work background of the entrepreneur was an important factor in understanding how such individuals approach entrepreneurship. The research entrepreneur is identified as the category of technical entrepreneur most likely to be involved in a university/academic setting. This type of

Table 4.1 Entrepreneurship typologies

Basis of categorization	Categories	Author
Occupational/work background of the individual entrepreneur	Research technical entrepreneur Producer technical entrepreneur User technical entrepreneur Opportunist technical entrepreneur	Jones-Evans, 1987
Extent to which an academic is involved in the practice of entrepreneurship	Academic entrepreneur Entrepreneurial scientist Scientific entrepreneur	Dickson et al., 1998
The extent of involvement by an academic with a spin-out company	Orthodox spin-out Technology spin-out Hybrid spin-out	Birley, 2002

individual was described as having: 'a knowledge-oriented, science and technology background having worked in higher education/academia or in a non-commercial laboratory' (Cooper, 2000: 237).

Dickson et al. (1998) identified three types of entrepreneur based on a perceived transition from a posture of being purely academic to one of exploiting science. First, the academic entrepreneur is identified as someone who engages in entrepreneurial endeavours, but only as an adjunct to their academic work. Second, the entrepreneurial scientist is described as the scientist who was operating full-time in a business venture while still essentially dedicated to scientific interests. Third, the scientific entrepreneur is identified as someone with both science and business qualifications, operating in a venture and regarding science as business (Dickson et al., 1998).

Birley (2002) suggested a typology based on distinct types of spin-outs. First the orthodox spin-out is described as a company formed by one or more academics who leave the university to form the company. Interestingly, in a seeming contradiction to the Dickson et al. description, Birley identifies these founders as academic entrepreneurs. Second, the technology spin-out is described as a situation when an outside investor/manager buys or leases the intellectual property (IP) from the university and forms a new company.

The inventor academic(s) is (are) described as having no involvement with the running of the company. Third, the hybrid spin-out is identified as the predominant form of spin-out in Imperial College – the focus of the Birley study. It is suggested that in the hybrid form of spin-out there is a combination of inventor and founding academics with varying degrees of involvement with spin-out companies. In the context of promoting entrepreneurship among academics, Birley also reports a shift in university policy, 'from a technology transfer strategy that focused upon licensing technologies to large organisations and positively discouraged faculty entrepreneurial activity to one that focuses upon actively encouraging the creation of new ventures from faculty research' (Birley, 2002: 135). The examples detailed above serve as an illustration of how entrepreneurs involved in high-tech start-ups, are a highly diverse group of individuals demonstrating complex interaction with other components of a knowledge market.

The Knowledge Marketplace

Coincidently, the confluence of the three distinct research streams – technology-based firms; the commercialization of academic discipline knowledge; and the role of universities in society – is consistent with a corporate (rather than an individual) view of academic entrepreneurship. In other words the focus on the individual, central in the corpus of entrepreneurship research largely ignores the corporate context. We suggest that a corporate entrepreneurship (Antoncic and Hisrich, 2003) perspective better addresses important relationships among academic entrepreneurs, host institution and parent academic discipline. Sharma and Chrisman (1999) suggest that three types of phenomena form the focus for understanding corporate entrepreneurship: venturing, innovation and renewal. Table 4.2 presents a tentative framework for understanding the recent 'genealogy' of academic entrepreneurship and the sorts of entrepreneurship processes that merit investigation.

The attempt to conceptualize the domain of academic entrepreneurship by identifying contributory streams of research, relating these to categories of corporate entrepreneurship and making these categories operational (as opportunity, novelty and advantage seeking), can provide a focus for enquiry with which to investigate processes in the knowledge market. Indeed, the need for such a focus is implicit from the work of Lundvall (1990) on national/regional systems of innovation and more specifically from Saxenian's (1996) study of regional networks in Silicon Valley and Oakey's (1995) work on high-tech firms in the UK.

Table 4.2 A 'genealogy' of academic entrepreneurship

Contributory research streams and foundational researchers	Category of academic entrepreneurship	Academic entrepreneurship processes	Entrepreneurship definitional support
Technology-based firms (Oakey, 1984)	Venturing	Opportunity seeking	Zahra and Dess, 2001 Miles and Covin, 2002
Commercialization of discipline knowledge (Gibbons and Wittrock, 1985)	Innovation	Novelty seeking	Brazeal and Herbert, 1999 Tidd et al., 2005
The role of the university in society (Etzkowitz, 1983)	Renewal	Advantage seeking	Hitt et al., 2001 Dess et al., 2003

METHODOLOGY

The aim of the study was to investigate entrepreneurship among established and prospective academic entrepreneurs as a foundation for better understanding and supporting high-tech start-ups. In particular we were interested in the dynamics of the knowledge marketplace within which such academic entrepreneurs operate. The research was of practical relevance as both authors are involved in the teaching and promoting of entrepreneurship among academics and students in universities. This 'embeddedness' in the phenomenon suggested the need for a constructivist, interpretative approach (Schwandt, 2000) that recognized our inherent subjectivity. Such a context suggested a methodology that draws on two strategies of enquiry (Denzin and Lincoln, 2000): case-study research and action research.

Assumptions and Definitions

A definitional understanding of the concepts of entrepreneurship and entrepreneur is acknowledged as: 'Entrepreneurship encompasses acts of organisational creation, renewal, or innovation that occur within or outside an existing organisation' (Sharma and Chrisman, 1999: 18).

For this study we suggest that the organizational context of a university setting is central in understanding how academic entrepreneurship takes place and how high-tech firms interact with academia. Further: 'Entrepreneurs are individuals or groups of individuals, acting independently

or as a part of a corporate system, who create new organisations, or instigate renewal or innovation within an existing organisation' (ibid.). For the purposes of this study, academics demonstrating the above behaviour were deemed to be academic entrepreneurs.

Strategies of Enquiry

Two types of case study were felt to be relevant in terms of 'bounding' the research effort. Primarily the research was viewed as an *intrinsic case*, that is, because the authors wanted to gain a better understanding of a specific phenomenon in a unique university setting. Second, it was viewed as an *instrumental case*, that is, a contribution to the wider issue of understanding academic entrepreneurship as a phenomenon in its own right (Stake, 2000). The focus on a single case raised issues of validity of the research outcomes. To address this issue, a triangulation tactic was used as an alternative to validation (Fine et al., 2000; Stake, 2000) whereby three different perspectives from the single-case setting were selected: university managers of innovation, academic entrepreneurs and graduate students. In this way a multi-perspective and rich understanding was anticipated.

The case context and desired pragmatic outcome suggested an action research approach in terms of an iterative staged sequence consisting of a 'spiral of repeated cycles of planning, acting observing and reflecting' (Kemmis and McTaggart, 2000: 595). In particular, an action research approach justified the collection of quantitative data as: 'approximations to the ways participants understand themselves' (ibid.: 600). In this way a practical tool – the academic entrepreneurship questionnaire (AEQ) – was developed that could be used to profile both academic entrepreneurs and prospective academic entrepreneurs.

Research Design

The research design is based on, and is an extension of, an approach previously developed by Brennan et al. (2005) and consisted of three stages:

1. In-depth interviewing of university managers of innovation and academic entrepreneurs. The intention was to identify a set of common themes determined to be important in understanding the nature of academic entrepreneurship.
2. Development of a questionnaire, based on the key themes identified in stage 1, which could be used to survey academic entrepreneurs. The intention was to gain an understanding of how academic entrepreneurs understood themselves with specific reference to the key

Table 4.3 Summary of design stages

Design stage	Focus	Technique	How captured	How interpreted	Output
1	Academic entrepreneurship processes in a university setting	In-depth interviews ($n = 12$)	Audio tape and transcription	Sense-making	Key themes
2	Key theme dimensions and academic entrepreneurs	24-item questionnaire ($n = 9$) completed	Seven-point Likert scale	Value patterns	Profile characteristics
3	Profile characteristics academic groups ($n = 4$)	24-item questionnaire ($n = 124$) completed	Seven-point Likert scale	Profile comparisons	Assessing preferences in academics

Note: Total $n = 145$.

themes and if possible characterize different types of academic entrepreneurship.

3. The use of thematic characteristics (and academic profile types) as a practical tool in understanding the nature of academic entrepreneurs in three distinct groups. First, a group of science, engineering and technology graduates participating in an introduction to entrepreneurship seminar (SET graduates). Second, a group of teams short-listed for a regional university-based entrepreneurship competition. These teams consisted of academics and students (competition teams). Third, a group of doctoral students in two cohorts (A and B), with no stated interest in entrepreneurship.

Details of each stage and associated research activity are presented in Table 4.3.

Stage 1: key themes

University-based managers of innovation and established academic entrepreneurs were selected on the basis of purposeful sampling. The managers of innovation were those individuals tasked with deciding and implementing policy within the corporate structure and pursuing specific strategic objectives. The managers in turn identified academic entrepreneurs who were explicitly known to the institution. All 12 individuals participated in in-depth interviews that were recorded and later transcribed. Questions

were asked using the three academic entrepreneurship processes detailed in Table 4.2 (opportunity-, novelty- and advantage-seeking activity). Each process was explored using five levels: at the level of the individual; community of practice; academic school; university institution; and the wider entrepreneurial system. The last – the entrepreneurship system – was defined as the individual and corporate actors who interact in a recognizable context to form the infrastructure for entrepreneurship (Van de Ven, 1993; Spilling, 1996). Overall, the questioning tactic of stratifying was felt to be consistent with the idea of understanding a hierarchy of interaction, moving from the individual outwards to the entrepreneurial environment as a whole.

The text material was interpreted using a sense-making process of repeated cycles of: analysis, synthesis, sharing and summarizing (Weick, 1995). The output of this process was the identification of four key themes:

- *Work relationships* – the extent to which and nature of how an individual academic works with others while undertaking entrepreneurship.
- *Knowledge production* – the way in which an academic uses discipline knowledge to produce new knowledge.
- *Knowledge acquisition* – the way in which an academic uses knowledge networks.
- *Organizational orientation* – how academics regard and manage their relationship with their host university institution.

Stage 2: profiling academic entrepreneurs

The key themes produced as an outcome of stage 1 were then explored by revisiting the management literature that initially informed our understanding of the domain of academic entrepreneurship. Four pairs of bipolar preferences were identified that both addressed the key themes identified in stage 1 and built on previous research. These are detailed in Table 4.4, along with the key references used to inform the construction of the 24-item (AEQ) questionnaire.

Nine academic entrepreneurs (seven academics from the stage 1 population and an additional two individuals) were asked to complete the AEQ. The academics came from a range of disciplines and four types of entrepreneur were identified on the basis of differing patterns of response:

- *Hero* – an academic who is highly social with discipline work colleagues and also produces knowledge at the forefront of their discipline. They tend to use the institutional knowledge acquisition network while engaged fully with the host university and the wider entrepreneurial environment.

Table 4.4 Key themes in academic entrepreneurship

Theme	Bipolar preferences		References
Work relationships	Social	Individual	Nonaka, 1994 Storey, 2000
Knowledge production	Mode 1 (discipline focus)	Mode 2 (interdiscipline)	Gibbons et al., 1994 Nowotny, 2001
Knowledge acquisition	Receiver	Scanner	Cohen and Levinthal, 1990 Ekvall, 2002
Organizational orientation	Internal	External	Tidd et al., 2005 Etzkowitz, 2003

Source: Brennan et al. (2005).

- *Maverick* – an academic who engages strongly with discipline work colleagues but is less interested in knowledge production at the forefront of their discipline. They have a strong interest in interdisciplinary knowledge production and on the application of knowledge to problems outside academia. They tend not to engage with knowledge acquisition through university systems but use their own scanning network. They are also strongly orientated towards opportunities in the external entrepreneurship system. The term 'maverick' is intended to convey the idea that such academics, while highly successful in terms of entrepreneurship, tend not to engage with university systems.
- *Broker* – an academic who is highly social with discipline work colleagues but is less interested in producing knowledge at the forefront of their discipline. Rather they are interested in interdisciplinary knowledge trading or exchange and the application of knowledge in the wider entrepreneurial environment. They use both institutional and their own scanning networks for knowledge acquisition, while at the same time they are equally orientated towards the host university and the wider external entrepreneurship environment.
- *Prospector* – an academic who is highly individualistic with low engagement with discipline work colleagues and less interest in knowledge production at the forefront of their discipline. Their main interest is in the application of discipline knowledge and interdisciplinary knowledge trading/exchange. Knowledge acquisition is based strongly on their own scanning network with low use of

Table 4.5 A typology of academic entrepreneurs

A typology of academic entrepreneurs		Academic–university relationship	
		Balanced	Skewed
Discipline knowledge	Producer/user	Hero	Maverick
	Trading/exchange	Broker	Prospector

Source: Brennan et al. (2005).

university-based systems. They are strongly orientated towards the external, wider entrepreneurial environment.

The difference between the four types of academic entrepreneur is characterized in terms of their approach to discipline knowledge (contrasting the *production/use* of discipline knowledge with the *trading/exchange* of discipline knowledge) and their relationship with their host university (*balanced* in terms of engagement with systems and colleagues contrasted with a *skewed* engagement in terms of being extremely individualistic and/or not using university systems). In addition no single type was associated with a particular discipline background (Table 4.5).

Stage 3: assessing preferences in prospective academic entrepreneurs

The four types of academic entrepreneur identified in stage 2 reflected differing preferences in terms of how the individuals involved undertook academic entrepreneurship. Consistent with the overall aim of understanding academic entrepreneurship and the dynamics of the knowledge marketplace, four groups of academics/graduates including two groups of prospective entrepreneurs (Hisrich and Drnovšek, 2002; Erikson, 2003) were identified that could be profiled in terms of the four types of academic entrepreneur identified in stage 2.

First, a group of SET discipline graduates who participated in an introduction to entrepreneurship seminar. The graduates were all self-selecting in that they applied to participate in a seminar whose aim was to assist those interested in entrepreneurship. The seminar lasted three days and had a focus on the commercialization of academic research and the key stages involved in the entrepreneurship process. The group completed the AEQ during the final stage of the seminar.

The second group consisted of self-selecting teams of academics and graduates who had been short-listed for a regional, university-based entrepreneurship competition. The competition involved the completion of a

Table 4.6 Profiling prospective academic entrepreneurs (%)

Type / Population	Hero	Maverick	Broker	Prospector	Indeterminate
Academic entrepreneurs ($n = 9$)	22	34	22	22	N/A
Competition team members ($n = 22$)	18	23	18	23	18
SET graduates ($n = 23$)	35	9	17	13	26
PhD Group A ($n = 32$)	18	10	6	16	50
PhD Group B ($n = 47$)	36	15	2	10	36

business proposal linked to the commercialization of academic research and had a significant financial incentive for the winning business plan. This group also completed the AEQ at the end of a seminar aimed at improving the content/structure of their entry proposals.

The third and fourth groups consisted of doctoral students from two different university campuses. Questionnaires completed by all four groups were used to identify the types of prospective academic entrepreneurs based on the characteristics identified in stage 2 of the study. Table 4.6 presents the results and includes a reference profile (first row) for the academic entrepreneurs arising from stage 2 of the research process.

The above results suggest that among established academic entrepreneurs, in one particular institutional setting, there is a broadly even representation of the four types of academic entrepreneur (allowing for the small sample size). Among prospective academic entrepreneurs represented by competition members, the type distribution is broadly similar but also includes a significant proportion that were of indeterminate type, that is, could not be profiled with reference to the established entrepreneurs. In the SET group, the percentage of indeterminate types rose to over a quarter of the sample. In addition, a high percentage of hero types were represented at the expense of mavericks. Among both doctoral groups the percentage of indeterminate types rose still further to 50 and 36 per cent respectively, while the percentage of brokers was noticeably less than the previous samples. In addition the dominant bipolar preferences for each group were identified and are presented in Table 4.7.

Table 4.7 Academic entrepreneurship: assessing preferences (%)

Preference / Population	Social	Individual	Mode 1	Mode 2	Receiver	Scanner	Internal	External
Academic entrepreneurs	56	33	11	89	22	67	11	89
Competition team members	36	64	14	68	23	73	5	86
SET graduates	83	17	30	65	39	48	17	78
PhD students Group A	53	38	50	47	40	47	13	78
PhD students Group B	56	44	50	50	50	50	22	78

Note: Percentage discrepancies are accounted for by non-preferences between a particular pairing and rounding. Also note that multiple responses were possible.

The results from established entrepreneurs suggest that the typical academic entrepreneur has a preference for a close working relationship with discipline colleagues, is strongly orientated towards mode 2 (interdisciplinary) knowledge production, uses his/her personal scanning network to pursue opportunities and is highly orientated towards the external entrepreneurial environment. A similar set of preferences is suggested when one considers the results gained from the SET graduate group. In contrast, the competition team members differed in their profile in terms of a preference for an individual approach to work at the expense of social collaboration. Doctoral students also had a social preference for work relationships, equal preferences for modes 1 and 2 knowledge production, equal preferences for receiver and scanner knowledge acquisition and a marked preference for an external organizational perspective.

DISCUSSION AND MANAGEMENT IMPLICATIONS

The aim of the chapter was to investigate entrepreneurship among established and prospective academic entrepreneurs and in particular the dynamics of the knowledge marketplace within which such academics operate. The summary outcomes detailed in Tables 4.6 and 4.7 highlight a number of significant issues:

1. *Discipline knowledge* In-depth questioning of those involved in academic entrepreneurship identified the use of discipline knowledge as of

primary importance – in particular, the distinction between those interested in the *production/use* of discipline knowledge as a primary focus, compared to those who prefer the *trading/exchange* of discipline knowledge. The distinction is characterized by the proposed hero and broker types of academic entrepreneur. Heroes appear to prefer generating knowledge at the forefront of their discipline and indeed rely on their discipline field for recognition, and the recognition of their personal contribution to discipline innovation through peer review. In contrast brokers, while clearly located within a particular discipline, are more interested in knowledge trading/exchange between the university and the wider entrepreneurial environment. Brokers tend to be highly social and interested more in recognition from their host university rather than a particular discipline.

2. *Academic–university relationship* The extent to which academic entrepreneurs engage with their host university systems was also of significance. In particular, maverick types were discernible who, while interested in knowledge production/use, were much less interested in receiving knowledge through university systems and were not particularly engaged with their host university. This creates a paradox for university managers of innovation in that these individuals tend to be highly visible in the external entrepreneurial environment yet were extremely difficult to manage. Likewise the highly individualistic prospectors were orientated, in an extreme way, to the external entrepreneurial environment and self-reliant on their own knowledge networks and scanning processes. Prospectors were similar to mavericks in the extent of their prominent profile outside the university institution.
3. *The promotion of academic entrepreneurship* In the introduction to the chapter we observed the trend for a much greater interest in university-based entrepreneurship in the future. The evidence of significant skewed dimension to the relationship between academic entrepreneurs and their host university clearly raises significant challenges for university managers – in particular, the development of policies and processes that address the underlying reasons for attitudes taken by mavericks and prospectors. In the specific context of promoting prospective academic entrepreneurship two tactics – information seminars and reward-based competitions – clearly attract different types of prospective entrepreneurs. The targeting of individuals and the content/expected outcomes of such events should take account of the differing academic entrepreneurship profiles.
4. *Work relationships* The choice between social and individual bipolar preferences suggests that academic entrepreneurship is a decidedly

social phenomenon and somewhat at odds with the emphasis on the individual in the wider entrepreneurship literature. Interestingly the award-based competition attracted a majority of academics with an individual preference.

5. *Knowledge production* The preference for mode 2 or interdisciplinary knowledge production was particularly evident in established academic entrepreneurs. This tends to suggest that initiatives such as problem-based research centres are particularly relevant as institutional vehicles for academic entrepreneurs in that such centres not only address societal problems but are also inherently interdisciplinary.
6. *Knowledge acquisition* The preference for the use of personal scanning by academic entrepreneurs has implications for the ways in which university systems are designed. The use of central gatekeepers of knowledge is clearly problematic for maverick and prospector types in particular. Different mechanisms for knowledge exchange, for example through the establishment of web-based internal knowledge markets, may provide alternative ways of engaging with these types.
7. *Organizational orientation* The preference for an external orientation was found to be overwhelming. Again this has implications for how a host university actually facilitates this process. Are central university units best placed to facilitate such interaction or are other mechanisms more effective?
8. *High-tech start-ups* Support for high-tech start-ups should not only address the key issues of funding, skills development, the IP protection and cluster development but also the more tacit aspects of knowledge production and acquisition as well as the relationship with knowledge-based organizations such as universities.

CONCLUSIONS

As a result of our investigation we suggest that the increasing prevalence of entrepreneurship in universities will create significant challenges for both university policy makers and managers, and indeed for those who aspire to academic entrepreneurship. In particular we agree with Etzkowitz (2003) on the need for changes in organizational entities and systems in order to overcome real barriers within modern university structures and strategies. It is also apparent that academic entrepreneurship is different in important ways from independent entrepreneurship – specifically in terms of the nature of discipline knowledge and the academic–university relationship.

Table 4.8 The entrepreneurial university

Academic entrepreneurship	Paradigm	
	The managerial university	The entrepreneurial university
Work relationships	Individual entrepreneurship	Corporate entrepreneurship
Knowledge production	Discipline focus (Mode 1)	Interdiscipline focus (Modes 1 and 2)
Knowledge acquisition	Central gatekeepers	Multiple gatekeepers in a knowledge market
Organization orientation	Internal – external (dichotomous thinking)	The entrepreneurial system ('trialectic' thinking)

Source: Brennan et al. (2005).

We further suggest that a change in organizational thinking is needed in order to fully support academic entrepreneurship. The nature of such a change is summarized in Table 4.8.

1. The dominant social aspect of work relationships suggests the need to view entrepreneurship as corporate rather than simply an individual phenomenon.
2. The interdisciplinary aspect of knowledge production suggests the need for thinking outside the rigours of individual disciplines while still recognizing the fundamental role of such disciplines for academic innovation.
3. Attempts to funnel knowledge through central units can be counter-productive. Multiple gatekeepers need to be welcomed and reflect the reality of interdisciplinary knowledge production.
4. The dichotomous thinking that simplifies academia into theory (inside the university) and practice (outside the university) does not reflect the nature of academic entrepreneurship. 'Trialectic' thinking, encompassing the idea of multiple parts that attract (Ford and Ford, 1994), and the triple helix concept of multiple relationships, offer a more meaningful framework for understanding academic entrepreneurship.

Finally, the identification of types of academic entrepreneur based on their approach to discipline knowledge and relationship with a host university recognizes a set of key relationships important for understanding

this special form of entrepreneurship. Such key relationships are important in that they both give credibility to individual academics, while providing the specialist knowledge that forms the basis of the entrepreneurial enterprise and especially high-tech start-ups. As such they are important for beginning to understand the enablers and barriers to interaction at the academic–industry interface.

REFERENCES

Antoncic, B. and R.D. Hisrich (2003), 'Clarifying the intrapreneurship concept', *Journal of Small Business and Enterprise Development*, **10** (1), 7–24.

Askling, B., M. Henkel and B. Kehm (2001), 'Concepts of knowledge and their organisation in universities', *European Journal of Education*, **36** (3), 341–50.

Autio, E. (1997), 'New technology-based firms in innovation networks', in D. Jones-Evans and M. Klofsten (eds), *Technology Innovation and Enterprise: The European Experience*, London: Macmillan, pp. 209–35.

Birley, S. (2002), 'Universities, academics, and spinout companies: lessons from Imperial', *International Journal of Entrepreneurship Education*, **1** (1), 133–53.

Blacker, F. (1995), 'Knowledge, knowledge work and organizations: an overview and interpretation', *Organization Studies*, **16** (6), 1021–46.

Brazeal, D.V. and T.T. Herbert (1999), 'The genesis of entrepreneurship', *Entrepreneurship Theory and Practice*, **23** (3), 29–45.

Brennan, M.C., A. Wall and P. McGowan (2005), 'Academic entrepreneurship: assessing preferences in nascent entrepreneurs', *Journal of Small Business and Enterprise Development*, **12** (3), 307–22.

Carayannis E., E. Rodgers, K. Kurihara and M. Allibritton (1998), 'High technology spin-offs from government R&D laboratories and research universities', *Technovision*, **8** (1), 1–11.

Cohen, W.M. and D.A. Levinthal (1990), 'Absorptive capacity: a new perspective on learning and innovation', *Administrative Science Quarterly*, March, 128–52.

Collins, H. (1993), 'The structure of knowledge', *Social Research*, **60** (1), 95–116.

Cooper, S. (2000), 'Technical entrepreneurship', in S. Carter and D. Jones-Evans (eds), *Enterprise and Small Business*, Harlow: Pearson, pp. 220–41.

Csikszentmihalyi, M. (2001), 'A systems perspective on creativity', in J. Henry (ed.), *Creative Management*, London: Sage, pp. 11–26.

Denzin, N.K. and Y.S. Lincoln (eds) (2000), *Handbook of Qualitative Research*, Thousand Oaks, CA: Sage.

Dess, G.G., R.D. Ireland, S.A. Zahra, S.W. Floyd, J.J. Janney and P.J. Lane (2003), 'Emerging issues in corporate entrepreneurship', *Journal of Management*, **29** (3), 351–78.

Dickson, K., A. Coles and H. Smith (1998), 'Science in the market place: the role of the scientific entrepreneur', in W. During and R. Oakey (eds), *New Technology Based Firms in the 1990s*, London: Paul Chapman, pp. 27–37.

Ekvall, G. (2002), 'Conditions and levels of creativity', in J. Henry and D. Mayle (eds), *Managing Innovation and Change*, London: Sage, pp. 99–110.

Erikson, T. (2003), 'Towards a taxonomy of entrepreneurial learning experiences among potential entrepreneurs', *Journal of Small Business and Enterprise Development*, **10** (1), 106–12.
Etzkowitz, H. (1983), 'Entrepreneurial scientists and entrepreneurial universities in American academic science', *Minerva*, **21**, Autumn, 198–233.
Etzkowitz, H. (2003), 'The European entrepreneurial university: an alternative to the US model', *Industry and Higher Education*, October, 325–35.
Faulkner, W. (1994), 'Conceptualising knowledge used in innovation: a second look at the science-technology distinction and industrial innovation', *Science, Technology and Human Values*, **19** (4), 425–58.
Ferguson, R. (1999), 'What's in a location? Science parks and the support of new technology-based firms', Doctoral thesis, Swedish University of Agricultural Sciences, Ultuna.
Fine, M., L. Weis, S. Weseen and L. Wong (2000), 'For who? Qualitative research, representation and social responsibilities', in Denzin and Lincoln (eds), pp. 107–32.
Ford, J.D. and L.W. Ford (1994), 'Logics of identity, contradiction and attraction in change', *Academy of Management Review*, **19** (4), 756–85.
Gibbons, M., C. Limoges, H. Nowotny, S. Schwartzman, P. Scott and M. Trow (1994), *The New Production of Knowledge*, London: Sage.
Gibbons, M. and B. Wittrock (1985), *Science as a Commodity: Threats to the Open Community of Scholars*, Harlow: Longman.
Hisrich, R.D. and M. Drnovšek (2002), 'Entrepreneurship and small business research – a European perspective', *Journal of Small Business and Enterprise Research*, **9** (2), 172–222.
Hitt, M.A., R.D. Ireland, M. Camp and D.L. Sexton (2001), 'Strategic entrepreneurship: entrepreneurial strategies for wealth creation', *Strategic Management Journal*, **22** (6/7), 479–91.
Jones-Evans, D. (1987), 'Technical entrepreneurship, experience and the management of small technology-based firms', in D. Jones-Evans and M. Klofsten (eds), *Technology Innovation and Enterprise: The European Experience*, London: Macmillan, pp. 11–60.
Jones-Evans, D. (1998), 'Universities, technology transfer and spin-off activities: academic entrepreneurship in different European regions', Targeted Socio-Economic Research Project No. 1042, Pontypridd: University of Glamorgan.
Kemmis, S. and R. McTaggart (2000), 'Participatory action research', in Denzin and Lincoln (eds), pp. 567–606.
Kinsella, R. and V. McBrierty (1997), 'Campus companies and the emerging techno-academic paradigm: the Irish experience', *Technovision*, **17** (5), 245–51.
Laukkanen, M. (2003), 'Exploring academic entrepreneurship: drivers and tensions of university-based business', *Journal of Small Business and Enterprise Development*, **10** (4), 372–82.
Lundvall, B. (1990), *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*, London: Frances Pinter.
Miles, M.P. and J.G. Covin (2002), 'Exploring the practice of corporate venturing: some common forms and their organisational implications', *Entrepreneurship Theory and Practice*, **26** (3), 21–40.
Neck, H.M., G.D. Meyer, B. Cohen and A.C. Corbett (2004), 'An entrepreneurial system view of new venture creation', *Journal of Small Business Management*, **42** (2), 190–208.

Nonaka, I. (1994), 'A dynamic theory of organizational knowledge creation', *Organization Science*, **5** (1), 14–37.
Nowotny, H., P. Scott and M. Gibbons (2001), *Re-thinking Science: Knowledge and the Public in an Age of Uncertainty*, London: Polity.
Oakey, R.P. (1984), *High Technology Small Firms*, London: Frances Pinter.
Oakey, R.P. (1995), *High-Technology New Firms: Variable Barriers to Growth*, London: Paul Chapman.
Office of Science and Technology (OST) (2001), *Science Enterprise Challenge Guidelines*, London: OST, www.ost.gov.uk/enterprise/knowledge/sec.htm.
Roberts, E.B. (1991), *Entrepreneurs in High Technology: Lessons from MIT and Beyond*, Oxford: Oxford University Press.
Samsom, K.J. and M.A. Gurdon (1993), 'University scientists as entrepreneurs: a special case of technology transfer and high technology venturing', *Technovation*, **13** (2), 63–71.
Saxenian, A. (1996), *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*, Cambridge, MA: Harvard University Press.
Schwandt, T.A. (2000), 'Three epistemological stances for qualitative inquiry: interpretivism, hermeneutics, and social constructionism', in Denzin and Lincoln (eds), pp. 189–214.
Shane, S. (2004), *Academic Entrepreneurship*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Sharma, P. and J.J. Chrisman (1999), 'Towards a reconciliation of the definitional issues in the field of corporate entrepreneurship', *Entrepreneurship Theory and Practice*, **23** (3), 11–27.
Spilling, O.R. (1996), 'The entrepreneurial system', *Journal of Business Research*, **36** (1), 91–103.
Stake, R.E. (2000), 'Case studies', in Denzin and Lincoln (eds), pp. 435–54.
Storey, J. (2000), 'The management of innovation problem', *International Journal of Innovation Management*, **4** (3), 347–67.
Storey, D.J. and B.S. Tether (1998), 'Public policy measures to support new technology-based firms in the European Union', *Research Policy*, **26** (9), 1037–57.
Tidd, J., J. Bessant and K. Pavitt (2005), *Managing Innovation*, Chichester: Wiley.
Van de Ven, A.H. (1993), 'The development of an infrastructure for entrepreneurship', *Journal of Business Venturing*, **8** (3), 211–30.
Weick, K.E. (1995), *Sensemaking in Organizations*, Thousand Oaks, CA: Sage.
Zahra, S.A. and G.G. Dess (2001), 'Entrepreneurship as a field of research: encouraging dialogue and debate', *Academy of Management Review*, **26** (1), 8–10.

PART TWO

The econo-geographic aspects of emergence, cooperation and survival

5. Emergence of high-tech ventures in France: how do regional, individual and organizational factors influence birth and sustainability of new firms?

Frank Lasch, Frédéric Le Roy and Saïd Yami

INTRODUCTION

Researchers and practitioners emphasize that high-tech ventures are very specific types of organization that require specific conditions for the emergence, the localization and the sustainability of their business. High-tech entrepreneurs seem to be particularly sensitive to the local or regional socio-economic environment that offers the best entrepreneurial opportunities to create and to survive. But very few studies analyse this relationship and only a few empirical findings are available that offer us a deeper insight into how regional conditions affect entrepreneurship in general and survival in particular. A real paradox illustrates this situation. On the one hand, high-tech ventures, and especially those in information and communication technologies (ICTs), are often considered as 'footloose' ('death of distance') and challengers of the relationship between geography (the quality of the regional context) and location. On the other hand, certain areas seem to be more attractive than others for this type of firm. But entrepreneurship, favoured or handicapped by institutional and regional conditions, is only half of the truth when we focus on topics like emergence and sustainability of firms in the ICT sector. In this industry, entrepreneurial opportunities are linked to a high risk of failure and in France only one firm out of three passes the crucial first three-year threshold. The perception of this (still) emerging industry is but partially complete. Most economic actors have great difficulty in clearly understanding this sector and are not always aware of the problems that new ICT firms have to face.

Consequently, the main objective of this chapter is to give a holistic view of the French ICT sector.

The theoretical, managerial and practical interest of this chapter is to answer a number of very pragmatical questions that, due to a certain lack of empirical research are still without a clear response. How can the borders of the ICT sector be defined? What are the main reasons that can explain the localization pattern? Are certain areas more entrepreneurial than others? What are the key factors of survival of these new high-tech ventures?

While Part I focused on human capital, social culture, individual and psychological aspects, this chapter first analyses the impact of institutional and regional conditions for high-tech entrepreneurship and then how human capital and organizational settings at the start-up affect the sustainability of new high-tech ventures. The findings are based upon research into the French ICT sector conducted during the last three years (Lasch, 2003a; Lasch et al., 2005a, 2005b). According to the research questions listed above, this chapter is divided as follows. In the first section, a definition of this emerging and extremely heterogeneous sector is given. The second section analyses the dynamics of this industry in terms of new firm formation between 1993 and 2001. The third section concentrates on the impact of the ICT sector on the local development and raises the question whether these supposed foot-loose activities diffuse or concentrate in the territorial borders of metropolitan France. The fourth section presents recent research results of the authors on individual and organizational factors affecting sustainability of new firms. The last section summarizes the results and presents a number of implications for practitioners and economic actors willing to promote and help in the survival of new techno-ventures in France.

THE DELIMITATION OF THE ICT SECTOR

Defining the ICT sector is a difficult task for several reasons. The definition of innovation and technology in general and ICT in particular evolves over time, especially against the background of a gravity shift from the industry to the service sector since the mid-1980s. Because it is an emerging, very dynamic sector, the limited lifetime of definitions due to the rapid progress in technology and the shortening product or service cycles is a major difficulty. So first, we need to outine the general difficulty of defining an emerging industry; second, we give an overview of the process of definition finding; and finally, we identify core activities of the ICT sector and more periphery activities closely linked to it.

The Difficult Task of Defining a New Industry

Conforming to the general interest of this book to collect experience from several countries across Europe, in this review we focus exclusively on delimitations that use the Standard Industrial Classification codes (SIC; Nomenclature d'Activité Française (NAF) in France). These classifications have the advantage of being compatible internationally and can so be used for cross-national comparisons.

Consensual definitions have existed in France only since the end of the 1990s. A starting-point towards a delimitation of ICT firms was the classification of the Organization for Economic Cooperation and Development (OECD) which, originally, was developed in a purely industrial perspective to cover the field of innovation and technology-based industries (MEFI/SESSI, 1999). Using the SIC four-digit code, this classification uses as its main criteria the level of investments in terms of research and development (R&D) and distinguishes four types of technological intensity of industrial activities: 'high', 'medium-high', 'medium-low' and 'low' technology (Table 5.1). But the exclusive focus on the production sector excludes the majority of the services belonging to the emerging ICT sector and limits strongly the usefulness of this classification. The application of the OECD definition to the measuring of the quantitative evolution of innovation- and technology-based firms offers a first insight into structural evolutions in the French economy over the last decade. Because it is a purely industrial classification, it is not surprising that a heavy decline of both firm stock and employment in industrial innovation and technology-intense sectors is observed (530,000 jobs

Table 5.1 The evolution of the firm stock in innovation- and technology-based sectors in France (OECD definition) between 1993 and 2001

OECD categories	Number of firms in 2001	Change in firm stock (%)	Change in employment (%)	Average size per firm (2001*)
High technology	5,760	−3.1	−4.6	57.1
Medium-high technology	26,530	+0.1	−17.5	24.2
Medium-low technology	62,730	−5.1	−10.9	16.9
Low technology	93,140	−10.0	−21.5	9.9

Note: * Employees per firm.

Source: Database: SIRENE.

fewer than in 1993!). Thus Table 5.1 reveals a strong link between innovation and technology inputs and the evolution of the firm stock: the lower the technological level of the firms the higher the losses.

Nevertheless, the OECD classification is a starting-point and a first classification towards a definition of the emerging ICT sector. As a consequence, most publications include the first-level 'high technology' of this classification to define the industrial branch of the ICT sector. Only the aero-spatial and the pharmaceutical industries are not considered as purely ICT industries.

In Search of a Consensual Definition Including Knowledge-intensive Services

In the second half of the 1990s, both economic actors and researchers realized that most of the new ICT firms are in fact service businesses and became aware of the need to adapt the OECD classification of the early 1990s. In particular, knowledge-intensive services in general appear increasingly as a main topic of publications in research studies towards the end of the decade. This type of firm is symptomatic of the change in the economic growth from industry to the service sector (Hauknes, 1999). Consequently, the OECD updated its classifications in order to include the service branch of the emerging ICT sector (Pattinson et al., 2000). This awareness concerns not only the OECD, but also different public institutions, like the Services des Études et des Statistiques Industrielles (SESSI) (MEFI/SESSI, 2001), the French National Institute of Statistics and Economic Studies, INSEE (Vicaire, 2000, 2001), as well as local economic actors like the chambers of commerce (Courtois-Martignoni, 2000; Grouthier, 2000). Unfortunately, these efforts result in a multiplication of delimitations that are more or less restrictive and produce varying estimations of the number of firms and employees held by the ICT sector. Thus, the range increases from 50,000 to 180,000 firms and from 680,000 to 1,250,000 employees (Lasch, 2001a, 2001b).

Core Activities and Extensions

Approaching the year 2000, numerous academic publications and the efforts made by the public economic and statistical institutions (Cases et al., 1999; Heitzmann and Rouquette, 1999; Rouquette, 1999) contribute finally to crystallize a consensual view of what can be considered as the core activities of the ICT sector (Table 5.2). The delimitation suggested by Heitzmann and Rouquette (1999) is commonly used as a reference in the annual publication of the INSEE on the evolution of the French economy

(INSEE, 2000). Using this classification, the ICT sector accounts for 56,100 firms and 705,300 employees in 2000.

Extended delimitations can be explained by the difficulty of capturing a certain number of ICT firms in using this tool. So, even if the large majority of ICT firms can be identified, the example of national telecommunications illustrates this methodological problem: in this NAF division, for example, activities linked to new IC technologies cannot be separated from the ones based on ordinary telephone services. Another example is biotechnology firms, which can be found in several NAF divisions such as the pharmaceutical industry and R&D in natural sciences. Similarily for certain multimedia firms or even industrial firms classified as medium-high technology but specialized in high-end products (*haut de gamme*) are in reality ICT firms (Lasch, 2003b).

A number of studies that approach the ICT sector with a more global viewpoint, in addition to core activities, include firms specialized in 'contents': creation and reproduction of numeric data support, production and maintenance of databases, film and video production and their distribution, and radio and television broadcasting (Beale, 1998; Bruneau and Lacroix, 2001; Nivlet, 2001; Vicaire et al., 2002). Others consider business services where specific knowledge or certain innovation and technology-based services such as R&D and technical studies/analysis is needed, and stress the importance of proximity effects emanating from those firms for the ICT sector (Lasch, 2001a, 2001b, 2003a).

This review underlines the great difficulties involved in the delimitation of the ICT sector. Nevertheless, three main branches constitute the core of this sector: high-tech industry (first level of the OECD classification), telecommunication (France Télécom and other providers) and computer services.

The Delimitation Used in this Chapter

The delimitation we use (Table 5.2) is similar to that used in most of the recent publications (Cases et al., 1999; Heitzmann and Rouquette, 1999; Rouquette, 1999), but excludes the national telecommunication sector. The 'contents' are not part of the definition, because the SIC/NAF classification does not allow their clear identification. Two extensions complete the core activities mentioned above, that is, R&D and technical studies/analysis. Finally, it is worth noting that two high-technology sectors, aeronautics and space as well as pharmaceuticals, are not considered as ICT industries.

Based upon this delimitation, the ICT sector recognizes 20 subdivisions of the NAF with a total of 87,200 firms and 710,000 employees in metropolitan France (1 January 2001). But finding a consensual delimitation of the

Table 5.2 The ICT sector divided into subsectors

Code NAF700	
	High-tech industry, production of . . .
246J	Data supports
300A	Business machines
300C	Computers and hardware
321A	Passive electronic components and condensators
321B	Active electronic components
322A	Radio emitting and transmitting components
322B	Telephones
323Z	Equipments for the reception, recording and reproduction of sound and image
	Telecommunications (services)
642B	Other providers others than France Télécom
	Computer services
713E	Rental of business machines and computer systems
721Z	Consulting in information and computer systems
722Z	Software development
723Z	Data administration and use
724Z	Development and administration of databases
725Z	Repair and services for business machines and computer systems
726Z	Other computer-related services
	Extension
731Z	R&D in natural and physical sciences
732Z	R&D in human sciences
742C	Engineering and technical studies
743B	Technical analysis, testing and inspections

ICT sector is not the only difficulty for studies dealing with this emerging industry, as the next section will outline.

EMERGENCE AND GROWTH OF THE ICT SECTOR IN FRANCE

The ICT sector is the most dynamic and prosperous industry in France. Compared with 1993, the ICT sector accounted for 31,264 more firms in 2001 (+55.9 per cent) and the number of employees was 710,000 (+45.9 per cent; Table 5.3). So, in 2001, the ICT sector accounted for 3.2 per cent of the entire firm stock (industry, trade and services) and 5.0 per cent of the total employment. Despite the explosion of the 'internet bubble', in 2003

INSEE was still measuring an increasing number of new firms in general and especially in the innovation and technology-based sectors, such as ICT (Rieg, 2004). Consequently, in order to get a better understanding of this emerging industry, it is necessary to explore the structural specificities in more depth.

An Extremely Heterogeneous Sector (Structural Analysis of the Firm Stock)

The overall tendency masks sharp disparities among the 20 subdivisions of the sector, mainly between services and industry. The growth of the whole sector is driven by services, especially the subdivisions linked to computer science (consulting in information and computer systems; software development; Table 5.3). Industrial ICT firms, on the other hand, suffer from significant job losses (except for production of active electronic components and telephones; Table 5.3) and display very heterogeneous results. The production of computers and computer equipment, for example, is affected by a diversification or externalization process proxied by an increase in the number of firms and a decrease in the employment in this subdivision. In contrast, a concentration process proxied by an increase in employment and a decrease in the number of firms can be observed in two subdivisions (production of passive components; production of equipment for the reception, recording and reproduction of sound and images).

But the heterogeneity of the ICT sector is not only a matter of firm stock and employment dynamics; it is above all a structural problem with large differences in average firm size between industry and services. The average firm size in the subdivision 'consulting in information systems' (6.8 employees), for example, is six times smaller than the average firm size of industrial ICT firms (40 employees; Table 5.3). Nevertheless, since 1993, a significant reduction in the average firm size has been observed for all subdivisions of the ICT sector.

High Firm Birth Rates, but a Small Firm Size at Start-up

Entrepreneurship in the ICT sector gave birth to 84,535 new firms with a total of 160,000 jobs at start-up and the annual number of new ICT firms increased from 8791 in 1993 to 14,921 in 2001. In 2000, 59.3 per cent of all new ICT firms belong to the services and 1.7 per cent to the industry. The extensions to these two core branches, R&D and technical studies/analysis represent 39.0 per cent of firm births. High-tech venturing in this sector during the period of observation represents 4.6 per cent of all new firms founded and 5.4 per cent of all jobs created in start-ups (in industry, trade

Table 5.3 The evolution of the firm stock in the ICT sector by subdivisions between 1993 and 2001

NAF subdivision	Firms 2001	Part of sector (%)	Firm stock (1993–2001)	Employment 2001	Employment (1993–2001)	1993[a]	2001[a]
	Industry, production of . . .						
Computers and hardware	645	0.7	+98 (+17.9%)	27,516	−5.124 (−15.7%)	59.7	42.7
Active electronic components	919	1.1	+514 (+126.9%)	38,765	+17.358 (+81.1%)	52.9	42.2
Telephones	1,135	1.3	+578 (+103.8%)	44,044	+10.168 (+30.0%)	60.8	38.8
Other high-tech subdivisions	1,628	1.9	−1.087 (−60.0%)	67,879	−6.590 (−10.8%)	22.6	41.7
	Services						
Consulting in information systems	15,120	17.3	+10.748 (+245.8%)	102,375	+58.238 (+131.9%)	10.1	6.8
Software development	16,208	18.6	+9.219 (+131.9%)	108,936	+58.908 (+117.8%)	7.2	6.7
Data treatment	5,130	5.9	−837 (−14.0%)	42,765	−3.906 (−8.4%)	7.8	8.3
Other services	5,024	5.8	+1.434 (+28.5%)	24,612	+4.682 (+23.5%)	5.6	4.9
Telecommunications (except France Télécom)	2,681	3.1	+2.106 (+366.3%)	34,544	+26.364 (+322.3%)	14.2	12.9
Engineering & technical studies[b]	33,260	38.1	+5.845 (+21.3%)	169,379	+33.579 (+24.7%)	5.0	5.1
Technical analysis, testing and inspections[b]	2,750	3.2	+1.243 (+82.5%)	28,564	+15.058 (+111.5%)	9.0	10.4
R&D[b]	2,700	3.1	+1.403 (+108.2%)	34,220	+14.685 (+75.2%)	15.1	12.7
Total ICT sector	87,200	100.0	+31.264 (+55.9%)	710,377	+223.420 (+45.9%)	8.7	8.1

Notes:
a. Average firm size. b. Subdivisions considered as 'extensions' of the ICT sector delimitation.

Source: Database: SIRENE.

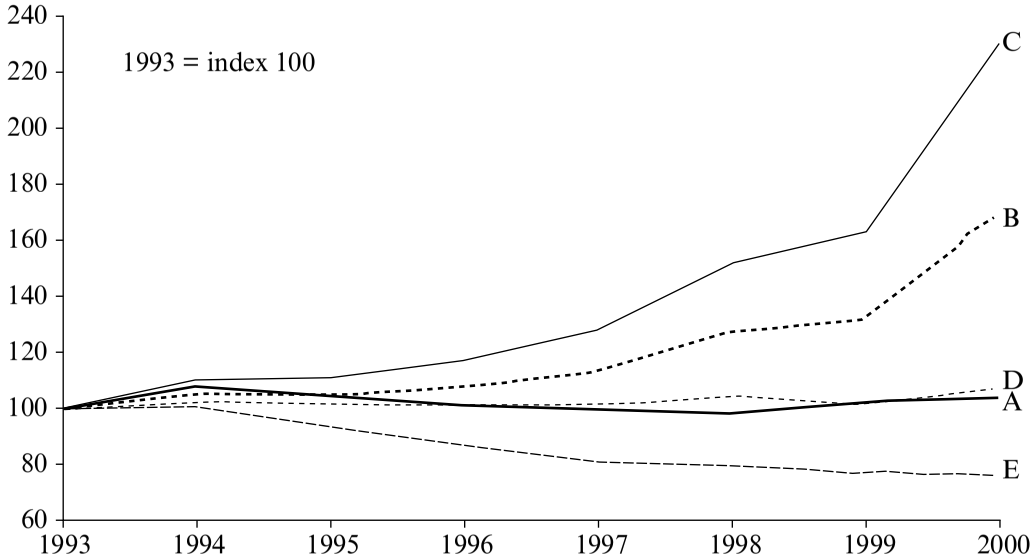
and services; agriculture excluded). The entrepreneurship intensity of the whole ICT sector ('B' in Figure 5.1) is well above the average ('A'), but displays very heterogeneous intrasector dynamics. And while the number of new firms in industry ('D') has decreased since 1993, service firms related to computer, software activities or telecommunications ('C') display a constant rise in firm births.

But the high level of entrepreneurship in the ICT sector masks a hard fact: the average firm size at start-up is only 1.9 employees (Lasch, 2003a). Literature emphasizes a strong link between firm size at start-up and sustainability (Lasch et al., 2005b); thus we have to consider that young ICT firms are extremely fragile and their high growth potential seems to be linked to a high risk of failure. But before we deal with the crucial question of sustainability, we need first to have a closer look at the localization pattern and, second, to answer the question: in which type of areas do high-tech entrepreneurs find a favourable context for their ventures?

GEOGRAPHY MATTERS FOR HIGH-TECH VENTURING!

Researchers and economic actors agree that innovation- and knowledge-based firms have specific needs, require specific regional conditions and are particularly sensitive to a socio-economic environment that offers the best entrepreneurial opportunities for creation (and survival). Consequently, it is crucial to understand the pattern of localization of this emerging ICT sector and to analyse whether and why some areas develop a favourable entrepreneurial environment for new firms. In France, to our knowledge, few publications deal with the impact of the socio-economic environment on high-tech venturing, such as those in the ICT sector.

Nevertheless, a strong theoretical framework exists to explain localization of innovation- and technology-based firms in a broader viewpoint. This research points out that innovations and new knowledge emerge in specific places, in specific contexts, and in interaction with the socio-economic environment (Meusburger, 2000). So, based upon regional innovation theories, three main approaches have been developed to explain how knowledge externalities in agglomerations embrace local production systems: 'innovative milieu' (Maillat, 1995; Crévoisier, 1997; Camagni et al., 1999; Greffe, 1999), 'industrial districts' (Beccatini and Rullani, 1995; Courlet and Pecqueur, 1996; Corolleur and Courlet, 2003), and 'learning regions' (Morgan, 1997; Keeble and Wilkinson, 1999; Lawson and Lorenz, 1999).



	1993	1994	1995	1996	1997	1998	1999	2000
All sectors (A)	224,267	241,506	234,951	227,073	224,761	221,323	228,511	234,268
ICT sector as a whole (B)	8,791	9,285	9,249	9,466	10,003	11,205	11,615	14,921
ICT service branch-core (C)	4,637	5,100	5,166	5,451	5,952	7,033	7,564	10,690
ICT services-extension (D)	3,682	3,772	3,749	3,710	3,733	3,854	3,744	3,965
ICT industry-core (E)	472	413	334	305	318	318	307	266

Figure 5.1 New firm formation in the ICT sector between 1993 and 2001

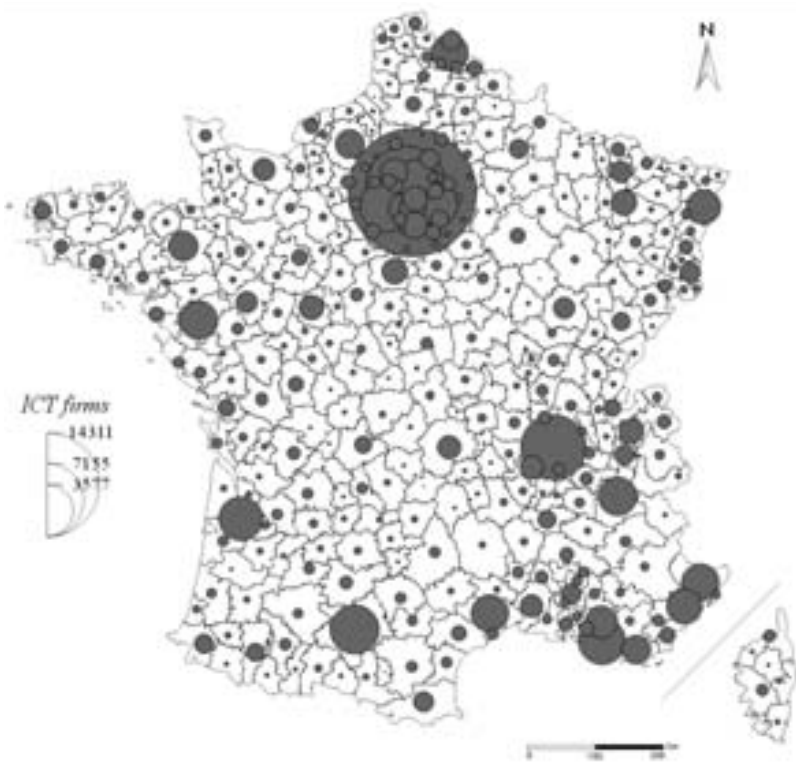
For our purpose, two basic questions are to be considered: first, do ICT firms, which are supposed to be geographically rather flexible ('footloose'), concentrate in certain areas or, on the contrary, are they dispersed all over the national territory? And second, why are certain areas more entrepreneurial than others and attract this specific type of firm?

Geographical Concentration or Diffusion of the ICT Sector?

The diffusion of ICTs is naturally expected to induce a de-concentration of economic activities as well as a reduction of spatial disparities (Ceh, 2001; Lethiais et al., 2003), and to challenge, to some extent, the relationship between geographical proximity and the accumulation of knowledge (Autant-Bernard et al., 2003: 312). Other authors maintain the opposite viewpoint and stress that, paradoxically, no spatial diffusion of the ICT sector itself can be observed (Suire, 2003: 381).

Based upon our research (Lasch, 2003a; Lasch et al., 2005a), which is a quantitative, exhaustive analysis that covers the whole population and all new firms created in the period from 1993 to 2001 (for methodology, see Appendix 5A), we can give more substantial support to the hypothesis that the attraction of certain areas is reinforced (Quah, 2001; Koski, et al., 2002), and less to the 'death of distance' theory (Cairncross, 1997). But our results indicate as well that forces of dispersion and forces of agglomeration both influence significantly the choice of localization of the entrepreneurs.

A first analysis of the localization pattern reveals strong evidence for the concentration theory (Figure 5.2). We can observe a substantial process of concentration of ICT firms in the Paris region and some regional capitals over the last decade. In 2001, for example, 65.9 per cent of all ICT firms are concentrated in 25 labour market areas corresponding to the historically most important agglomerations (Lasch, 2003a). But, some exceptions can be observed and some 'new' extremely dynamic areas emerge. So, to some extent, an inversion of the ancient geography of the French economy is triggered, now favouring a western and southern periphery. This new equilibrium of territories is essentially due to new firm births of ICT services, whereas the ICT industry persists in traditionally industrialized regions in the northeastern part of France (Lasch, 2003a: 124). As a consequence, we can give support to the observation that the development of the ICT sector also contributes to a de-concentration of activities in the French economy. But this process is relatively limited and favours agglomerations of large and medium size, especially those that are supposed to possess a high innovation and knowledge potential.



Source: Adapted from Lasch (2003a), p. 105.

Figure 5.2 Localization pattern of ICT firms in 2001

Entrepreneurial Areas for High-tech Venturing: What Types of Regions Attract ICT Firms?

Identifying the key factors that attract entrepreneurs in the ICT sector is the second question that this section seeks to answer. As most of the new firms are localized in proximity to the residence of the founder (Schmude, 1994b; Dahlstrand, 1999), the analysis of the structural, territorial, effect on entrepreneurship is crucial. Even if few studies examine this question for innovation- and technology-based firms, evidence exists for the link between the local environment and firm formation in general.

An international research project points out three key determinants for 'entrepreneurial' areas (Reynolds and Storey, 1993): first, population growth, which reflects an increasing local market demand and competitive opportunities for entrepreneurs, but also an increase in the number of new

potential entrepreneurs; second, firm size (a small average firm size favours industrial start-ups and a large one new service businesses; Keeble and Walker, 1994; Nerlinger, 1998); third, a high population density/urbanization degree, which is a proxy for a well-developed infrastructure.

But most authors explain regional disparities in entrepreneurship mainly with urban agglomeration economies (Audretsch and Fritsch, 1994; INSEE, 2000). Other frequently cited determinants are industry structure (diversification or concentration of economic activities; Schmude, 1994a; Fritsch and Niese, 2000); a well-developed financial infrastructure and a high-qualified labour market (Keeble and Walker, 1994); unemployment rate (Audretsch and Fritsch, 1993; Johnson and Parker, 1996); and quality of the natural environment ('sunbelt' effects; Rouzier, 1987; George, 1991).

Even if a large consensus in literature emphasizes the importance of agglomeration economies for innovation- and knowledge-based firms, some authors relativize this relationship and privilege externalities of localization (Armington and Acs, 2002; Capello, 2002). So, localization economies emanating from the neighbourhood of firms of the same or similar activities may perhaps reveal a stronger impact for high-tech venturing (synergies, interaction and cooperation between firms) as 'simple' agglomeration effects. Moreover, the concentration of innovative firms in a regional economy stimulates and promotes the formation of other, new local ICT firms, because their sustainability depends more than those of non-innovative firms on networking, R&D cooperation, tacit knowledge and informal contacts. Geographical proximity to firms of similar or the same sector can be a considerable advantage for the exchange of information and technology transfer (Czarnitzki and Spielkamp, 2000). A high concentration of ICT firms in an area is also an indicator for future entrepreneurs of a well-developed infrastructure for their business and inspires a favourable business 'climate' for the realization of their entrepreneurial project.

Indeed, the results of the previous localization analysis indicate that agglomerations offer to entrepreneurs, in parallel with pecuniary externalities, more specific advantages that are relevant to the ICT sector. A number of authors point out that innovation- and technology-based externalities in the regional environment promote high-tech venturing (Audretsch, 1998; Collinson and Gregson, 2003; Nguen and Vicente, 2003; Lasch et al., 2005a). Innovation and synergy play a crucial role in the regional development and competitiveness (Ritsilä, 1999) and stress the importance of proximity effects and interaction between firms in the local context.

Proximity is often similar to good integration opportunities in the local network. Entrepreneurs in innovation and technology, like those in the ICT sector, dedicate significantly more time than non-innovative firms to cooperation and are real networkers (Johanisson, 1998; Nijkamp, 2003). We

note that there is an increase in cooperation between competitors (Astley and Fombrum, 1983; Nalebuff and Brandenburger, 1997; Lecoq and Yami, 2002).

A well-developed R&D and university infrastructure constitutes a further external knowledge (re)source for entrepreneurs in the ICT sector (Meyer-Krahmer and Schmoch, 1998; Engel and Fier, 2000). But the impact of universities in the local innovation system seems to be less developed in France. Indeed, the mobility of public research towards private industry, and the number of academic and scientific spin-offs founded by graduates, researchers and scientifically skilled technicians is inferior compared with its European neighbours and the US (Mustar, 1995, 1997; Guillaume, 1998; Emin, 2003).

Based upon these findings, and using the same data as the previous section, we measured the impact of the socio-economic environment on ICT entrepreneurship (Lasch, 2003a; Lasch et al., 2005a). The selected independent variables are proxies for the different determinants discussed above and are crossed in a multiple regression model with the firm birth rate in each of the 348 French labour market areas (LMAs) (Table 5.4).

The results clearly show that the regional socio-economic environment affects entrepreneurship in innovation significantly. The major determinants are a well-developed R&D infrastructure, localization economies, presence of large firms, and, finally, population growth. Contrary to most studies cited above, the influence of agglomeration effects is not clearly confirmed. A non-linear relationship seems to explain this finding: above a certain concentration threshold, agglomeration effects may turn into diseconomies (Bade and Nerlinger, 2000). Positive agglomeration effects, typical for areas with a high population density and a well-developed infrastructure, can sometimes be neutralized and become diseconomies. So, opportunities for high-tech venturing are not necessarily found exclusively in the largest agglomerations. Other types of area can also perform a high level of entrepreneurial activity. To some extent, 'periphery' areas with little industrial tradition can offer interesting opportunities for an ICT firm.

Population growth is revealed to be essential for entrepreneurial areas. This result is rather surprising, because ICT firms are supposed to concentrate mainly on national and international markets (Fritsch, 1990; Bathelt, 1992; Koschatzky, 1997). The local market seems to be, at least in the crucial post-creation period, more important than pointed out by previous research. We should not forget that a positive population growth is not a simple indicator for a growing local market demand. It is similar to the arrival of a labour force that is unfamiliar with the local environment and thus somehow handicapped in perceiving entrepreneurial opportunities and risks. Several studies emphasize a positive link between integration in

Table 5.4 The determinants of the New Firm Formation (NFF) in the ICT sector in France, 1993–2001 (dependent variable: local ICT firm birth rate, 1993–2001)

LMA characteristics	Regression coefficient[a]	Standardized coeff.[b]
Agglomeration economies 1 (population density)	0.0002**	0.0633***
Demographics 1 (population growth)	0.0119***	0.2125***
Labour market 1 (unemployment)	−0.0147***	−0.1045***
Labour market 2 (household income)	0.0002***	−0.0003***
Labour market 3 (qualification)	0.0228***	0.3605***
Industry structure 1 (specialization)	−0.0007	−0.0208
Industry structure 2 (diversification)	−0.0037	0.0353*
Industry structure 3 (mainly SMEs)	−0.0034***	−0.0640*
Industry structure 4 (presence of large firms)	0.0060***	0.2168***
Innovation & knowledge potential 1 (R&D infrastr.)	0.1706***	0.0730***
Innovation & knowledge potential 2 (universities)	0.0026***	0.0839***
Proximity effects 1 (ICT services)	0.1411***	0.2406***
Proximity effects 2 (knowledge-intensive services)	0.0985***	0.1704***
Proximity effects 3 (high-tech industry)	−0.0007	0.0020
Fiscality 1 (local taxes)	−0.0023°	−0.0175
Natural environment (tourist frequentation)	0.0001	0.0316

Notes:
*** Sign. 1%; ** sign. 5%; * sign. 10%; ° sign. 30%.
a. $R^2 = 0.9629$ (adj. $R^2 = 0.9611$).
b. $R^2 = 0.9142$ (adj. $R^2 = 0.9101$).
Standardized coefficient: To eliminate size or unit effects subtraction of the average and divided by standard deviation is applied to each variable.

Source: Adapted from Lasch (2003a), p. 118.

local networks of consulting, knowledge and technology transfer, financing, business and sustainability of new firms (Koschatzky, 1997; Pleschak, 1997). These new populations may have the advantage of being entrepreneurial, but are less embedded and integrated in the local context. Their knowledge of the political, socio-economic and institutional background as well as of the measures of support for new firms is limited.

The negative impact of unemployment supports the advantage of areas with a well-educated working population (proxied by variable labour markets 1 and 2) and conforms with expectation. The industry structure of

entrepreneurial areas is less dominated by small firms; the positive influence of large firms prevails for high-tech venturing and underlines their role as potent clients, cooperation partners and incubators for spin-offs (Almus et al., 1999; Nerlinger, 1998). No result is measured for sector specificities of the local industry structure, which means that entrepreneurs in the ICT sector are mainly attracted for other reasons.

The principal key determinant is the positive impact of localization externalities. These positive effects of concentration appear as the key factor of high-tech venturing and emphasize the crucial importance of networking opportunities stressed in the literature (Aldrich and Zimmer, 1986; Hansen, 1995; Johanisson, 1998; Greve and Salaff, 2003; Nijkamp, 2003; Varamäki and Veslainen, 2003). The concentration of innovative firms stimulates and promotes the birth of new ICT firms. Proximity effects and knowledge externalities are indeed a determinant factor for entrepreneurs in a sector where survival and growth depends more than those of non-innovative firms on interorganizational cooperation, R&D cooperation, an intense relationship with the local R&D infrastructure and informal contacts. In this regard, the local R&D infrastructure is a crucial external resource.

Nevertheless, the crucial role of universities in the local economy as sources of knowledge and incubators for future entrepreneurs can only be partly confirmed. The regression coefficient, compared with other knowledge-related determinants, is rather small (Table 5.4). The relationship between new ICT firms and universities, generally considered as crucial, appears weaker in France, which supports the findings of Guillaume (1998) and Emin (2003).

Other environmental factors such as life quality or fiscality seem not to affect high-tech venturing; essentially, proximity effects (interaction, cooperation and networking opportunities) and positive knowledge externalities are the main factors that trigger ICT entrepreneurship in an area.

In summary, our results strongly support the hypothesis that knowledge externalities and proximity effects are the key determinants for high-tech entrepreneurship rather than pecuniary agglomeration advantages.

START-UP AND SURVIVAL: THE CRUCIAL QUESTION OF SUSTAINABILITY OF HIGH-TECH VENTURES

For a better understanding of innovation and knowledge-based entrepreneurship, a first step was made in the previous section and the results of our research clearly identify how geography matters for high-tech venturing and why some areas are more attractive for firms than others. But offering

a favourable environment for ICT start-ups is not enough if the new ventures are not sustainable: in fact, in France, only 38.7 per cent survive the critical first three years (Lasch, 2003a: 130). Consequently, the next step is to understand why some firms fail while others survive. What are the determinants that explain differences between successful and unsuccessful entrepreneurship in terms of survival?

Much research devoted to the identification of success factors of new ventures is published (see Lasch et al., 2005b), but no solid theoretical framework on this particular crucial topic exists. A large number of determinants are used to analyse the question of sustainability (survival and growth) of start-ups, but in literature various results and often contradictory findings demonstrate that explaining these differences in successful entrepreneurship is a difficult task.

To summarize, literature classifies success factors into three groups: the entrepreneur, the firm and the socio-economic environment. Most authors focus on general human capital, pre-start-up activities and initial organizational characteristics to produce predictive models for the sustainability of new ventures. Environmental effects on the sustainability of new ventures are generally considered as relatively minor (Solymossy, 2000). Consequently, in this section, we concentrate on individual and organizational factors that affect the sustainability of high-tech ventures.

Individual Factors that Affect the Sustainability of New Firms

Age, education, unemployment, gender and ethnicity are the most common variables that are used to measure the impact of general human capital on survival. Differences in age, for example, are mostly explained by a higher level of education of entrepreneurs in knowledge-based sectors. Indeed, entrepreneurs in the ICT sector start up at an age between 36 and 39 (Lasch, 2003a), which is on average two to five years later than those in non-innovative sectors (Pleschak and Rangnow, 1995; Seeger, 1997). But, the findings for the link between age at start-up and the success of the firm are very heterogeneous. Some authors measure the impact of age positively (Wicker and King, 1989), others find negative results (Pleschak, 1997), and some find no significant differences at all (Brüderl et al., 1996). Nevertheless, age is correlated with a high education level, a key success factor confirmed by most studies (Cooper et al., 1994; Brüderl et al., 1996; Dahlqvist et al., 2000; Wiklund and Shepherd, 2001).

The impact of factors like gender or ethnicity is less linked to the question of sustainability, but research underlines a certain impact on growth: firms founded by female entrepreneurs or those belonging to ethnic minorities are as sustainable as others, but they are rarely founders of high-performance

ventures (Brüderl et al., 1996; Dahlqvist et al., 2000; Cliff et al., 2004). The same applies for entrepreneurs who start up from a situation of being unemployed, but authors are more convinced that this type of firm is less sustainable.

When there is no real agreement on the impact of education, literature identifies a clear impact of work experience on sustainability (Wiklund and Shepherd, 2001). Industry-specific knowledge in particular has a direct impact on the sustainability of the new venture (Cooper et al., 1994; Brüderl et al., 1996). But also the firm size of the last employment of the entrepreneur can be relevant for the learning process of managerial skills which are crucial for most authors (Cooper et al., 1994; Pleschak, 1997). Employees in small and medium-sized enterprises (SMEs) seem to have more opportunities to gain entrepreneurial and managerial knowledge compared to those in large firms with a higher division of labour (Greenan, 1994; Schmude, 1994a). Firms founded by entrepreneurs with experience in large firms seem to be less sustainable (Pleschak, 1997).

Networks can open doors to different kinds of knowledge (tacit, specific knowledge or entrepreneurial). So, opportunities for networking, especially social and personal networks like the family, are considered as important external knowledge sources (Aldrich and Zimmer, 1986; Johanisson, 1998; Aldrich and Cliff, 2003; Greve and Salaff, 2003; Nijkamp, 2003; Varamäki and Veslainen, 2003).

The literature also discusses the importance of pre-founding activities, but no real consensus exists on this question. Even if most authors confirm a positive impact of pre-start-up activities (Brüderl et al., 1996; Castrogiovanni, 1996; Schutjens and Wever, 2000), some studies relativize this relationship (Dahlqvist et al., 2000).

Organizational Factors that Affect the Sustainability of New Firms

Organizational characteristics are supposed to have an impact of the sustainability of a new venture. Authors stress above all the importance of financing and firm size (Cooper et al., 1994; Brüderl et al., 1996; Wiklund, 1999; Dahlqvist et al., 2000). A high start-up capital also offers the entrepreneur the possibility of starting a venture with a certain firm size in terms of employment, which is supposed to lead to a better performance of the new venture from the beginning, and increases the chance of survival.

Some authors measure higher rates of survival, when the new venture is founded with a business partner or an entrepreneurial founding team (Brüderl et al., 1996; Schutjens and Wever, 2000; Ruef et al., 2003; Teal and Hofer, 2003). Others, on the contrary, find a negative relationship and

identify possible risks of team founders, such as disharmonies between partners (Seeger, 1997; Nerlinger, 1998; Almus et al., 1999). Nevertheless, especially for high-tech ventures, complementarities between the founding partners should prevail and increase the chance of survival of a new firm.

Knowledge-based firms have to face additional costs due to the time-expensive development of innovative market ideas or high-tech products (Kulicke, 1990). Starting with a file of clients may reduce this kind of risk and improve the firms' sustainability. Some authors also mention the importance of the number of clients (degree of dependence) and the type of clients (private customers, public institutions, other firms; Koschatzky, 1997; Seeger, 1997).

Differing viewpoints exist on the importance of the regional market orientation as a success factor (local, national, international markets). While some authors stress that high-tech ventures should diversify their markets regionally (Bathelt, 1992) and rapidly conquer the national market to increase their chances of success (Koschatzky, 1997), others find evidence for high risks that early 'internationalizers' have to face (Bürgel et al., 2001; Sapienza et al., 2003).

In the previous section, we presented hard evidence for the importance of knowledge spillovers and localization effects. Sustainable high-tech venturing seems to be strongly linked to the regional context, which shapes opportunities for entrepreneurship (Audretsch, 1998; Collinson and Gregson, 2003; Nguen and Vicente, 2003; Lasch et al., 2005a). An entrepreneurial area is supposed to offer a higher chance of survival, but the choice of location is mostly motivated by private reasons (Schmude, 1994b).

A high integration in local networks is considered by most authors as a key factor for sustainability (Grabher, 1993; Park, 1996; Koschatzky, 1997; De Propris, 2002) and high-tech entrepreneurs spend more time with networking compared to non-innovative firms (Johanisson, 1998). Some authors stress that it is crucial for the modern entrepreneur to be a creative networker (Nijkamp, 2003). Once engaged in a network, cooperation leads to further cooperation (Varamäki and Veslainen, 2003). In particular, local networking opportunities and interaction with other firms of the same or similar sector is likely to increase the chance of survival. Following the previous discussion, we suggest that the chance of survival of new ICT firms depends strongly on those 'global–local' networks.

What Does a Sustainable ICT Firm Look Like?

Based upon the literature review, we concentrate on factors related to the entrepreneur (general human capital and work experience; preparation and pre-founding activities) and to initial organizational start-up characteristics.

For a better understanding of the variables that affect the sustainability of new firms, we compared, using a cohort analysis, sustainable firms, 'survivors' (n = 278), with 'exitors' (n = 220), firms that did not pass the critical three-year threshold (see Appendix 5A for methodology).Variables related to the entrepreneur are: general human capital, work experience, firm size of last employment, industry-specific knowledge, management experience, prior start-up experience, social and personal networks, and pre-start up activities (Table 5.5). Variables related to initial organizational characteristics of new ventures are capital, firm size, client structure and location choice (Table 5.6).

Is Human Capital Critical for High-tech Venturing?

Human capital as a critical criteria for sustainable entrepreneurship is stressed in many publications, but our results, seen as a whole, do not conform to expectations (Table 5.5). Neither a high education level nor age as proxies for experience significantly affect successful entrepreneurship in this sector; nor does working experience in general and industry experiences in particular. Not even pre-start up management and entrepreneurial experience can explain the differences between the survivor and the exitor groups. Firms founded on a situation of unemployment are as successful as academic start-ups. Entrepreneurs in the personal environment, who are often considered as providers of important insider information, seem not to be as crucial a knowledge source for high-tech venturing. These findings reveal a real paradox. Is a high human capital perhaps a *conditio sine qua non* for successful high-tech venturing, and thus of no real significance in our results?

The only significant differences we find are linked to the firm size of the former employment: survivors worked more often before the start-up in SMEs; exitors were more likely to come from large companies. This finding gives us hints that managerial competences can indeed make the difference. But they are perhaps more practical, realistic experiences than those of entrepreneurs who gained management experience in a cadre employment status. Being able to lead people may not be enough when practical and pragmatic decision taking is required to keep the venture alive.

Another important individual success factor is the way in which an entrepreneur prepares the start-up. Our results lead us to the conclusion that the survivors do not automatically prepare the start-up in a better way, but seem to be more active in mobilizing more external information sources and resources. Entrepreneurs risk expending their energy mainly on the technical success of their products and services.

Table 5.5 Human capital, working experience and pre-start-up activities

Entrepreneur	Survivors (n = 278)	Exitors (n = 220)	Test[a]
Age	39.5	38.5	ns
Education level (university/high school graduation)	32.5%	33.5%	ns
Starting up from a situation of unemployment	10.3%	11.0%	ns
Academic start-up	4.0%	4.0%	ns
Start-up in the same activity/sector as former employment	87.0%	82.6%	ns
General working experience (minimum 3 years)	87.1%	87.5%	ns
Last employment in firm (size by employees) . . .			
less than 3	9.1%	10.2%	ns
3 to 9	21.2%	19.0%	ns
10 to 49	30.8%	26.5%	ns
50 to 199	16.2%	11.6%	ns
(total firms size under 200)	(77.8%)	(67.3%)	***
>200	22.7%	32.7%	***
Total	100.0%	100.0%	
Specific working experience (manager, cadre)	45.2%	46.0%	ns
Entrepreneurial experience (minimum 1 start-up)	27.7%	32.3%	ns
Examples of entrepreneurs in social and personal network	63.8%	65.2%	ns
Pre-start-up activities			
Contacts with consultants	59.4%	50.5%	***
Start-up training	21.9%	19.5%	ns
Clients approached or file of clients	68.7%	64.1%	ns
Competitors or market analysis	38.1%	38.2%	ns
Financing plan established	71.9%	68.6%	ns
Technical feasibility checked	44.2%	50.0%	*
Business relations with former employer	21.2%	17.7%	ns

Notes:
*** $p < 0.005$; * $p < 0.05$; ns: not significant.
a. Kolmogorov–Smirnov test of significance.

Source: Adapted from Lasch (2003a), p. 156.

Organizations from the Start-up on the Road to Success?

Initial organizational factors may determine which organizations are from the start on the road to success and which ones are on highways to hell. Indeed, our results indicate that the choices related to the organizational set-up are more than crucial. From the nine examined factors, seven had a

Table 5.6 Organizational setting at start-up

Organization at start-up	Survivors (n = 278)	Exitors (n = 220)	Test[a]
Public aids obtained	36.0%	24.5%	***
Capital at start-up . . .			
less than €15,000	44.6%	52.3%	***
15,000 to €40,000	41.0%	36.8%	ns
40,000 to €75,000	8.3%	6.8%	ns
75,000 to €150,000	2.5%	1.8%	ns
> €150,000	3.6%	2.3%	ns
(total above €15,000)	(55.4%)	(47.7%)	***
Total	100.0%	100.0%	
Firm size at start-up (number of employees)	3.38	1.93	
Entrepreneurial founding team	42.1%	40.5%	ns
Mainly subcontractor activities	28.8%	27.3%	ns
Number of clients (total sales)			
1 or 2 clients	16.2%	33.6%	***
3 to 10 clients	51.4%	24.1%	***
>10 clients	32.4%	42.3%	***
total	100.0%	100.0%	
Type of clients			
private customers	12.6%	20.9%	***
other firms, commercials	65.5%	57.7%	***
large-scale retailing	6.5%	6.8%	ns
administration or public sector	15.5%	14.5%	ns
total	100.0%	100.0%	
Geographical location of clients (total sales)			
local or regional	61.8%	63.2%	ns
national	31.3%	25.5%	*
international	6.9%	11.3%	ns
(total local/regional & international)	(68.7%)	(74.5)	*
total	100.0%	100.0%	
Choice of location motivated by . . .			
proximity to market	15.8%	15.7%	ns
proximity to supplier	2.4%	1.9%	ns
proximity to client	5.4%	1.9%	ns
opportunity	11.3%	9.0%	ns
cost-reduction	12.8%	11.2%	ns
local infrastructures	5.4%	6.4%	ns
local public aids	1.5%	1.5%	ns
(total economic reasons)	(54.4%)	(47.6%)	**
proximity to residence	28.3%	32.2%	ns
other private reasons	17.3%	20.2%	ns
(total private reasons)	(45.6%)	(52.4%)	**
total	100.0%	100.0%	

Notes:
*** $p < 0.005$; ** $p < 0.025$; * $p < 0.05$; ns: not significant.
a. Kolmogorov–Smirnov test of significance.

Source: Adapted from Lasch (2003a), p. 160.

significant effect on the sustainability of a high-tech venture. No significant results were measured for entrepreneurial founding teams and subcontractors. Successful entrepreneurs, compared to exitors, start with a bigger firm size, solid financing, more often obtain public aid and their chance of survival depends heavily on the client structure and the choice of location.

Successful entrepreneurs determine the location of the new firm mainly for cost reduction and economic reasons. If we connect this to our findings about entrepreneurial areas, we realize the importance of geography for location and survival. In fact, proximity to similar firms, networking and knowledge exchange, access to specific local R&D knowledge resources and an efficient integration in local institutional networks (finance, politics and so on) may increase the chance of survival in a sector where high growth potential is also similar to a high risk of failure.

The positive impact of financing factors conform to literature and are not surprising, but the client-related determinants merit a closer look. Subcontractors, for example, who generally start with a certain guarantee of income, have no competitive advantage in the ICT sector. Conforming to expectations is the fact that a small number of clients raise the risk of failure, but paradoxically, entrepreneurs who quickly enter into business with many clients are more often exitors than survivors. So, perhaps, a 'reasonable' number of clients (say, 3 to 10) seems to fit best with the organizational profile of high-tech ventures such as those in the French ICT sector.

Differences in sustainability also appear when the type of client is analysed. Sustainable firms are mainly engaged in firm-to-firm business relationships rather than those that privilege the private customer. Finally, sustainability depends heavily on the regional market orientation. Successful entrepreneurs quickly become competitive on the national market, but our results indicate that they are very prudent (and carefully prepared?) internationalizers. In fact, early internationalizers are exposed to high risks, and display high mortality rates. Those that exit ('exitors') depend more strongly on a geographically restricted market potential and do business mainly with local or regional clients.

DISCUSSION

In this penultimate section we summarize and discuss the results listed above. First, we dealt with the question 'what can be considered as a high-tech venture, and especially those businesses in the ICT sector?'. The development of a consensual definition of this particular sector was retraced over a decade and demonstrates the difficult task of defining a new, emerging

industry. The delimitation used for our structural analysis of the emergence and growth of the ICT sector in France produces the clear image of an extremely heterogeneous sector with great differences between industry and services. The spectacular growth of the ICT sector during the last decade is mainly driven by the service branch, especially two subdivisions: consulting in information and computer systems and software development. But the heterogeneity is not only limited to firm stock and employment growth differences between subdivisions, but is above all a question of industry structure. The average firm size of a service business is six times smaller compared to a business in the ICT industry. But the main result is the small firm size at start-up, which is characteristic of new ventures in the whole sector. Consequently, this leads us to the hard fact that the emerging ICT sector suffers from insufficient start-up conditions and the high growth potential of these new high-tech ventures is linked to a high risk of failure.

The fragility of new high-tech ventures raises the question of sustainability. Mainly SMEs, new high-tech ventures are supposed to be extremely sensitive to the local environment. But does the type of region affect high-tech entrepreneurship and what type of local environment offers the best opportunities for entrepreneurs in the ICT sector? The results demonstrate clearly the importance of geography for high-tech venturing. First, we observed a high concentration of ICT firms in certain areas (labour markets), a finding which confirms that new high-tech ventures require a specific local environmental context and seek areas that offer a favourable context for the location and the development of the entrepreneurial project. Understanding the main forces for this asymmetric spatial development induced by new high-tech ventures is crucial for practitioners and economic actors, but also for technopreneurs themselves, against a background of international competition.

Entrepreneurial areas that attract new high-tech ventures can be described as labour markets with a well-developed R&D infrastructure, a high knowledge and innovation potential, and especially localization economies that indicate opportunities for networking, knowledge transfer and different forms of cooperation (proximity effects). Other important characteristics are the presence of large firms and a high population growth. Contrary to most research, the positive impact of agglomeration effects is not clearly measured. Proximity effects, such as interaction or networking opportunities, and positive knowledge externalities are of prime importance.

Sustainability of new high-tech ventures is not only a matter of a favourable regional environment offering entrepreneurial opportunities. The survival of new firms also depends on individual and organizational factors. Indeed, we measured high mortality rates of new high-tech ven-

tures, which emphasizes that they face specific problems. We used a cohort analysis and measured clear differences between successful and unsuccessful entrepreneurship in comparing the survivors' group with the exitors'. The main result is that initial organizational factors are more important than human capital and preparation. To simplify, the sustainability of high-tech ventures mainly depends on financing and customer-specific variables, and less on human capital, working experience or pre-start-up activities. Starting up with significant financing, a strong focus on customer structure and market potential in addition to careful preparation for the process of internationalization are crucial factors that divide successful from unsuccessful entrepreneurs. Finally, a thorough choice of the location is crucial for entrepreneurs in the ICT sector.

Seen as a whole, the results presented above underline the importance of the local socio-economic environment as one of the key factors for the sustainability of high-tech ventures. But the environmental effects on sustainability are to date a rather unexplored research field. Between, first, the hard evidence that points out localization economies as a main argument for entrepreneurial areas to attract high-tech venturing, and, second, the results on the sustainability of new firms, we find sufficient substance to support the hypothesis that a combined global–local strategy is one key to success in this particular sector.

CONCLUSION

The main objective of this chapter was to give a deeper insight into the emergence of high-tech ventures and focused on how regional, individual and organizational factors influence the birth and sustainability of new firms. The study analysed the French ICT sector between 1993 and 2001.

The findings present a number of implications for practitioners and economic actors willing to promote and help in the survival of new high-tech ventures. First, the evolution of a consensual definition of the ICT sector over the last decade was retraced in order to demonstrate the hard task of defining a new, emerging industry. This resulted in a clear image of an extremely heterogeneous sector which showed great differences between industry and services. Second, this type of firm proves to be highly sensitive to the local environment, which underlines the importance of geography for high-tech venturing. A high concentration of ICT firms in certain labour markets was observed and illustrates clearly how high-tech ventures require a specific local environmental context, and entrepreneurs seek areas that offer the best possible conditions for the localization and development of their businesses. Entrepreneurial areas are characterized by an excellent R&D

infrastructure, a high knowledge potential, and especially localization economies that indicate opportunities for networking and different forms of cooperation. Third, we analysed how human capital and organizational settings at the start-up affect the sustainability of new high-tech ventures. The main result is that initial organizational factors strongly affect the survival of new firms when compared to human capital and pre-founding activities.

The limits of our study are mainly linked to the methodology. Our empirical study applies a quantitative approach using empirical mass data over a long time period. Even if considerable empirical and methodological advances have been made (especially in using a very fine-grained geographical zoning), some questions may find more specific answers that only future research using qualitative approaches can deliver. One of the main findings, the importance of proximity effects for entrepreneurship, waits to be clarified. But what is behind geographical proximity when we talk about cooperation? Another direction for future research concerns the impact of individual, organizational and regional determinants on the sustainability of new high-tech ventures. In our study, the sample size did not allow us either to compare cross-regional conditions with survival or to provide findings for this relationship.

So, a number of our findings could be detailed and our results give a first idea of the possibilities. In doing so, we see a great potential for future research, for a better understanding of how regional, individual and organizational factors influence the birth and sustainability of new firms.

REFERENCES

Aldrich, H.E. and J.E. Cliff (2003), 'The pervasive effects of family on entrepreneurship: toward a family embeddedness perspective', *Journal of Business Venturing*, **18**, 573–96.

Aldrich, H. and C. Zimmer (1986), 'Entrepreneurship through social networks', in D.L. Sexton and R.W. Smilor (eds), *The Art and Science of Entrepreneurship*, Cambridge, MA: Ballinger Publishing Co., pp. 3–23.

Almus M., J. Egeln and D. Engel (1999), 'Determinanten regionaler Unterschiede in der Gründungshäufigkeit wissensintensiver Dienstleister, Discussion Paper, **99** (22), Mannheim: Zentrum für Europäische Wirtschaftsforschung (ZEW).

Armington, C. and Z.J. Acs (2002), 'The determinants of regional variation in new firm formation', *Regional Studies*, **36** (1), 33–45.

Astley, W.G. and C.J. Fombrum (1983), 'Collective strategy: social ecology of organizational environments', *Academy of Management Review*, **8** (4), 576–87.

Audretsch, D. (1998), 'Agglomeration and the location of innovative activity', *Oxford Review of Economic Policy*, **14** (2), 18–29.

Audretsch, D.B. and M. Fritsch (1993), 'Betriebsgründungen, Stillegungen, Turbulenz und Regionalentwicklung', Discussion Paper, **93** (17), Mannheim: Zentrum für Europäische Wirtschaftsforschung (ZEW).

Audretsch, D.B. and M. Fritsch (1994), 'The geography of firm birth in Germany', *Regional Studies*, **28**, 359–65.
Autant-Bernard, C., N. Massard and C. Largeron (2003), 'TIC, diffusion spatiale des connaissances et agglomération', *Géographie, Économie, Société*, **5** (3–4), 311–31.
Bade, F.-J. and E. Nerlinger (2000), 'The spatial distribution of new technology-based firms: empirical results for West-Germany', *Papers of Regional Science*, **79**, 155–76.
Bathelt, H. (1992), 'Erklärungsansätze industrieller Standortentscheidungen. Kritische Bestandsaufnahme und empirische Überprüfung am Beispiel von Schlüsseltechnologie-Industrien', *Geographische Zeitschrift*, **80**, 191–213.
Beale, J. (1998), 'Les contenus – un nouveau secteur de croissance', DSTI/ICCP/IE **96** (6), Paris: OECD.
Becattini, G. and E. Rullani (1995), 'Système local et marché global. Le district industriel', in A. Rallet and A. Torre (eds), *Économie industrielle et économie spatiale*, Paris: Economica, pp. 171–92.
Brüderl, J., P. Preisendörfer and R. Ziegler (1996), 'Der Erfolg neu gegründeter Betriebe: eine empirische Studie zu den Chancen und Risiken von Unternehmensgründungen', Berlin: Betriebswirtschaftliche Schriften, No. 140.
Bruneau, E. and M. Lacroix (2001), 'Towards the construction of information in activities and products classifications in 2007', Série Documents de Travail/INSEE Île-de-France.
Bürgel, O., A. Fier, G. Licht and G. Murray (2001), 'Internationalization of high-tech start-ups and fast growth evidence for UK and Germany', Discussion Paper, **01** (35), Mannheim: Zentrum für Europäische Wirtschaftsforschung (ZEW).
Cairncross, F. (1997), *The Death of Distance*, London: Orion Business Books.
Camagni, R., D. Maillat, A. Matteaccioli and J.-C. Perrin (1999), 'Le paradigme du milieu innovateur dans l'économie spatiale contemporaine', *Revue d'Économie Régionale et Urbaine*, **3**, 425–8.
Capello, R. (2002), 'Entrepreneurship and spatial externalities: theory and measurement', *The Annals of Regional Science*, **36**, 387–402.
Cases, C., F. Favre and J.-P. François (1999), 'L'innovation technologique dans les services aux entreprises', *Le 4 Pages des Statistiques Industrielles*, **105**, 1–4.
Castrogiovanni, G. (1996), 'Pre-startup planning and the survival of new small businesses: theoretical linkages', *Journal of Management*, **22** (6), 801–22.
Ceh, B. (2001), 'Regional innovation potential in the United States: evidence of spatial transformation', *Papers of Regional Science*, **80**, 297–316.
Cliff, J.E., N. Langton and H.E. Aldrich (2004), 'Walking the talk? Gendered rhetoric vs. action in small firms', *Organization Studies*, **26** (1), 63–91.
Collinson, S. and G. Gregson (2003), 'Knowledge networks for new technology-based firms: an international comparison of local entrepreneurship promotion', *R&D Management*, **33** (2), 189–208.
Cooper, A.C., F.J. Gimeno-Gascon and C.Y. Woo (1994), 'Initial human and financial capital as predictors of new venture performance', *Journal of Business Venturing*, **9** (5), 371–95.
Corolleur, F. and C. Courlet (2003), 'The Marshallian industrial district, an organizational and institutional answer to uncertainty', *Entrepreneurship and Regional Development*, **15** (4), 299–308.

Courlet, C. and B. Pecqueur (1996), 'Districts industriels, systèmes productifs localisés et développement', in L. Abdelmalik and C. Courlet (eds), *Les nouvelles logiques du développement*, Paris: Harmattan, pp. 91–102.
Courtois-Martignoni, F. (2000), *Les technologies de l'information et de la communication à Paris et en Île-de-France*, Paris: Mairie de Paris/Observatoire du Développement Économique Parisien.
Crévoisier, O. (1997), 'L'approche par les milieux innovateurs: intégrer la dynamique territoriale dans les théories de l'innovation', *Revue de l'Économie Méridionale*, **175**, 3–24.
Czarnitzki, D. and A. Spielkamp (2000), 'Business services in Germany: bridges for innovation', Discussion Paper **00** (52), Mannheim: Zentrum für Europäische Wirtschaftsforschung (ZEW).
Dahlqvist, J., P. Davidsson and J. Wiklund (2000), 'Initial conditions as predictors of new venture performance: a replication and extension of the Cooper et al. study', *Enterprise and Innovation Management Studies*, **1** (1), 1–17.
Dahlstrand, A.L. (1999), 'Technology-based SMEs in the Göteborg region: their origin and interaction with universities and large firms', *Regional Studies*, **33**, 379–89.
De Propris, L. (2002), 'Types of innovation and inter-firm co-operation', *Entrepreneurship and Regional Development*, **14**, 337–53.
Emin, S. (2003), 'L'intention de créer une entreprise des chercheurs publics: le cas français', Paris: Doctoral thesis, Sciences de Gestion, Université Pierre Mendès.
Engel, D. and A. Fier (2000), 'Does R&D infrastructure attract high-tech start-ups?', Discussion Paper **00** (30), Mannheim: Zentrum für Europäische Wirtschaftsforschung (ZEW).
Fritsch, M. (1990), 'Technologieförderung als regionalpolitische Strategie', *Raumforschung und Raumordnung*, **2–3**, 117–23.
Fritsch, M. and M. Niese (2000), 'Der Einfluss der Branchenstruktur auf das Gründungsgeschehen – eine Analyse für die westdeutschen Raumordnungsregionen 1983–1997', *Geographische Zeitschrift*, **88**, 234–50.
George, P. (1991), 'La revanche du Midi: le pari de Montpellier', *Annales de Géographie*, special issue, Portrait des villes, 55–65.
Grabher, G. (ed.) (1993), *The Embedded Firm: On the Socio-economics of Industrial Networks*, London/New York: Routledge.
Greenan, N. (1994), 'L'organisation du travail dans les PMI se distingue-t-elle de celle des grandes entreprises?', *Économie et Statistiques*, **271–2**, 87–103.
Greffe, X. (1999), 'Le chantier des milieux innovateurs', *Revue d'Économie Régionale et Urbaine*, **3**, 419–24.
Greve, A. and J.W. Salaff (2003), 'Social networks and entrepreneurship', *Entrepreneurship Theory and Practice*, Fall, 1–22.
Grouthier, J.-P. (2000), 'Résultats de l'enquête sur les travaux des CCI en matière d'observation des TIC', Paris: INSEE DG – Direction de la Diffusion et de l'Action Régionale: note du 18/9.
Guillaume, H. (1998), *Technologie et innovation*, Government report, Paris.
Hansen, E.L. (1995), 'Entrepreneurial networks and organizational growth', *Entrepreneurship Theory and Practice*, Summer, 7–19.
Hauknes, J. (1999), *Knowledge Intensive Services: What is their Role?*, Paris: OECD.
Heitzmann, R. and C. Rouquette (1999), 'Les technologies de l'information et de la communication', INSEE Première, No. 648.

Institut National de la Statistique et des Études Économiques (INSEE) (2000), *L'Économie française. Édition 2000–2001*, Paris: Livre de Poche.
Johanisson, B. (1998), 'Personal networks in emerging knowledge-based firms: spatial and functional patterns', *Entrepreneurship and Regional Development*, **10**, 297–312.
Johnson, P. and S. Parker (1996), 'Spatial variations in the determinants and effects of firm births and deaths', *Regional Studies*, **30**, 679–88.
Keeble, D. and S. Walker (1994), 'New firms, small firms and dead firms: spatial patterns and determinants in the United Kingdom', *Regional Studies*, **28**, 411–27.
Keeble, D. and F. Wilkinson (1999), 'Collective learning and knowledge development in the evolution of regional clusters of high technology SMEs in Europe', *Regional Studies*, **33**, 295–303.
Koschatzky, K. (ed.) (1997), *Technologieunternehmen im Innovationsprozess: Management, Finanzierung und regionale Netze*, Heidelberg: Technik, Wirtschaft und Politik. Karlsruhe: Schriftenreihe des Fraunhofer-Instituts für Systemtechnik und Innovationsforschung/ISI, (23).
Koski, H., P. Rouvinen and P. Ylä-Anttila (2002), 'ICT clusters in Europe: the great central banana and small Nordic potato', *Information Economics and Policy*, **14**, 145–65.
Kulicke, M. (1990), *Entstehungsmuster junger Technologieunternehmen*, Karlsruhe: Fraunhofer ISI.
Lasch, F. (2001a), 'Les technologies de l'information et de la communication en Languedoc-Roussillon en 2001: Forte concentration sur la zone d'emploi de Montpellier', INSEE Repères pour l' Économie du Languedoc-Roussillon – Synthèse, 12.
Lasch, F. (2001b), 'Les technologies de l'information et de la communication (TIC) en France et en Languedoc-Roussillon: Concentration géographique et création d'établissements de 1993 à 2001', INSEE-Languedoc-Roussillon Série Documents de Travail, Montpellier, www.insee.fr/lr.
Lasch, F. (2003a), *Innovations- und technologieorientierte Neugründungen in Frankreich. Eine Untersuchung von Einflussfaktoren auf regionale Disparitäten im Gründungsgeschehen in Informations- und Kommunikationstechnologien (1993 bis 2001) – La création d'entreprises dans le secteur des technologies de l'information et de la communication (TIC) en France. Une analyse des facteurs déterminants de la création régionale et une étude des déterminants de la survie et du succès des jeunes entreprises (1993 à 2001)*, Beiträge zur Wirtschaftsgeographie Regensburg, 4, Regensburg.
Lasch, F. (2003b), 'Les technologies de l'information et de la communication en Languedoc-Roussillon. Des besoins spécifiques pour une filière jeune à forte intensité de création', INSEE Repères-Synthèse pour l'Économie du Languedoc-Roussillon, 1.
Lasch, F., F. Le Roy and S. Yami (2005a), 'L'influence de l'environnement socio-économique sur la création d'entreprises dans le secteur TIC: le cas de la France', *Finance, Contrôle, Stratégie*, **8** (1), 73–107.
Lasch, F., F. Le Roy and S. Yami (2005b), 'Les déterminants de la survie et de la croissance des start-up TIC', *Revue Française de Gestion*, **31** (155), 37–56.
Lawson, C. and E. Lorenz (1999), 'Collective learning, tacit knowledge and regional innovative capacity', *Regional Studies*, **33**, 305–17.
Lecocq, X. and S. Yami (2002), 'From value chain to value networks: toward a new strategic model', in M. Lundan-Sarianna (ed.), *Network Knowledge in*

International Business, Cheltenham, UK and Northampton, MA, USA: Edward Elgar, pp. 9–27.
Lethiais, V., A. Rallet and J. Vicente (2003), 'TIC et réorganisation spatiale des activités économiques: introduction', *Géographie, Économie, Société*, **5** (3–4), 275–86.
Maillat, D. (1995), 'Milieux innovateurs et dynamique territoriale', in A. Rallet and A. Torre (eds), *Économie industrielle et économie spatiale*, Paris: Economica, pp. 211–32.
Malmberg, A. (1996), 'Industrial geography: agglomeration and local milieu', *Progress in Human Geography*, **20**, 392–403.
Meusburger, P. (2000), 'The spatial concentration of knowledge: some theoretical considerations', *Erdkunde*, **54**, 352–64.
Meyer-Krahmer, F. and U. Schmoch (1998), 'Science-based technologies: university–industry interactions in four fields', *Research Policy*, **27**, 835–51.
Ministère de l'Économie des Finances et de l'Industrie – Service des Études et des Statistiques Industrielles (MEFI/SESSI) (1999), 'L'état des PMI', Paris: SESSI Chiffres clés – Analyse, 187.
Ministère de l'Économie des Finances et de l'Industrie – Service des Études et des Statistiques Industrielles (MEFI/SESSI) (2001), 'L'industrie française des technologies de l'information et de la communication', Paris: SESSI Chiffres clés, Hors Série Production Industrielle.
Morgan, K. (1997), 'The learning region: institutions, innovation and regional renewal', *Regional Studies*, **31**, 491–503.
Mustar, P. (1995), *Science et innovation – annuaire raisonné de la création d'entreprises par les chercheurs*, Paris: Economica.
Mustar, P. (ed.) (1997), *Les chiffres clés de la science et de la technologie*, Paris: Economica.
Nalebuff, B.J. and A.M. Brandenburger (1997), 'Coopetition: competitive and cooperative business strategies for the digital economy', *Strategy and Leadership*, November–December, 28–35.
Nerlinger, E. (1998), *Standorte und Entwicklung junger innovativer Unternehmen: Empirische Ergebnisse für West-Deutschland*, Baden-Baden: Schriftenreihe des Zentrum für Europäische Wirtschaftsforschung (ZEW), 27.
Nguen, G.D. and J. Vicente (2003), 'Réseaux métropolitains, formes locales d'organisation et ancrage de l'activité économique', *Géographie, Économie, Société*, **5** (3–4), 287–310.
Nijkamp, P. (2003), 'Entrepreneurship in a modern network economy', *Regional Studies*, **37** (4), 395–405.
Nivlet, J.-M. (2001), 'Le secteur du contenu et la révision des nomenclatures d'activités', in Groupe de Voorburg sur les statistiques de services 16ème reunion – Session 1, Paris: Société de l'information.
Park, S.O. (1996), 'Networks and embeddedness in the dynamic types of new industrial districts', *Progress in Human Geography*, **20**, 476–93.
Pattinson, B., P. Montagnier and L. Moussiegt (2000), *Measuring the ITC Sector*, Paris: OECD.
Pleschak, F. (1997), 'Entwicklungsprobleme junger Technologieunternehmen und ihre Überwindung', in K. Koschatzky (ed.), *Technologieunternehmen im Innovationsprozess: Management, Finanzierung und regionale Netze*, Heidelberg: Schriftenreihe des Fraunhofer-Instituts für Systemtechnik und Innovations forschung/ISI-Technik, Wirtschaft und Politik, **23**, 13–33.

Pleschak, F. and R. Rangnow (1995), *Ergebnisse des BMFT-Modellversuchs 'technologieorientierte Unternehmensgründungen in den neuen Bundesländern', der Jahre 1990 bis 1994*, Karlsruhe: Fraunhofer ISI.
Quah, D. (2001), 'ICT clusters in development: theory and evidence', *IEB (Institut d'Economia de Barcelona) Papers*, **6** (1), 85–100.
Reynolds, P.D. and D.J. Storey (eds) (1993), *Local and Regional Characteristics Affecting Small Business Formation: A Cross-National Comparison*, Paris: European Commission–OECD/WKSUM01.
Rieg, C. (2004), 'Forte hausse des créations d'entreprises en 2003', *INSEE Première*, **944**, 1–4.
Ritsilä, J.J. (1999), 'Regional differences in environments for enterprises', *Entrepreneurship and Regional Development*, **11**, 187–202.
Rouquette, C. (1999), 'Les statistiques des TIC', *Courrier des Statistiques*, **89**, 43–49.
Rouzier, J. (1987), 'Le sud, une novation socio-économique', *Révue d'Économie Méridionale*, **138**, 49–63.
Ruef, M., H.E. Aldrich and N.M. Carter (2003), 'Homophily, strong ties, and isolation among U.S. entrepreneurs', *American Sociological Review*, **68**, 195–222.
Sapienza, H.J., E. Autio and S. Zahra (2003), 'Effects of internationalization on young firms' prospects for survival and growth', *Academy of Management Best Conference Paper 2003 ENT: G1*.
Schmude, J. (1994a), *Geförderte Unternehmensgründungen in Baden-Württemberg. Eine Analyse der regionalen Unterschiede des Existenzgründungsgeschehens am Beispiel des Eigenkapitalhilfe-Programms (1979–1989)*, Erdkundliches Wissen (114), Stuttgart.
Schmude, J. (1994b), 'Qualifikation und Unternehmensgründung. Eine empirische Untersuchung über die Qualifikationsstrukturen geförderter Unternehmensgründer in Baden-Württemberg', *Geographische Zeitschrift*, **82**, 166–79.
Schutjens, V. and E. Wever (2000), 'Determinants of new firm success', *Papers of Regional Science*, **79**, 135–59.
Seeger, H. (1997), *Ex-Post Bewertung der Technologie- und Gründerzentren durch die erfolgreich ausgezogenen Unternehmen und Analyse der einzel- und regionalwirtschaftlichen Effekte*, Münster: Hannoversche Geographische Arbeiten (53).
Solymossy, E. (2000), 'Entrepreneurial dimensions: the relationship of individual, venture and environmental factors to success', *Entrepreneurship, Theory and Practice*, Summer, pp. 79–80.
Suire, R. (2003), 'Stratégies de localisation des firmes du secteur TIC: du cyber district au district lisière', *Géographie, Économie, Société*, **5** (3–4), 379–98.
Teal, E.J. and C.W. Hofer (2003), 'New venture success: strategy, industry structure, and the founding entrepreneurial team', *Journal of Private Equity*, Fall, 38–51.
Varamäki, E. and J. Veslainen (2003), 'Modelling different types of multi-lateral cooperation between SMEs', *Entrepreneurship and Regional Development*, **15**, 27–47.
Vicaire, V. (2000), 'Services et NTIC', Document de travail préparé à l'occasion du Séminaire des Directeurs Régionaux de l'INSEE, Paris.
Vicaire, V. (2001), 'Le dynamisme des activités informatiques en Île-de-France', *INSEE-Île-de-France, Regards*, **2–3**.
Vicaire, V., V. Aillaud, D. Deschamps, F. Lavelle and M. Delassus (2002), *Technologies de l'information et de la communication en Île-de-France*, Paris: INSEE-Ile-de-France.

Wicker, A.W. and J.C. King (1989), 'Employment, ownership and survival in microbusinesses: a study of new retail and service establishments', *Small Business Economics*, **1**, 137–52.
Wiklund, J. (1999), 'The sustainability of the entrepreneurial orientation–performance relationship', *Entrepreneurship, Theory and Practice*, Fall, 37–48.
Wiklund, J. and D.A. Shepherd (2001), 'Intentions and growth: the moderating role of resources and opportunities', *Academy of Management Proceedings 2001 ENT: F1*.

APPENDIX 5A METHODOLOGY

Second to Fourth Sections

This research used an empirical, quantitative, approach based upon an exhaustive data of the whole firm population in France (the 'SIRENE' database). This official register of all existing and newly created firms, elaborated by INSEE, gave us the opportunity to analyse the entire firm stock and every new firm created between 1993 and 2001 in metropolitan France (84,535 firms). A longitudinal observation period (1993 to 2001), and fine-grained zoning (the labour market areas: LMAs) was chosen. The 348 LMAs are aggregates of the 33,000 French municipalities into 348 LMAs (overseas departments excluded). The firm birth rate (dependent variable) is defined as the number of new ICT firms divided by the number of all existing firms in an LMA (for a definifion of the labour market approach, see Lasch, 2003a: 62). The selected independent variables are crossed in a multiple regression model with the firm birth rate in each of the 348 LMAs. For the data processing and statistical treatment the SAS (Statistical Analysis Systems) program was used.

Fifth Section

In this section, we used a dataset that offers the opportunity to gather information on the firms at their start and again three and five years later. This dataset is collected by INSEE. Designed as a cohort analysis of new firms since 1994 ('enquête SINE'), one firm out of five is observed over a five-year period (on average three questionnaires). For our study the first wave was used (first questionnaire at the start-up in 1994 and second questionnaire in 1997). In this database, questionnaires of 24,191 firms (all sectors) were available and, as we focus on the ICT sector, our sample comprised 498 firms.

6. Are human capital and culture the key factors in explaining intra-regional differences? Novice entrepreneurship and geo-cultural context in the Walloon region

Vincent Calay, Jean-Luc Guyot and Gilles Van Hamme

INTRODUCTION

Endogenous business creation (local entrepreneurship) is a crucial form of economic dynamism in a region. Against this background, the regional government of Wallonia developed its 'Contract for the Future of Wallonia' (February 2000) in order to promote local entrepreneurship. It is endorsed in the updated version of the contract (January 2005), the 'Strategic Transversal Plan' developed by the present Walloon Minister for the Economy and Employment (June 2005) and the plan 'Priority Actions for the Future of Wallonia' of the regional government (August 2005).

Many examples have shown that effective development policies cannot ignore the complexity and diversity of various situations, especially territorial ones. Therefore the subregional identities formed by the local networks, the resistance to change and the various forms of social organizations to be found throughout Wallonia have to be taken into account.

To avoid the pitfall of uniformity in the measures and structures to be put in place to revitalize Walloon entrepreneurship, the Walloon Institute of Evaluation, Future Planning and Statistics (IWEPS)[1] is currently developing a research programme on entrepreneurship in Wallonia. One of the main objectives is to understand the conditions and processes necessary for business venturing. The focus is on the link between structural, institutional and human mechanisms, and entrepreneurship. A number of questions concern IWEPS in particular: who are the creators of new enterprises? What are the economic, social and cultural mechanisms pushing them to launch and develop a new business? What are their general

motivations and specific motives? What are the difficulties they face, what support do they have and what are their needs during the entrepreneurial process? To answer these research questions, several factors have to be taken into account:

- the profile of the entrepreneur (in all its various aspects: economic, social, cultural, geographic, experience, skills and so on);
- the relationship between the entrepreneurial act and the family setting; the entrepreneur's career, especially on the professional level;
- the resources mobilized during the establishment of the business; the access and management strategies developed by the entrepreneur in conjunction with these; and
- the specific characteristics of the subregional context in which the entrepreneurial act takes place and their dynamic relationship with the latter.

To deal with these points, several analyses have been conducted (survey questionnaires, analysis of administrative data, interviews and so on), particularly in partnership with the Institute for Environmental Management and Land-Use Planning (IGEAT, Free University of Brussels). Within this research programme, IGEAT researchers are particularly concerned with the spatial aspects of the entrepreneurial phenomenon and the specific features of subregional contexts. The object is to define, in the light of historical factors, the heterogeneous nature of the Walloon region with respect to entrepreneurial dynamics and the corresponding diversity of measures which need to be applied in order to stimulate such dynamics.

In this chapter we present some of the results of the collaboration between IGEAT and IWEPS researchers. This exploratory research initiative sets out to identify infraregional characteristics in terms both of the extent of the entrepreneurial activity emerging in them and the variables characterising the local context of this emergence. The findings considered here concern all start-up business developments in the region between 1 June 1998 and 31 May 2000. We focus particularly on first-time developments; that is, enterprises created by novice entrepreneurs. This choice is dictated by a fundamental direction of the research programme, which is to give special attention to the transition from being a non-entrepreneur to being a novice entrepreneur, in the context of a more general consideration of self-employment.

The next section deals with the theoretical references guiding our empirical work; followed by a section that introduces our analytical and methodological framework. In the subsequent section, the specific local findings pertaining to entrepreneurship and context are presented and interpreted.

To do this, the situation of the Walloon municipalities and labour market areas are examined (specific characteristics). This is followed by a discussion, and the final section concludes.

Two concepts will provide a theoretical guide for our interdisciplinary approach: one from sociology, 'principles of action' (*logique d'action*); the other from regional studies, 'metropolization'. The first examines business creation and the emergence of the entrepreneur from two main perspectives: individual and contextual. The second describes the context of economic dynamics in the light of the segmentation of the production process and the externalization of costs which induce companies to come closer to major urban areas in order to benefit from agglomeration economies of scale.

ENTREPRENEURSHIP, CONTEXT AND GEOGRAPHY: THEORETICAL BACKGROUND

One could, as Verstraete (2000) suggests, see the entrepreneurial phenomenon as a process started by an individual, the entrepreneur, which can give rise to the establishment of an organizational structure (which may be a business, but not necessarily). For the sake of completeness, it should be pointed out that this dynamic process interacts with the environment. The individual, the organization (as a structure and a strategic process) and the environment therefore constitute three research possibilities in the field of entrepreneurship. Verstraete also explains the necessity, for a correct understanding of entrepreneurship, of studying both the entrepreneurs themselves and the organization in their socio-economic context.

Theoretical Basis of the Research Programme and Relevance of the Geographical Approach

This was the perspective which led us to design our entire research programme, concerning the creators of businesses, in using a theoretical framework based on the concept of *principles of action*. This framework supplies a common platform for researchers coming from different disciplines (sociology, geography and economics) and makes it possible to transcend 'deterministic' constructs, which go no further than associating a given characteristic of the entrepreneurs or their environment with the act of creation.

This approach, initiated by Pareto (1917 [1968]), is rooted in the Weberian current of the sociology of rationalities (Weber, 1904–17 [1965]). Based on an examination of organization, Amblard et al. (1996) propose a system-

ization of the more interesting rationalities. These authors are strongly influenced by the current debate in the area of organizational sociology, but their theories do not seem to be at all specific to the particular world of the organization. They can be transposed to many other social realities, including that of the business creator. According to these authors, the concept of principles of action refers to the relationship between the agent (*acteur*), in his/her strategic and historico-cultural constitution, on one hand, and the situation (*situation d'action*), on the other.

From this perspective, agents are characterized by a strategic dimension and are equipped with an identity which is the product of their personal career and their cultural, social and historical roots. They pursue objectives, mobilize resources and translate ideas into concrete realities. Agents, to be fully understood, must therefore be analysed on the basis of the different dimensions within which they organize themselves. The *situation* itself is both a moment in time and a cultural and symbolic space. It is a unique and intricate entity, corresponding to a basically finalized system of subjects and objects and is not reducible to a micro-logical dimension, in so far as it is more or less and inescapably shaped by its socio-historical context.

Principles of action therefore manifest themselves during interactions arising from the combination of the historically and culturally constituted agent and the situation: it is from the encounter between the agent and the situation that the interactions develop that permit the principles of action to materialize. From this perspective agents cannot be reduced to being strategic ones in the classical sense of the term, particularly because they act in a social, cultural and historical reality that cannot be ignored. Understanding principles of action therefore requires an analysis of the various structural, dynamic and strategic components generating them.

With regard to entrepreneurs, applying the principles of action concept can clarify the complex relationships existing between the sociological characteristics of the entrepreneurs and their environment, the strategic stance taken with regard to business creation and its development and outcome. We do not have room here to develop the various components of this theoretical framework, so we limit ourselves to a brief presentation of the elements which provide an entry point to a geographical analysis of business creation.[2] These elements are part of the situation.

Institutional context

The institutional factors must be considered, particularly those arising from the legal and political contexts liable to influence entrepreneurial strategies and procedures for setting up new businesses. These factors are numerous (Hisrich and Peters, 1998; Wtterwulghe, 1998). For example, the tendencies of economic policies on the supra-national, national, regional

and local[3] levels; the social climate, with particular regard to industrial relations, public policy with regard to, among other things, support for business start-ups (for example, Santarelli and Vivarelli, 1994; Crépon and Duguet, 2003), taxation, management of infrastructures and so on.

The institutional element therefore cannot be reduced to the attitude and actions of the public authorities with regard to entrepreneurs and business creation. Taking this element into account in fact requires the inclusion in the analysis of other agents who contribute in varying degrees to shaping the situation for business entrepreneurs. These include banks, and more recently universities, with the development of high-value-added spin-offs (Smilor et al., 1990; Feldman, 1994; Nlemvo et al., 1999).

These institutional elements can display varying degrees of spatial heterogeneity and so lead to different types of local entrepreneurial dynamics.

Economic context

In the original model developed by Amblard et al. (1996), this context is included in a generic category with the institutional context. Because of its importance to the subject of our study, we shall consider it as an entirely separate component of the situation. Without doubt this component is the one that has been most generally investigated,[4] but we limit ourselves here to the elements allowing a geographical interpretation of business development.

A prime factor in economic reality is the impact of prevailing economic conditions on entrepreneurial behaviour (Boadway et al., 1998; Lee, 1999; Wennekers and Thurik, 1999; Pfeiffer and Reize, 2000). For some, including Evans and Leighton (1989, 1990), Mason (1989), Storey (1991) and Burke (1997), the lack of job opportunities constitutes a catalyst for the creation of new enterprises because it encourages the unemployed to start up their own business: they propound the so-called 'push' effect. In contradiction to this viewpoint, other economists stress a negative relationship between unemployment and entrepreneurship (Fritsch, 1992; Garofoli, 1994; Robson, 1996). For them, business creation is induced by the pressures of demand. In other words, they put forward the 'demand–pull' explanation. Both hypotheses are supported by empirical observation: while longitudinal studies support the push effect, time-spot analyses do the same for the pull effect. It is therefore very difficult, on the basis of empirical studies, to define the real impact of the economic situation on business creation. This is no doubt because it is always only one variable among many. It is all the more difficult to judge the local differential effect of this factor at the national or regional level.

Another factor which has been investigated concerns the impact of economies of localization and urbanization (Glaeser et al., 1992; Henderson et al., 1995). Localization economies are linked to the number of firms

belonging to the same sector, grouped in a specific area. The availability of a specialized workforce, intermediate products or services, the production of special knowledge and know-how are thought to produce positive external effects.

Urbanization economies relate to the existence of districts, or clusters.[5] The notion of a cluster is closely linked to that of synergy (Ansoff, 1965 – cited in Surlemont, 2000): an isolated business will be less effective than one which is integrated in a cluster. The size of the cluster means that its members have access to investments which cannot be made in isolation. It means that sometimes common costs can be shared (Porter, 1980, 1990; cited in Surlemont, 2000) as well as certain risks, such as those associated with penetrating new markets or perfecting new products. Furthermore, belonging to a cluster can ensure certain economies of scale, for example in the case of joint productions, or can result in a positive reputation. Inclusion in a cluster also allows for a division of labour between members, so that they can each concentrate on their strong points (Hamel and Prahalad, 1990; cited in Surlemont, 2000). Other advantages are the complementary nature of the products offered by firms in the cluster, the possibility of setting up oligopolistic structures which can have a favourable influence on the costs of production factors (Baumol et al., 1982; cited in Surlemont, 2000), the improved ability to react to market developments, reduced transaction and coordination costs (Williamson, 1985; cited in Surlemont, 2000), the possibility of developing specific training for a specialized workforce, better information flow and consequently a greater capacity for innovation and adaptation (Von Hippel, 1988; cited in Surlemont, 2000).

While there has been a great deal of discussion, empirical research has not been able to establish whether industrial specialization or diversity constitutes a more conducive environment for entrepreneurship (Easton, 1992; Glaeser et al., 1992; Garofoli, 1994; Henderson et al., 1995; Ostgaard and Birley, 1996; Feldman and Audretsch, 1999; Baum et al., 2000).

The influence of other elements in the economic context has been demonstrated. According to Reynolds et al. (1994), a significant presence of small firms and a dense and growing population have a strong and positive influence on the creation of new enterprises. These authors echo the work of Krugman (1991), which shows a statistically significant, positive relationship between industrial density and population growth, on the one hand, and business creation on the other.

Robson (1996) and Carree (2002) maintain that there is a positive relationship between the setting up of new businesses and the gross national product growth rate as well as real growth in individual wealth. Conversely, Crépon and Duguet believe that high interest rates and inflation have a depressing effect on business creation.

The influence of local markets has also been emphasized. The availability of a qualified, experienced workforce can determine the location of new companies and the labour market can be an indicator of a reserve of potential entrepreneurs (Garofoli, 1994; Keeble and Walker, 1994; Holl, 2002). With regard to the products and services market, although local demand seems to have a positive influence on business creation in most sectors (Julien and Marchesnay, 1996), the proximity of the core market seems to have a particularly strong influence on creation in the service sector (Keeble and Walker, 1994; Holl, 2002).

Another aspect of the local dimensions of the economic context of business creation has been treated by Garofoli (1994), Audretsch and Fritsch (1994), Audretsch and Vivarelli (1996) and Gorg et al. (2000). These authors establish a link between firm size and entrepreneurship: a large number of small firms in an area seems to have an impact on new business creation.

Facilities and infrastructures

In all cases and situations there exist to a greater or lesser extent the constraints of the physical objects present which will in some way constitute the material structures for the activity and which, if invested in by the agent, will play a part in the elaboration of the principles of action. The study of the principles of action must therefore include the material context.

In studying business entrepreneurs, several authors have emphasized the role, either positive or negative, played by a context composed of material structures and mechanisms. Schumpeter (1911) has underlined the impact of these elements by pointing out the importance of the technological component in the innovativeness which characterizes the entrepreneurial process. In his opinion, the main function of the entrepreneur is innovation in terms of products or of production and distribution techniques.

Furthermore, technological development affecting production facilities also affects the industrial structure: for example, it has led to employment shifting from the manufacturing to the service sector and, in many cases, a reduction in the size of firms (Armington and Acs, 2002). These movements have a certain effect on the division of labour and, to some extent, result in firms becoming more specialized. These changes, which have a material origin, can be a great stimulus to the creation of firms which will meet the new requirements of the production system. However, they cannot be said to appear everywhere in the same way, particularly given the specificities of the local industrial substratum. A geographical interpretation of these mechanisms is therefore entirely relevant.

On the other hand, facilities can put a brake on an enterprise. According to the sector of activity, the level of technological intensity varies, as do the constraints in terms of research and development and the resulting capital

requirements. Some sectors will therefore be more open to entrepreneurial activity than others (Mukhopadhyay, 1985; Acs and Audretsch, 1989; Fritsch, 1992; Keeble and Walker, 1994; Burke, 1997; Libecap, 1998; Verzele and Crijns, 2001). Given the sector specialization that can be observed in terms of space, local disparities will certainly be found. They therefore constitute an interesting field for geographers.

One should also emphasize the differentiating role on the spatial level of the infrastructures available, as has been demonstrated by Bartik (1989), Veltz (1993), Van de Ven (1993), Massey (1995) and Maillat (1994, 1999). The quality of the transport infrastructure can have a significant effect on the location of businesses, in the context of transport cost reduction (Holl, 2002).

These different studies show that facilities and infrastructure cannot be ignored in the examination of the principles of action of entrepreneurs and that a geographical interpretation of these elements is crucial.

Cultural context

In addition to the economic, institutional and material components of the situation, the cultural context should also be considered. Every social space, be it an organization, a family unit or society as a whole, is impregnated with values, myths and symbols. The situation could probably be understood without these but will be all the richer if they are taken into account.

The importance of the cultural context for business creation has been recognized for a long time. Some researchers have attempted to describe the macro-sociological circumstances at the origin of business projects by examining the links between the appearance and development of an entrepreneurial class and the socio-historical context and macro-cultural structures (Weber, 1920, 1922; Sombart, 1926, 1932; or Fanfani, 1935). Others have examined the relationships between enterprise and cultural referents (Stimpson et al., 1990; Sweeney, 1991; Spilling, 1991; Storey and Strange, 1992; Antoine, 1996; Takyi-Asiedu, 1993) and/or normative models (McGrath et al., 1992; Fagenson, 1993). The work edited by Brown and Ulijn (2004) develops some interesting ideas in this respect.

Along the same lines we should mention the phenomena highlighted by the research of Shapero and Sokol (1982), Jackson et al. (1994) and Davidsson (1995), referring in particular to the cultural climate (willingness to take risks and accept failure, perception of difficulties linked to business creation, importance and respect accorded to small firms and their owners, type of socialization of children in the educational system, pro-entrepreneurial attitudes), and of Courpasson (1994) on the impact of the local context on the formation of professional identities. For Hisrich

and Peters (1998) the influence of the cultural context is particularly expressed in mechanisms which make the transition to entrepreneurship both desirable and realistic for the individual. The work of these authors shows the importance of the socio-cultural environmental variables in the cognitive processes involved in this transition. The research developed in 23 countries by Hofstede et al. (2004) shows the strong relationship between cultural factors, psychological attitudes and level of entrepreneurship.

It would be illusory to see the cultural context as homogeneous, even at the national or regional level. Because of the socio-historical course they have followed, the subregions have, in the course of time, developed their own cultural traits. These doubtless have an impact on local entrepreneurial dynamics. A geographical examination of these characteristics is therefore of obvious interest in understanding the diversity of principles of action at work in business start-ups.

Specific Theoretical References for a Geography of Enterprise

While this aspect is important, the fact remains that the entrepreneur as a person is rarely studied in economic geography. The discipline in fact is basically centred on the study of industrial or production systems and has been satisfied, from the time it took off in the 1970s, with a relatively wide scale of analysis.

Nevertheless, for some 10 years, the national and neoclassical concept of the workings of industrial systems has made room for new areas of research, mainly focused on the notion of 'region' and the 'socio-economic' dimensions of these systems. The reintegration of the notion of space into economic science is inherent to this movement.

However, geography has remained relatively foreign to it. As several authors have shown recently, the discipline needs to question its modes of thinking and must try to integrate the basic unit of the industrial system, that is, the business enterprise, and therefore entrepreneurship itself, into its considerations. A review of the literature shows us that the very recent attempts to conceptualize business enterprises in economic geography (Yeung, 2000, 2001; Taylor and Asheim, 2001; Maskell et al., 2003) have mainly emphasized the importance of the context in their emergence. It is here that the discipline will rediscover, at the very heart of such problems, its central preoccupations: economic activities do not emerge at random. Pre-existing social, cultural and economic structures favour their development. Thus a certain business is set up in a certain place for specific reasons which are determined by, or at the very least connected to, a particular territorial context. The same holds true for the entrepreneur.

How can we characterize and identify such a context? What variables should we use? What indicators should be determined and on what basis? A geographical study of the process of business creation has to answer questions such as these.

One explanation of the low level of interest shown by geography in the enterprise and the entrepreneur is the long pre-domination of neoclassical theory, which conceives a business as a kind of 'black box' where behaviour and location are strictly determined by perfectly informed rational choices. Such a concept is present, for example, in the work of Pellenbarg et al. (2002) and Pellenbarg and Van Steen (2003). Even if some authors have relativized such a vision through so-called 'behaviourist' approaches, that is, by introducing limits to rationality, it is only recently that an approach has been made to business enterprises by using socio-economic criteria, in the tradition of Polanyi.

These new developments may be classified into six categories, as Taylor and Asheim (2001) have proposed. They often overlap but can be distinguished by a viewpoint which is always different. Furthermore, such a categorization appears to go to a greater depth and to be more detailed than that provided by researchers such as Yeung (2000, 2001) in industrial geography. Nevertheless, these different approaches all revolve around the idea of the 'social construction of the economy', and not effectiveness or rational calculation.

In the first category, the business enterprise is seen under its institutional aspect (Hodgson, 1988). It is considered as an institution which encompasses the calculation dimension at the origin of the neoclassical and behaviourist rationalist approaches.

The second category is based on the networking dimension of firms which extends the institutionalist vision by locating this 'microstructure' within the more general structure of the networks (Dicken and Thrift, 1992). Such an approach is often referred to as the 'embeddedness of the firm'. From this perspective, businesses are analysed as being integrated into networks of reciprocity, interdependence and power relationships. Thus economic exchange and economic activity, and therefore, in particular, entrepreneurship, are integrated into particular social contexts. They are therefore contingent on such conditions as knowledge, culture, social structure and political institutions. This echoes the theoretical framework of principles of action. Wakkee et al. (ch. 9 in this book) adopt this approach.

As Taylor and Asheim (2001) have remarked, this new approach to business firms is particularly illustrated in studies of 'new industrial spaces', 'industrial districts', 'regional innovation systems', 'innovative environments' and so on.

All these analyses have reinstated space in the economic sciences, with repeated reference to the notion of 'the region'. This notion does not, however, correspond to a subnational division, but to a space organizing a system of businesses which, through its integration into a highly specific social fabric, generates economic growth and innovation. In geography, the term used is 'territory'.

Often in the literature a third approach is to be found, based on the notion of 'learning regions', which underlines the importance of cooperation and collective training to promote innovation and competitiveness, the predominance of the networked agglomeration economy and regional development coalitions. Lundvall (1992) has also emphasized the importance in this context of the horizontal organization of businesses, which is conducive to innovation and competitiveness. Consequently, for example, a highly qualified human capital traditionally inclined to cooperation may be a determining competitive advantage.

In this approach to business enterprises which leaves aside purely rationalist criteria, a fourth current (Maskell et al., 1998) has considered the ability of the firm to take advantage of territorial resources which, by organizing specific skills, guarantee competitiveness and innovation. Of course, the mechanism may work in reverse and the combination of such resources can sometimes generate certain rigidities. Thus in some situations the firm's dependence on this combination of resources may prevent it moving from one place to another.

Two other more marginal approaches have examined, on the one hand, the discursive dimension of the business and, on the other, its time dimension. The former, elaborated by Yeung (2001), is radically opposed to the neoclassical vision and supports the notion that a company is not based on the logic of the maximization of profits, but on a process of the organized repetition of perceptions which creates an organizational culture. The company, from this perspective, is limited to a managerial discourse within a disordered, global and changing environment. The second (Taylor, 1999) sees the company, contrary to its legal definition, as a temporary coalition. The company is consequently reduced to a sort of envelope detached from the entrepreneurial process itself.

Maskell et al. (2003) have also provided their own epistemology of business firms in economic geography and identifies two main approaches: those of the complete and incomplete contracts. Such a distinction is consistent with the division between the rationalist and socio-economic approaches which we have developed above. However, the authors very properly ask the question about which theory it would be appropriate to accept in economic geography. For Maskell et al., the company must be considered according to the theory of the selection of skills, that is, mainly based on the hetero-

geneity of resources available within a given territory. Thus territorial differences may arise which greatly influence the location of businesses and also their freedom of movement, as well as their competitiveness and capacity for innovation. We should mention in particular the different structures of supply and demand, the mixed results of previous investments, institutional density and so on. According to this vision of the business enterprise, capabilities particular to certain geographical areas make the latter more likely to produce specific types of skills. A specific culture becomes established which is based on the repetition of daily tasks and the accumulation of an original cultural and symbolic capital. These specific territorial resources can furthermore influence the quality of the way in which companies function by promoting or hindering the internal flow of information. Geographic proximity may also stimulate inter-firm comparison processes, improve competition and therefore competitiveness and innovation (ibid.).

These two ways of approaching firms as part of a specific territorial context, defining their identity and the conditions of their emergence and creation, raise the question of their actual limits. This involves the connection between territory and the firm. On this point, Dicken and Malmberg (2001) have provided some indicators which should be considered before any deeper research is attempted. Their main criticism, one which we adopt here, concerns the generalized use of the term 'region', which they reject in favour of 'territory', a term more appropriate to the geographical approach.

In fact, as they underline, the territorial nature of the economy is multiform. It can at one and the same time designate a series of strongly interlinked economic activities, the dependence on certain sources of supply for inputs or of reception for outputs, a link with the rest of the world through suppliers and clients, but also dependence or independence with regard to local spheres of power. So, according to these authors, the entrepreneurial ecology of a territory is defined by four dimensions: the business, the territorial system and the territory, all incorporated into the more general dimension of the system of governance which qualifies the regulatory context, that is, the institutions, regulations and agreements. Systems of governance affect both businesses and territories. They take different institutional forms, have specific functions and vary in their geographical range.

Consequently, in such an approach, the business must be seen as an integral part of a much larger industrial system. It is therefore incorporated into a network. The authors also say, in keeping with the line followed by most geographers, that the business is itself a network within the network. Consequently the boundaries between business enterprises and the industrial system seem blurred and are easily crossed. Nevertheless, Dicken and Malmberg clearly state that firms have an identity independent of the

industrial system: this resides in the coordination of the activities which make them work. Therefore, for Dicken and Malmberg, business enterprises cannot be reduced to a hierarchical or horizontal mode of functioning, simply by following the hypothesis of the transformation of the industrial system. They opt for organizational diversity. Their ideas are very quickly qualified, however, by their recognition of the various forms of dependence: that is, the cultural and administrative heritage particular to the firm, its integration into a specific geographical context and the wider dependencies relating to merger–takeover processes.

Accordingly, the business appears as a complex spatial and territorial structure: it is endowed with territorial extension and a well-defined area in which it carries out its operations but also, to complete Dicken and Malmberg's statement of the case, from which it has emerged. Therefore some businesses are by nature 'intensely local', while others are more global. Nevertheless, the territory of a business is characterized by forms of volatility. It cannot be clearly delimited because the territories of several firms interpenetrate in complex ways and therefore become subjects of rivalry. Thus the territoriality of businesses is mainly based on the reciprocal influences of the territory and the business. It is therefore not surprising to see certain types of enterprise appearing in more conducive environments, as, for example, high-technology enterprises which require not only a highly qualified labour force, but also good possibilities for cooperation in order to encourage competitiveness and innovation. The product life-cycle theory is therefore very relevant here. Tacit forms of knowledge are more dependent on particular territorial contexts than codified and more widely disseminated knowledge or know-how. This can give rise to certain governance tensions between strategies developed by companies and policies pursued by other actors.

HYPOTHESES AND METHODOLOGY

Hypotheses

This brief theoretical discussion shows the importance of considering the entrepreneurial phenomenon and business creation not only from the point of view of the individual but also from a geographical perspective. In fact, the creator and the creation situation are not dissociable. In this order of ideas, the contribution of geography to the notion of enterprise is obvious. It allows a two-dimensional definition of it to be established: on the one hand, external, regarding it within a particular context, particularly territorial, and on the other, internal, observing the organizational specificities

proper to the firm. By analogy, to understand the principles of action of entrepreneurs, we may consider this to be made up of an external dimension, the context (territorial if one chooses the geographical view) from which they have come, and an internal dimension, linked to their individuality.

In this chapter we shall concentrate on examining the territorial context of business creation. Starting from the currently available data, we therefore have chosen to explore the relationships, within the Walloon region, between the intensity of entrepreneurial activity as observed, not on the individual level (entrepreneurial propensity), but at the level of geographical entities defined on the basis of administrative divisions (first the municipalities and then the labour market areas made up of aggregates of municipalities), and the cultural characteristics of these entities. Our approach is founded on three central hypotheses:

Hypothesis 1 (H1) Business creation intensity differs geographically, at the level both of municipalities and of the labour market areas of the territory of Wallonia.

Hypothesis 2 (H2) Wallonia is not a homogeneous unit, particularly economically, facility-wise, socio-historically or culturally: there are distinctive local features which are particularly evident at the levels of the municipalities and local labour markets.

Hypothesis 3 (H3) A significant relationship exists between the differences of entrepreneurial intensity and the distinctive features (socio-cultural level, unemployment rate, population density and so on).

With regard to this last-mentioned central hypothesis (H3), it would seem unnecessarily tedious to make a complete inventory of the sub-hypotheses relative to the potential effect of each variable linked to the different components of distinctive local features and contexts.[6] Furthermore, in the absence of a definite consensus in the literature regarding the relationships between these variables and business creation we shall not hazard any forecasts in this respect.

Operationalization and Data

The scale of the spatial analysis

The question of scale must first be considered globally, in so far as the objective is to understand the spatial aspect of entrepreneurs in Wallonia. The results of this study can hardly be transposed to a larger scale or even be applied on the same scale to other regions, since Wallonia has been

shaped by a particular socio-economic history and has been deeply marked, especially in the central areas, by the early appearance of heavy industry. We are not trying to understand the weakness of entrepreneurship in Wallonia, but rather the internal disparities encountered in the region.

Consequently the geography of business creation and its analysis will be presented on two different scales: the scale of the municipality and that of the labour market area. The municipal administrative scale is the most discriminating on which we can work, because it provides a precise picture of the spatial diversity of the processes under discussion, particularly differences of behaviour between the urban centres and the peripheries. However, this kind of breakdown is to a great extent random because the numbers involved are often very low. Therefore the interpretation of the results, at such a detailed level, proves to be a very delicate matter, all the more so as municipalities which are structurally and geographically close may behave differently. This is why we shall use the local labour market scale concomitantly:[7] it is certainly less sensitive, but not arbitrary, unlike, for example, broad administrative districts. Labour market areas are defined on the basis of travel-to-work criteria, an essential geographical link which explains the spread of social, economic or political realities from the centre of employment over the area of influence.

For a geographical analysis it would appear essential, therefore, to give a prominent place to this kind of epistemology, because modifications of scale have a huge influence on the results of statistical analyses. In a breakdown by labour market area, for example, the fact of separating or amalgamating zones of influence and employment centres can profoundly change the statistical results and therefore necessarily the way in which the different problems will be approached. Thus if one chooses to isolate employment centres, one will essentially be investigating the difference between the often more dynamic peripheries and the centres. Conversely, if everything is brought together to form a single unit, that of the labour market area, both centre and periphery, the resulting map will underline the socio-economic differences between local labour markets.

Measuring business creation

It is difficult to provide a complete definition of the concept of entrepreneurship, so rather than lose ourselves in vain theoretical considerations, we have chosen a pragmatic approach and have decided to concentrate exclusively on business start-ups. We are aware that this approach is reductionist, but it has the merit of being operational. In this chapter we shall therefore examine the concept of company creation and this will be done in a precise manner: entrepreneurial intensity will be described on the basis

of business start-ups taking place in Wallonia between 1 June 1998 and 31 May 2000. With regard to the creators of these businesses, we shall consider only those with no previous entrepreneurial experience (novices).

In this regard we should indicate that identifying entrepreneurs and their position as novices is a quite difficult task in the Walloon context. In Wallonia, the current administrative and statistical systems most frequently use as observation units either companies considered as legal entities or employers. There is no directory of business creators, even less so of 'new' entrepreneurs or creators. Identifying these is therefore problematic and alternative ways have to be found.

We had to proceed in two stages. First, we used data concerning firms to isolate those set up between 1 June 1998 and 31 May 2000. Then we contacted all of these 12,748 firms in order to identify who had set them up and find out whether they had had any previous entrepreneurial experience. This identification survey was carried out in October and November 2001. As a result of the data collected, 3257 novices were identified and located.

In statistical indicator terms, entrepreneurial intensity will be calculated for each municipality by giving the number of novice entrepreneurs identified in its active population.[8] An entrepreneurial intensity indicator will therefore be obtained, which we shall call a 'municipality entrepreneurial quotient'. In the same way, an indicator can be obtained for each labour market area by giving the number of novice entrepreneurs identified in its active population.

Measuring the characteristics of the situation at the municipal level

We must forewarn the reader concerning local specificities. The currently available data do not provide a complete or accurate picture of the situation in Wallonia, and it is not easy to examine the different dimensions of the situation (institutions, facilities and infrastructure, culture).

From an institutional viewpoint, it should first be emphasized that the geographical entities on which we base our analyses, that is, the municipalities, are subsumed into a relatively homogeneous global context which leaves little space for subregional specificities. In fact, legal and administrative frameworks are mostly defined at the regional or federal level. Furthermore, public policies to promote entrepreneurial activity, as things stand, are hardly differentiated geographically and the characteristics of industrial relations and the social climate at the municipal level are not currently measured.[9] Company tax is mostly calculated according to a system defined by the federal authorities. However, the municipal authorities have the power to decide local taxes, which can lead to differences in tax regimes. Unfortunately quantitative data concerning municipal tax policy is complex and at present we do not have an exhaustive survey for the 262

municipalities. It is therefore so far not possible to examine the institutional component of the situation.

With regard to the Walloon cultural context, particularly with reference to systems of values and perceptions regarding entrepreneurial activity and business creation, we have only a very limited number of variables to provide a broad outline of cultural characteristics in the municipalities. We are restricted by the data provided by different administrative sources and can only approach the characteristics of local *subcultures* on the basis of these. We have therefore examined the following structural variables: income level, voting at elections (electoral behaviour), educational level, age and sex structure of the population, marital status, sectoral job structure, company size, job status and activity rates. We can only regret the absence of municipal data regarding attitudes towards and perceptions of entrepreneurial activity and business creation. Nevertheless, the available variables should permit us to identify the characteristics of municipalities with regard to the cultural context.

The economic context presents fewer difficulties for an analysis at the municipal level. Several indicators are in fact measured by the municipal administrations. Nevertheless, phenomena linked to location and urbanization economies are not subject to systematic and exhaustive quantitative measurements. Furthermore, while regional accounting is effective, it does not make it possible to calculate the gross domestic product or economic growth for the municipalities. The absence of municipal data is also true with regard to the effective development of local markets. However, the revenue level observed in the municipalities provides an indirect indicator, if an ambiguous one. As a factor in explaining entrepreneurial dynamism, it may be interpreted in terms of the standard of living but it can also involve financial elements (liquidities available) and even sociological ones (socio-economic level).

Table 6.1 summarizes all the indicators examined. Each indicator is the result of an official, exhaustive collection of administrative data. The table also presents the links between situation and indicators.

Data Processing

We proceed in four stages. First, based on cartographic work, we limit ourselves to a description of the spatial heterogeneity of the entrepreneurial phenomenon as ascertained by measuring the quotients of novices. Second, we analyse local contexts. To do this we examine the quotients of novices and the various contextual variables. The statistical treatment chosen is Pearson's ratio. This method may appear very simple, even simplistic. Our justification for its use is that the calculation of correlation

Table 6.1 Spatializable indicators of the situation of action

Situation	Spatializable indicators (at municipal and employment market levels)	Databases and sources used
Economic context	Proportion of all sections and under sections of the NACE classification in the added values	Own calculation based on regional accounts of 1997, one hand (source = National Bank of Belgium). The provincial data have been broken down on the basis of the salaried employment (on ONSS database[1])
	Proportion of persons working in establishments of <50 employees	Own calculation (on ONSS database)
	Proportion of persons working in establishments of >50 and <500 employees	Own calculation (on ONSS database)
	Proportion of persons working in establishments of >500 employees	Own calculation (on ONSS database)
	Unemployment rate in 1999: proportion of job seekers in the total active population	Carrefour database 1999
	Employment growth rate for 1992–98	Own calculation (Carrefour 1999 and ONSS 2001)
	Activity rate in 1999: proportion of persons on the employment market in the total population	Own calculation (Carrefour 1999 and ONSS 2001)
	Technological intensity of the industrial fabric: proportion of persons working in different levels of technological intensity according to the OECD classification	Own calculation (based on ONSS database 2001 and the OECD classification technological intensity)
	Average income per inhabitant	Ins[2] 2000 (incomes 1999)
Cultural context	Proportion of persons with different levels of diploma in the active population	Census of population of 1991(National Institute of Statistics of Belgium)
	Professional status: proportion of workers, employees, independents in the total employment	ONSS 2001(professional and manual 1–3 digits) and Carrefour 1999
	Nationality: proportion of foreigners in the population, of outside EU foreigners, of law status foreigners (Maghreb, Spain, Italy, and Turkey) and of high status foreigners (North American, Japanese . . .)	National Institute of Statistics of Belgium (1999)

Table 6.1 (continued)

Situation	Spatializable indicators (at municipal and employment market levels)	Databases and sources used
	Ages in five-year age classes	National Institute of Statistics of Belgium (1999)
	Marital status in proportion to the total population	National Institute of Statistics of Belgium (1999)
	Sex in proportion to the total population	National Institute of Statistics of Belgium (1999)
	Relative electoral weight of parties and the level of abstention in the elections	Own database (IGEAT) of electoral results of 1999 national elections
Facilities and infra-structures	Penetration of new information and communication technologies (proportion of households with mobile phones, pc, internet)*	National Institute of Statistics of Belgium (2001)
	Aesthetic quality of the environment (based on enquiries concerning the perception of the near environment)	National Institute of Statistics of Belgium (2001)
	Quality of administrative services (based on enquiries)	National Institute of Statistics of Belgium (2001)
	Residential and industrial building permits in proportion to the municipal area	National Institute of Statistics of Belgium (2001)

Note: * These data have not been used at the employment market level.

Sources:
1. National Social Security Office. 2. National Statistics Institute.

coefficients makes it possible to measure the similiarity in spatial distribution between business-creation and socio-economic variables.[10] The results must therefore be interpreted with great caution because the similarity between the distributions of two indicators does not in any way indicate a causal relationship. This is why our correlation analysis will be clarified by an interpretative reading of the Walloon area intended to define the territorial context of business creation, not just through statistical variables, but also through a more comprehensive analysis aimed at identifying the various effects on business enterprise of the historical construction of Wallonia, which is not quantifiable. The third stage involves an effort to combine the explanatory factors using a principal components analysis (PCA). This type of analysis has the advantage of reducing the various explanatory dimensions of novice entrepreneurship

to a few main lines which preserve the essential information, thus avoiding superfluous analyses of correlations between explanatory variables. Correlations are then calculated between the quotients of novices and new lines resulting from the PCA. This analysis has only been carried out on socio-cultural variables (diplomas, incomes, professions, employment status, electoral behaviour, marital status and structure by age). In the fourth stage, we discuss the different statistical results in the light of our three hypotheses.

SPATIAL DISPARITIES OF NOVICE ENTREPRENEURSHIP: EMPIRICAL EVIDENCE

Geographical Characteristics and Intensity of First-time Entrepreneurship

At the municipal level the first feature one notes is the marked sub-regional consistencies in Wallonia, showing a general contrast between a dynamic Walloon Brabant and the southeastern region with a much less dynamic central belt. In this belt there are significant differences at the municipal level, particularly in the main urban areas (Mons, Charleroi, Namur and Liège; Figure 6.1). We would particularly emphasize the very low levels of business creation in the municipalities of Charleroi and the Centre, while their southern and northern peripheries enjoy higher levels; the low levels in the working-class municipalities of Liège and the greater dynamism in the areas northwest and south of the town; the higher performance levels in Mons than in the Borinage. Contrasts between centres and peripheries are therefore not unequivocal: everything depends on the type of suburb (working-class or middle-class residential). It should also be pointed out that business creation in urban centres is overestimated, in so far as the survival rate is generally lower. Finally, the dynamism of some of the border areas in Wallonia should be noted, in contrast to the central area: in particular, Walloon Brabant, which adjoins the region of Brussels-Capital, and the southeast on the border with Luxembourg.

The map of novice entrepreneurs by labour market area shows three remarkable facts (Figure 6.2). First, the low novice rate in the Meuse and Sambre valleys, which include the greater part of the region's urban structure. Second, a more significant dynamism to the south of this belt (Ardennes) and particularly in the Bastogne labour market area, tempered however by the relatively low volumes of novices shown by the map at the municipal scale. Third, marked dynamism in Walloon Brabant, to the north of the belt, reinforced by a clearly higher volume of novices than in the

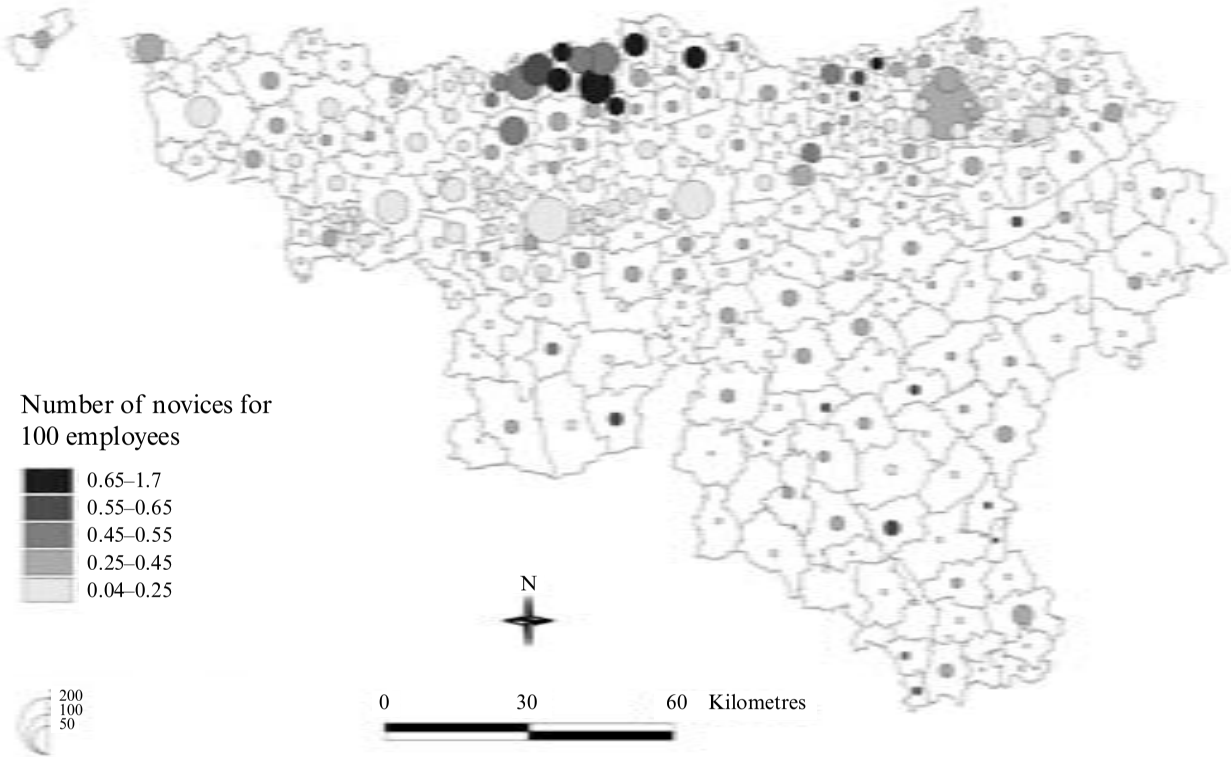


Figure 6.1 Quotients of novices by municipalities

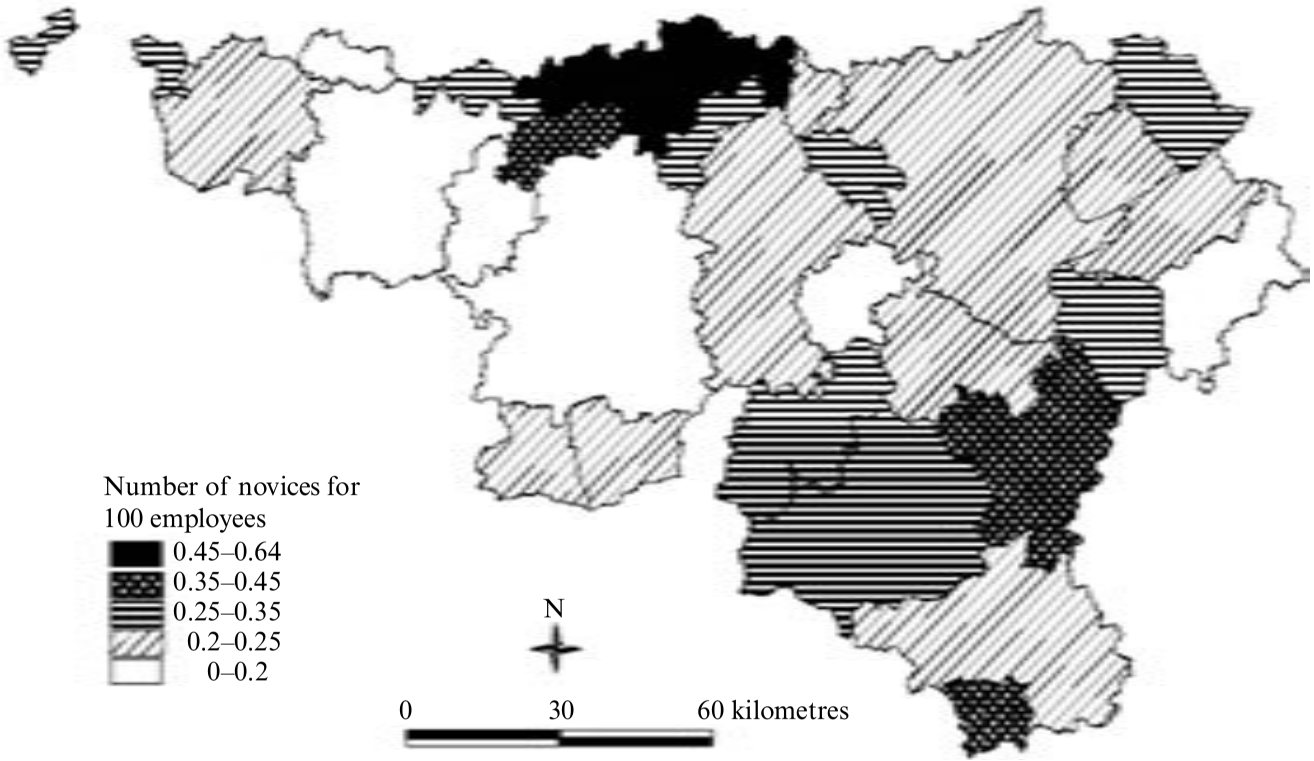


Figure 6.2 Quotients of novices by employment in local labour market

south. It should also be noted that the Virton basin and the German-speaking region have low quotients. Furthermore, the eastern part of the Walloon industrial belt, in particular the Liège basin, has higher novice entrepreneur rates than the western part, particularly Charleroi, the Centre and the Mons-Borinage.

The Components of the Novice Entrepreneurial Context

Spatial correlations between the quotient of novices and socio-economic indicators

With respect to the context of business creation, our theoretical basis of reference proposes four dimensions for geographic observation. What is the extent and kind of influence of these variables relative to these dimensions in Wallonia? Table 6.2 shows the correlation coefficients between the quotient of novices and the different elements of the context. Rather than presenting the results by dimension, we prefer to give them by decreasing order of intensity, going from the highest positive relationships down to the most strongly marked negative ones, so making the relative importance of the variables under consideration clearer.

Towards an Integrated Reading of the Context of Novice Entrepreneurship

In order to get a more integrated view of the socio-cultural impact of the geographical context on novice entrepreneurship, we develop a PCA at both municipal and labour market levels.

At the municipal level

The first component accounts for 34 per cent of the information and the second one for 17 per cent (Table 6.3). The next components account for respectively 10, 9.6 and 5.6 per cent of the total variance. Table 6.3 also gives the correlation between these synthetic components and the quotient of novices.

At the labour market level

We work in the same way at the labour market level. Here, the first component accounts for 40 per cent of the total information, while the next components account for respectively 17, 12, 9 and 7 per cent (Table 6.4). Table 6.4 also gives the correlation between these synthetic components and the quotient of novices.

Table 6.2 Correlation between quotients of novices and context variables at the scale of the municipality and local labour markets (simple correlation coefficient of Pearson)[1]

	By municipality	By labour market
Proportion of four-year technical diploma-holders in the active population	0.562*	0.750*
Proportion of secondary-school graduates or higher	0.532*	0.676*
Proportion of three-year technical diploma-holders	0.508*	0.694*
Proportion of the self-employed	0.495*	0.689*
Average incomes by household 1997	0.493*	0.641*
Population changes 1998–2000	0.422*	0.653*
Proportion voting liberal-conservative (centre right)	0.402*	0.689*
Taxes/inhabitant 1999	0.401*	0.518*
Proportion of households with five or more people	0.363*	0.626*
Income/inhabitant 1999	0.344*	0.485*
Rate of employed workers	0.309*	0.407
Proportion of jobs in trade	0.249*	0.348
Proportion of Belgians in the population	0.245*	0.303
Proportion of jobs in hotels, catering and bars	0.220*	0.542*
Proportion of jobs in small businesses (<50)	0.199*	0.304
Proportion voting Christian social-democrat	0.184*	0.249
Proportion of jobs in high technology	0.177*	0.329
Proportion of jobs in agriculture	0.162	0.287
Rate of overall activity	0.139	0.105
Proportion of professional workers	0.136	0.370
Proportion voting for environmental parties	0.126	0.391
Proportion of jobs in education	0.076	0.201
Proportion of women aged 25–44	0.074	−0.040
Proportion of jobs in personal and collective services	0.068	0.061
Proportion of married men	0.056	0.040
Proportion of men aged 25–44	0.056	−0.061
Proportion of married women	0.048	0.015
Proportion of non-EU foreigners	0.037	0.132
Proportion of jobs in industrial services	0.029	0.310
Proportion of households of 2–4 persons	0.021	−0.042
Proportion of jobs in building	0.014	−0.187
Proportion of men aged 45–64	0.009	0.024
Proportion of jobs in medium-level technology	−0.010	0.044

Table 6.2 (continued)

	By municipality	By labour market
Proportion of women aged 45–64	−0.037	0.000
Proportion of jobs in financial activities	−0.042	−0.235
Proportion of jobs in the public services	−0.049	−0.150
Proportion of jobs in health	−0.081	−0.243
Proportion of single men	−0.091	−0.219
Proportion of jobs in transport and communications	−0.097	−0.090
Proportion of jobs in large businesses (<500)	−0.105	−0.185
Proportion of jobs in manufacturing industry	−0.133	−0.116
Proportion of manual workers	−0.136	−0.370
Proportion of employment in medium-sized businesses (51–499)	−0.150	−0.110
Population density	−0.172	−0.114
Proportion of single women	−0.173	−0.365
Proportion of divorced women	−0.175*	−0.246
Proportion of men over 65	−0.249*	−0.456*
Proportion of divorced men	−0.263*	−0.446
Proportion of women over 65	−0.362*	−0.726*
Proportion voting socialist	−0.440*	−0.662*
Unemployment rate	−0.457*	−0.664*
Proportion of salaried employment	−0.464*	0.034
Proportion of blank and spoiled ballot papers	−0.482*	−0.705*
Proportion of population without diploma or primary certificate	−0.493*	−0.662*
Proportion of lower-secondary graduates or lower	−0.532*	−0.676*

Notes: 1 The variables are weighted by local labour markets populations.
* Significant value <0.05.

DISCUSSION

Interpretation of the Statistical Results

The various correlations observed mainly show us nothing more than a spatial coincidence between the quotient of novices and the level of incomes and diplomas. These correlations do not mean that rich graduates are those who create business enterprises. As the measurements did not involve individual data, but geographical entities, the most that they show

Table 6.3 Information given by the different components of the PCA and the correlation between these components and the quotient of novices at the municipal level

	Proportion of information given by the different components of the PCA	Correlation with the quotients of novices
PC1	34.3	0.567*
PC2	17.2	−0.219*
PC3	10.0	−0.133
PC4	9.6	−0.203*
PC5	5.6	−0.060

Note: * Significant value <0.01.

Table 6.4 Information provided by the different components of the PCA and the correlation between these components and the quotient of novices, at the local labour market level

	Proportion of information (%)	Correlation with the quotients of novices
PC1	40.14	0.706*
PC2	17.36	0.400*
PC3	11.56	−0.301*
PC4	9.43	−0.109
PC5	6.90	−0.076

Note: * Significant value <0.01.

is that the rate of entrepreneurship is highest in municipalities and local labour markets where the population is the most qualified and incomes are highest. They confirm that municipalities with a poorly qualified population and low incomes are not favourable for business enterprise.

The first component of the PCA at municipal level can readily be interpreted as a variable at the municipality's socio-cultural level, contrasting municipalities having a large percentage of high-level professions, advanced diplomas and high incomes, on the one hand, with those having a high percentage of lower diplomas and low-level occupations on the other (Figure 6.3). This first component is by far the most strongly correlated with the quotients of novices, which confirms the determining influence of the socio-cultural and socio-economic level of the municipalities in explaining the spatial differences of business creation (Table 6.3). But it

Figure 6.3 The first two principal components of a PCA, constructed from socio-cultural variables within Wallonia, by municipality

shows that, geographically, it is difficult to separate the different dimensions of the social level, as the educational capital, as measured by the diploma, and economic capital, as measured by incomes and professions, are closely correlated. The first component of the PCA at labour market level (40 per cent of information) can also be interpreted as a socio-economic and cultural variable of the areas (standing) (Figure 6.4), and has by far the best correlation with the quotient of novices (Table 6.4).

Therefore the emergence of entrepreneurship in Wallonia would seem to be strongly related to the socio-economic level of the various areas and principally to its socio-cultural component, of which diplomas are only a partial indicator.

The social structure of employment (proportion of manual or professional jobs, proportion of wage and salary earners and the self-employed, activity and unemployment rates) is intermediately correlated with business creation. The partial relationship with the geographical distribution of diplomas and incomes (manual workers are less qualified than white-collar workers, as are the unemployed; the proportion of the self-employed is, other things being equal, higher in high-income areas and so on) only partially explains these significant correlations. But these variables also show other dimensions of the social realities in the areas concerned which may contribute to explaining why certain contexts are favourable to business enterprise. Thus, the proportion of the self-employed can mean that some

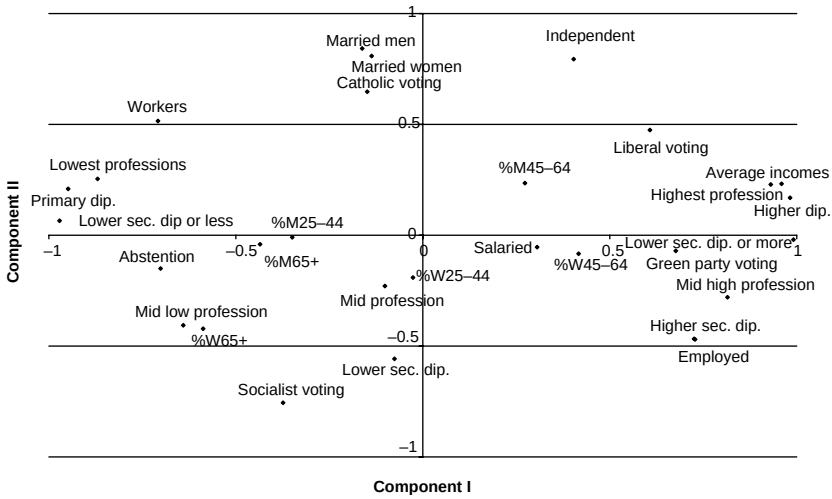


Figure 6.4 The first two components of a PCA constructed from socio-cultural variables in Wallonia, by municipality; a weighted analysis of the active population in the municipalities

regions with a poorly qualified population are still 'creative', probably because they are more favourable to entrepreneurial values. On the other hand, the presence of a high proportion of manual workers in an industrial crisis situation can nowadays lead to high unemployment and high cultural barriers to the idea of entrepreneurship.

The second component of the PCA at the municipal level contrasts status variables: employees and salaried workers on one hand, and workers and the self-employed on the other. However, it should be emphasized that these variables are both partially reflected in the first component. This second component has a significant negative correlation with the quotient of novices, but at a much lower level than the first. It is also negatively correlated with the proportion of married people and the Christian social-democrat vote, that is, with a form of conservatism). The fact that the self-employed, of whom a certain number are farmers, and the proportion of married people are relatively close together in this graph suggests that the rural and urban contexts contrast with each other, at least with regard to the main towns of Wallonia and their peripheries. The second component of the PCA at the labour market level can be interpreted the same way: spatially it contrasts the labour market areas of the large cities, which are less traditional and have a lower proportion of self-employed, with those of the more rural areas, which are more traditional with a larger proportion of

self-employed people. This component is positively[11] correlated with the quotient of novices: that is, rural environments which have a lower population density and are more traditional, are, all other things being equal, more favourable to business creation.

Furthermore, the results show that age and matrimonial status are not very relevant to the understanding of the phenomenon studied in a particular geographic space. Such variables are uniform throughout the Walloon region and are therefore not very discriminatory. In addition, they are only weakly linked with other socio-economic realities, such as diplomas and incomes, which, as we have already seen, are clearly more relevant to identifying the spatial location of business creators. Population density also presents a non-significant correlation with the quotient of novices, dynamism being found as much in areas of very low population as in high-density areas, such as the suburbs of large cities. On the other hand, population growth provides a good positive correlation, which can be interpreted as dynamism induced by the increase of a potential market but also by sociological dynamics, in that certain suburbs contain a growing and socially favoured population. The third axis of the PCA at the municipal level, which compares active members of the workforce aged 25 to 44 with older members and the retired, does not have a positive correlation with novice entrepreneurship. Business creation would seem to be independent of the age structure of the population. The third component of the PCA at labour market level shows the same opposition between young members of the labour force, essentially male, with retired people and older members of the labour force. However, unlike what we observed at municipal level, the correlation with the quotient of novices is weak but still exists, since the presence of older people (active or retired) seemed to be a negative factor. However, the interpretation must take account of the fact that the populations in the industrial belt are on average older, while in Walloon Brabant young active members of the population are more numerous, suggesting that this demographic difference, which is not at all spectacular, is partially linked to the socio-economic differences which are determining factors in explaining differences in business creation.

It might appear surprising that the sectoral job structure hardly appears among the explanatory variables – in particular the proportion of industrial jobs, early industrialization having left such a mark on Wallonia. Although industrialization in the Walloon area has been decisive in determining its differentiated historical development, it no longer constitutes such a discriminating factor. This can be explained by two developments: the previously industrialized zones of the belt have been dramatically de-industrialized since the 1960s (closure of the collieries, fall in employment

in the steel industry and so on) while other subregions have seen much more favourable industrial activity, particularly Walloon Brabant.

Finally, electoral behaviour is fairly well correlated with enterprise, particularly showing a positive correlation for centre-right voters in 2000 and a negative one for socialist voters. However, here again caution is necessary in the interpretation of these results: such correlations cannot be interpreted as being determined by the influence of local political groupings favourable or less so to business enterprise. It should first be pointed out that the vote reflects the socio-economic profile of the population: so, for example, the correlation between a centre-right vote and enterprise is above all linked to the high qualifications and incomes of the population. So, taken as such, the variable is not of any particular interest. However, the electoral variable appears meaningful if it is considered as reflecting the long arm of history. Voting behaviour therefore indicates the inertia of a population and the heritage of former social groupings still reproduced in voting behaviour. For example, the socialist domination in the Walloon industrial belt reflects its past industrialization rather than the actual weight of the manual working class which has been drastically reduced in numbers.

In the light of these results, it appears that the socio-economic status of the municipality is the most decisive factor in understanding the spatial diversity of business creation. It is not sufficient in itself, however: a finer understanding must integrate the cultural differences associated with status. This particularly applies to the contrast between areas characterized by a tradition of manual and salaried work, and those characterized by the self-employed, and also the differences between large cities and rural environments.

To summarize the statistical results, we can go back to our three hypotheses.

> *H1* Business creation intensity differs geographically, at the level both of municipalities and of the labour market areas of the territory of Wallonia.

This first hypothesis is confirmed. Municipalities and labour market areas present a wide range of situations in terms of business creation intensity. We show the marked subregional consistencies in Wallonia and a general contrast between a dynamic Walloon Brabant and southeast region with a much less dynamic central belt. In this belt there are significant differences at the municipal level, particularly in the main urban areas. Within these urban areas, contrasts between centres and peripheries are identified. The dynamism of some of the border areas in Wallonia is noted, in contrast to the central area.

The analysis of the labour market area shows three remarkable facts: first, the low novice rate in the Meuse and Sambre valleys, which include the greater part of the region's urban structure; second, a more significant dynamism to the south of this belt, tempered however by the relatively low volumes of novices shown by the map at the municipal scale; and third, marked dynamism in Walloon Brabant, to the north of the belt, reinforced by a clearly higher volume of novices than in the south.

H2 Wallonia is not a homogeneous unit, particularly economically, facility-wise, socio-historically or culturally: there are distinctive local features which are particularly evident at the levels of the municipalities and local labour markets.

We use a set of different variables to characterize the municipalities and the local labour markets in terms of employment, demography, policy and environment. We do not present the details of this description but the analysis confirms the second hypothesis.

H3 A significant relationship exists between the differences of entrepreneurial intensity and the distinctive features.

The results confirm our third hypothesis. The first-time establishment of a business is strongly influenced by the socio-cultural and economic dimensions of the geographical context: the socio-economic level (particularly diplomas) of the areas is a determining factor in explaining the spatial diversity of novice entrepreneurship in Wallonia. The proportion of the self-employed also appears to be an explanatory dimension, and one relatively independent of the first. On the other hand, high unemployment rates, which also bear witness to an industrial past, are a significant contextual obstacle to business creation.

Outline of the Explanatory Model of the Geographic Distribution of Entrepreneurship

From these results it can be gathered that Walloon Brabant is the most dynamic area in Wallonia. Such a fact may be seen as being closely connected to the well-to-do situation of the outskirts of Brussels, and this for two main reasons: first, Walloon Brabant is the preferred out-of-town destination for the rich upper and middle classes of Brussels – the social level is therefore the highest in Wallonia; and second, it is the part of the region which has benefited the most from the structural changes in the economy, described as 'metropolitanization', which have taken place in the last few

decades. It is an illustration of the clustering of economic activities in large towns, which can supply a series of services outsourced by industry. The phenomenon is generally seen as the result of the so-called 'post-Fordian' shift from a vertical to a horizontal organization of the economy. Despite the idea of a return to the urban centres to benefit from the advantages of clustering, it is essentially the peripheries of the large cities which benefit, certainly so in the context of Brussels (Lennert and Van Criekingen, 2003). The peri-urban environment makes the high business density possible, which in turn is conducive to the organization of networks, without the inconveniences of city-centre congestion. Such a context therefore creates numerous opportunities for business creation, particularly in business services. Therefore one can reasonably assume that Walloon Brabant possesses the combination of resources favourable to the creation of business in a flexible specialized economy, because it contains an economically and educationally privileged population, and has the benefits of geographical proximity to a large urban centre guaranteeing access to the various networks of a globalized economy. This is consistent with the theoretical hypotheses developed earlier.

The large towns in the region and their labour market areas, located in the Meuse and Sambre valleys, together with the area of Verviers, cannot be interpreted in the same way as Walloon Brabant. Their economic mass is not significant enough to be explained by the 'metropolitanization' principle. Furthermore, their industrial past, the effects of which are still noticeable, strengthens the hypothesis. The socio-economic structure of the industrial zone of the region, comprising the large cities in the Sambre and Meuse valleys and the Verviers labour market areas, is still affected by the decline of massive industrialization structures specialized in heavy industry. The population is not very skilled and incomes are low, while unemployment remains very high. It is not surprising then that these areas stagnate at a level below the average for the region, with the exception of the slightly more dynamic Liège labour market areas, even if one eliminates the effect of medium- to low-skill levels.

This context is reinforced by very particular social structures which are linked to its manual-worker past. The generalization of working-class conditions in this area answering to spheres of control centred in Brussels has not allowed the establishment of structures favourable to enterprise, because the level of skills, like that of incomes, has remained low. Therefore these areas, greatly influenced by an economic context of industrial crisis and the structural weakness of the service sector, aggravated by working-class traditions, produce a context which is not very conducive to entrepreneurial dynamism. However, this interpretation needs to be qualified because of a double difference between the east of the industrial zone, that is, Liège and

its labour market areas, and the west, that is, industrial Hainaut. The Liège region can be described as socially better off, particularly because it has a university. Therefore industrialization has taken place on the foundations of a relatively significant old urban centre with a less monolithic social structure. Accordingly, even if the effect of diplomas and revenues is eliminated, the Liège basin is more conducive to business creation.

Situated between the Charleroi and Liège labour market areas, the Namur area has been little affected by an industrial past, but its performance is as mediocre as that of Charleroi, at least when account is taken of the fact that the population is generally better qualified. This may be the result of a significant effect of non-commercial activities on the structure of the region.

Within Hainaut, Western Hainaut, particularly the Mouscron area, is clearly more dynamic in spite of a population with fewer diplomas. Outside the industrial belt, this zone has a more 'flexible' economic and social structure which makes it similar to that of the Courtrai region.

The rural areas to the south of the labour market areas of the industrial belt are much more dynamic, although average incomes and qualifications are often lower than in the industrial belt. These rural areas organized around small local towns have not been influenced by the large industrialized Walloon cities. Their social and economic structure has not been marked by the early proletarianization of the population. Consequently small economic structures and the self-employed have retained significant importance (even outside agriculture). The Virton and Arlon basins in the extreme south also have relatively high entrepreneurial indices, but rather lower than the Ardennes, despite a better-off population. It is true that the Virton basin remains marked by its steel-making past.

CONCLUSION

With Wallonia as a concrete example, we have attempted to illustrate a possible geographical and empirical approach to business creation. This attempt is based on activating an original theoretical framework. It is centred on the concept of principles of action and provides a work platform for researchers from different disciplines. The presentation of this structure showed the relevance of a geographical approach to business creation, and persuaded us to review the geographical literature on the subject. We were able to identify the difficulties related to the geographical conceptualization of enterprise, its creation and the person of the entrepreneur. We came to the conclusion that the geographical approach to business was based mainly on the study of the relationship between the business enterprise and the

territory – that is, the way in which the micro-network of the enterprise is connected to the greater networks which constitute the territory.

Because of the difficulties linked to the operationalization of theoretical references in geography, that is, their formulation as different indicators, we organized our analysis grid on the basis of the principles of action concept, thus making it possible to give a definite shape to an idea that geography so far has not really been able to describe. We were obliged, that is, to do something that is now common in geography, to import concepts from other branches of the human sciences. We accordingly selected a series of indicators suitable to characterize the context of business creation and the emergence of entrepreneurs.

These indicators were analysed in order to test three hypotheses. Business creation intensity differs geographically, at the level both based of municipalities and of the labour market areas of the territory of Wallonia (H1). Wallonia is not a homogeneous unit, particularly economically, facility-wise, socio-historically or culturally: there are distinctive local features which are particularly evident at the levels of the municipalities and local labour markets (H2). A significant relationship exists between the differences of entrepreneurial intensity and the distinctive features (H3). The analysis confirmed all of these hypotheses.

Furthermore, we would emphasize that certain territorial configurations are particularly favourable or unfavourable to entrepreneurship. For instance, the Walloon Brabant area on the periphery of Brussels is the most dynamic area, together with the Bastogne region and the northwest of Liège. All three are outside the depressed urban heart of the region, the Sambre and Meuse valleys.

This is one of the most important findings of our analysis, especially for the practitioner. Policies aiming at developing novice entrepreneurship in Wallonia will have to take the territorial diversity into account if success is targeted. These are also significant data for everyone interested in starting up a new firm in Wallonia as the local identities, attitudes and networks could have an impact on the development of the project. We do not have enough information to picture the situation for particular activity sectors, such as high-tech. Nevertheless, it can be presumed that starting up a high-tech firm will be easier in the areas which are characterized by a high level of human capital, as the recruitment of specialized and highly skilled workers would be easier. In this perspective, the proximity of universities and research units could be a positive factor. This is the case in the Walloon Brabant area and in Liège.

It is interesting to note that the explanatory factors arising from the contextual analysis are also those which arise from an analysis based on an individual survey (Calay et al., 2005). Could this mean that the geographical

diversity of first-time business creation is only the reflection of the social and economic diversity of the Walloon area, and that the contextual analysis is only a substitute for an analysis carried out on an individual basis? Two elements run counter to such a conclusion. On the one hand, it would seem that the hierarchy of explanatory factors is not the same for the individual analysis, which gives the same weight to the proportion of the self-employed and third-level graduates, whereas the contextual analysis shows the preponderance of the second factor which is spatially clearly more discriminatory. On the other hand, it would seem that for equivalent diplomas the proportion of entrepreneurs is always higher in dynamic regions like Walloon Brabant than in depressed ones like Hainaut, particularly for low diploma levels. This would lead one to believe that contexts unfavourable for business creation have a greater negative effect on social categories less inclined to business creation.

The conclusions of such an analysis are obviously provisional. A more detailed study focused on the characterization of sectors where first-time business creation takes place is necessary to fine-tune the interpretation of the results. Mostly, the comparison of the contextual approach presented in this chapter and the individual approaches based on enquiries should be developed in order to distinguish what could be explained by social characteristics of individuals and what could be associated to 'pure' territorial effects, related for example to close relationships. These are the essential questions that our subsequent research will attempt to clarify.

NOTES

1. IWEPS (Institut wallon de l'évaluation, de la prospective et de la statistique) is a public interest organization serving the Walloon government. Its general purpose is to help political decision making (transversal research, strategic consultancy and advice and so on).
2. For more details on the theory involved, see Guyot (2004).
3. The importance of political factors is particularly dealt with by Carroll (1988), Carroll and Hannan (1989), Kessides (1990) and Baldwin (1995).
4. For a review of economic literature on this point, see Capron et al. (2005).
5. Surlemont (2000: 117) defines a cluster as 'a dynamic set of economic agents located in the same region, active in complementary or similar professions, technologies, sectors or markets which join together to form a critical mass which is a source of competitiveness in important constituent parts of their activities'.
6. We shall discuss the question of identifying and choosing these variables at a later point.
7. As defined by De Wasseige et al. (2001).
8. The active population is the population in 1999 calculated on the basis of the Carrefour information bank by totalling all employed members of the labour force (basically salaried workers and the self-employed) and job seekers. This does not include the following categories: those on early retirement, job seekers dispensed from registration or whose registration has been suspended, or people on full-time career breaks.
9. For example, we do not have available an indicator based on the number of strike days per year in businesses, according to the municipality.

10. The correlation coefficients are calculated at the level of the municipalities and local labour markets.
11. The inversion of the correlation between the municipal and the labour market PCA can be explained by the fact that this second component is positively correlated with the share of self-employed in the labour market analysis and negatively correlated in the municipal analysis.

REFERENCES

Acs, Z. and D. Audretsch (1989), 'Small-firm entry in US manufacturing', *Economica*, **56** (222), 255–65.
Amblard, H., Ph. Bernoux, G. Herreros and Y.F. Livian (1996), *Les nouvelle approches sociologiques des organisations*, Paris: Seuil.
Ansoff, H.I. (1965), *Corporate Strategy*, New York: McGraw-Hill.
Antoine, J. (1996), *Valeurs de société et stratégies des enterprises*, Paris: PUF.
Armington, C. and Z. Acs (2002), 'The determinants of regional variation in new firm formation', *Regional Studies*, **36** (1), 33–45.
Audretsch, D. and M. Fritsch (1994), 'The geography of firm births in Germany', *Regional Studies*, **28** (4), 359–65.
Audretsch, D. and M. Vivarelli (1996), 'Determinants of new-firm startups in Italy', *Empirica*, **23** (1), 91–105.
Baldwin, J.R. (1995), *The Dynamics of Industrial Competition: A North American Perspective*, Cambridge: Cambridge University Press.
Bartik, T.J. (1989), 'Small business start-ups in the United States: estimates of the effects of characteristics of states', *Southern Economic Journal*, **55**, 1004–18.
Baum, J.A.C., T. Calabrese and B.S. Silverman (2000), 'Don't go it alone: alliance network composition and startups' performance in Canadian biotechnology', *Strategic Management Journal*, **21**, Special Issue, 267–94.
Baumol, W.J., J.C. Panzar and R.D. Willig (1982), *Contestable Markets and the Theory of Industry Structure*, New York: Harcourt Brace Jovanovitch.
Boadway, R., N. Marceau, M. Marchand and M. Vigneault (1998), 'Entrepreneurship, asymmetric information, and unemployment', Centre de recherche sur l'emploi et les fluctuations économiques, *Cahier de recherche*, no. 57, Université du Québec à Montréal.
Brown, T. and J.M. Ulijn (eds) (2004), *Entrepreneurship, Innovation and Culture: The Interaction between Technology, Progress and Economic Growth*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Burke, A. (1997), 'Small firm start-up by composers in the recording industry', *Small Business Economics*, **9**, 463–71.
Calay, V., H. Capron, M. Cincera, P. Desmarez, N. De Waeghe, L. Greunz, J.L. Guyot, J. Houard, O. Lohest, C. Vandermotten, J. Vandewattyne and G. Van Hamme (2005), 'Les nouveaux créateurs d'entreprise en Région wallonne et les conditions de leur réussite', mimeo, Dulbea-ULB, Institut wallon de l'évaluation, de la prospective et de la statistique, Bruxelles-Jambes.
Capron, H., N. De Waeghe, L. Greunz and O. Lohest (2005), 'Revue de la littérature économique', in Calay et al. pp. 60–97.
Carree, M. (2002), 'Does unemployment affect the number of establishments? A regional analysis for US states', *Regional Studies*, **6** (4), 389–98.

Carroll, G.R. (ed.) (1988), *Ecological Models of Organization*, Cambridge, MA: Ballinger.
Carroll, G. and M. Hannan (1989), 'On using institutional theory in studying organizational populations', *American Sociological Review*, **54**, 545–8.
Courpasson, D. (1994), 'Marché concret et identité professionnelle locale', *Revue Française de Sociologie*, **35**.
Crépon, B. and E. Duguet (2003), '*Bank loans, start-up subsidies and the survival of the new firms: an econometric analysis at the entrepreneur level*', paper presented at CEPR (Centre for Economic Policy Research) and CREI (Centre de Recerca en Economia Internacional) conference, Barcelona, November.
Davidsson, P. (1995), 'Culture structure and regional levels of entrepreneurship', *Entrepreneurship and Regional Development*, **7**, 41–62.
De Wasseige, Y., M. Laffut, C. Ruyters and P. Schleiper (2001), 'Bassins d'emploi et région fonctionnelles', Discussion paper, Services des études et de la statistiques du Ministère de la Région Wallonne, Jambes.
Dicken, P. and A. Malmberg (2001), 'Firms in territories: a relational perspective', *Economic Geography*, October, 345–63.
Dicken, P. and N. Thrift (1992), 'The organization of production and the production of organization: why business enterprises matter in the study of geographical industrialization', *Transaction of the Institute of British Geographers*, **17**, 279–91.
Easton, G. (1992), 'Industrial networks: a review', in B. Axelsson and Easton (eds), *Industrial Networks: A New View of Reality*, London: Routledge, pp. 3–27.
Evans, D.S. and L.S. Leighton (1989), 'Some empirical aspects of entrepreneurship', *American Economic Review*, **79** (3), 529–35.
Evans, D. and L. Leighton (1990), 'Small business formation by unemployed and employed workers', *Small Business Economics*, **2**, 319–30.
Fagenson, E. (1993), 'Personal value systems of men and women entrepreneurs versus managers', *Journal of Business Venturing*, **8** (5).
Fanfani, A. (1935), *Catholicism, Protestantism and Capitalism*, London: Sheed and Ward.
Feldman, M.P. (1994), 'The university and economic development: the case of Johns Hopkins University and Baltimore', *Economic Development Quarterly*, **8**, 67–76.
Feldman, M. and D. Audretsch (1999), 'Innovation in cities: science-based diversity, specialisation and localised competition', *European Economic Review*, **43**, 409–29.
Fritsch, M. (1992), 'Regional differences in new firm formation: evidence from West Germany', *Regional Studies*, **26** (3), 233–41.
Garofoli, G. (1994), 'New firm formation and regional development: the Italian case', *Regional Studies*, **28** (4), 381–93.
Glaeser, E., H. Kallal, J. Scheinkman and A. Shleifer (1992), 'Growth in cities', *Journal of Political Economy*, **100** (6), 1126–52.
Gorg, H., E. Strobl and F. Ruane (2000), 'Determinants of firm start-up size: an application of quantile regression for Ireland', *Small Business Economics*, **14**, 211–22.
Guyot, J.L. (with J. Vandewattyne) (2004), *Ebauche d'une sociologie des logiques d'action des créateurs d'entreprise: apports théoriques*, paper presented at the 7th Congrès International Francophone en Entrepreneuriat et PME, Universités Montpellier I et III, Montpellier, 27–29 October.

Hamel, G. and C.K. Prahalad (1990), *The Core Competences of Organizations*, Boston, MA: Harvard Business Review.
Henderson, V., A. Kuncoro and M. Turner (1995), 'Industrial development in cities', *Journal of Political Economy*, **103** (5), 1067–90.
Hisrich, R.D. and M.P. Peters (1998), *Entrepreneurship*, Chicago: Irwin.
Hodgson, G. (1988), *Economics and Institutions: A Manifesto for a Modern Institutional Economics*, Cambridge: Polity.
Hofstede, G., N.G. Noorderhaven, A.R. Thurik, L. Uhlaner, A. Wennekers and R. Wildeman (2004), 'Culture's role in entrepreneurship: self-employment out of dissatisfaction', in Brown and Ulijn (eds), pp. 162–203.
Holl, A. (2002), 'Determinants of spatial and sectoral variations in firm birth: empirical evidence for Portugal', Department of Town and Regional Planning Working Paper, University of Sheffield, Sheffield.
Jackson, J.E., G.R. Rodkey and R. Gretchen (1994), 'The attitudinal climate for entrepreneurial activity', *Public Opinion Quarterly*, **58** (3), 358–80.
Julien, P.A. and M. Marchesnay (1996), *L'entrepreneuriat*, Paris: Economica.
Keeble, D. and S. Walker (1994), 'New firms, small firms and dead firms: spatial patterns and determinants in the United Kingdom', *Regional Studies*, **28** (4), 411–27.
Kessides, I.N. (1990), 'Towards a testable model of entry: a study of the US manufacturing industries', *Economica*, **57**, 219–38.
Krugman, P. (1991), 'Increasing returns and economic geography', *Journal of Political Economy*, **99** (3), 483–99.
Lee, A. (1999), 'Empirical studies of self-employment', *Journal of Economic Surveys*, **13** (4), 381–416.
Lennert, M. and M. Van Criekingen (2003), 'Centre et périphéries: des espaces en compétition? Enquête sur les types de localisation des entreprise à l'échelle de l'aire métropolitaine bruxelloise', *Belgeo*, **4**, 425–42.
Libecap, G.D. (ed.) (1998), *Advances in the Study of Entrepreneurship, Innovation and Economic Growth (Vol. 10): Legal, Regulatory and Policy Changes that Affect Entrepreneurial Midsize Firms*, Stamford, CT and London: JAI Press.
Lundvall, B.A. (1992), *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*, London: Pinter.
Maillat, D. (1994), 'Comportements spatiaux et milieux innovateurs', in J.P. Auray, A. Bailly, P.H. Derycke and J.M. Huriot (eds), *Encyclopédie d'économie spatiale*, Paris: Economica, pp. 255–62.
Maillat, D. (1999), 'Interactions entre système urbain et système de production localisé', in A. Bailly and J.M. Huriot (eds), *Villes et croissance: Théories, modèles, perspectives*, Paris: Anthropos, pp. 187–206.
Maskell, P. et al. (1998), *Competitiveness, Localised Learning and Regional Development*, London: Routledge.
Maskell, P., H. Eskelinen, I. Hannibalsson, A. Malmberg and E. Vatne (2003), 'The firm in economic geography', *Economic Geography*, October, 328–43.
Mason, C.M. (1989), 'Explaining recent trends in new firm formation in the UK: some evidence from south Hampshire', *Regional Studies*, **23** (4), 331–46.
Massey, D. (1995), *Spatial Divisions of Labour: Social Structures and the Geography of Production*, London: Macmillan.
McGrath, R.G., I.C. MacMillan and S. Scheinberg (1992), 'Elitists, risk-takers, and rugged individuals? An exploratory analysis of cultural differences between entrepreneurs and non-entrepreneurs', *Journal of Business Venturing*, **7** (2), 115–35.

Mukhopadhyay, A.K. (1985), 'Technological progress and change in the market concentration in the U.S., 1963–1977', *Southern Economic Journal*, **52**, 141–9.
Nlemvo, Y., F. Pirnay, B. Surlemont, Y. Uerlings and H. Wacquier (1999), *Les spin-offs universitaires: contours et enseignement des pratiques exemplaires internationals*, report summary, Centre de Recherche PME et d'Entrepreneuriat, Université de Liège.
Ostgaard, T.A. and S. Birley (1996), 'New venture growth and personal networks', *Journal of Business Research*, **36** (1), 37–50.
Pareto, V. (1917 [1968]), *Traité de sociologie générale*, French translation, Geneva: Droz.
Pellenbarg, P.H. and P. Van Steen (2003), 'Spatial perspectives on firm dynamics in the Netherlands', *Tijdschrift voor Economische en Sociale Geografie*, **94** (5), 620–30.
Pellenbarg, P.H., L.J.G. Van Wissen and J. Van Dijk (2002), 'Firm Relocation: State of the Art and Research Prospects', ideas.repec.org/p/dgr/rugsom/02d31.html, 42 pp.
Pfeiffer, F. and F. Reize (2000), 'Business start-ups by the unemployed: an econometric analysis based on firm data', *Labour Economics*, **7** (5), 629–63.
Porter, M.E. (1980), *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, New York: Free Press.
Porter, M.E (1990), *The Competitive Advantage of Nations*, London: Macmillan.
Reynolds, P., B. Miller and W. Maki (1994), 'Regional characteristics affecting business volatility in the United States, 1980–1984', in C. Karlsson, J. Johannesson and D. Storey (eds), *Small Business Dynamics: International, National and Regional Perspectives*, London: Routledge, pp. 78–116.
Robson, M. (1996), 'Macroeconomic factors in the birth and death of UK firms: evidence from quarterly VAT registrations', *Manchester School of Economic and Social Studies*, **64** (2), 170–88.
Santarelli, E. and M. Vivarelli (1994), 'Is subsidizing entry an optimal policy?', *Small Business Economics*, **6**, 96–106.
Schumpeter, J. (1911), *Theory of Economic Development*, Oxford: Oxford University Press.
Shapero, A. and L. Sokol (1982), 'The social dimensions of entrepreneurship', in C. Kent, D. Sexton and K. Vesper (eds), *Encyclopedia of Entrepreneurship*, Englewood Cliffs, NJ: Prentice-Hall.
Smilor, R.W., D.V. Gibson and G.B. Dietrich (1990), 'University spin-out companies: technology start-ups from UT-Austin', *Journal of Business Venturing*, **5**, 63–76.
Sombart, W. (1926), *Le Bourgeois*, Paris: Payot.
Sombart, W. (1932), *L'Apogée du Capitalisme, t.1, Bibliothèque Politique et Économique*, Paris: Payot.
Spilling, O.R. (1991), 'Entrepreneurship in a cultural perspective', *Entrepreneurship and Regional Development*, **3**, 33–48.
Stimpson, D.V., P.B. Robinson, S. Waranusuntikule and R. Zhang (1990), 'Attitudinal characteristics of entrepreneurs and non-entrepreneurs in the United States, Korea, Thailand, and the People's Republic of China', *Entrepreneurship and Regional Development*, **2**, 49–55.
Storey, D.J. (1991), 'The birth of new firms – does unemployment matter? A review of the evidence', *Small Business Economics*, **3**, 167–8.
Storey, D.J. and A. Strange (1992), 'Entrepreneurship in Cleveland 1979–1989. A

study of the effects of the enterprise culture', *Department of Employment, Research Series No. 3*.
Surlemont, B. (2000), 'Les clusters: moteurs de dynamiques entrepreneuriales', *Reflets et Perspectives de la Vie Économique*, **34** (4), 115–22.
Sweeney, G.P. (1991), 'Technical culture and the local dimension of entrepreneurial vitality', *Entrepreneurship and Regional Development*, **3**, 363–78.
Takyi-Asiedu, S. (1993), 'Some socio-cultural factors retarding entrepreneurial activity in sub-Saharan Africa', *Journal of Business Venturing*, **8**, 91–98.
Taylor, M. (1999), 'The firm as a temporary coalition', www.envf.port.ac.uk/geo/whatson/aag 01.htm#Mike%20Taylor.
Taylor, M. and B. Asheim (2001), 'The concept of the firm in economic geography', *Economic Geography*, **77** (4), 315–28.
Van de Ven, A. (1993), 'The development of an infrastructure for entrepreneurship', *Journal of Business Venturing*, **8**, 211–30.
Veltz, P. (1993), 'Logiques d'entreprise et territoires: les nouvelles règles du jeu', in M. Savy and P. Veltz (eds), *Les nouveaux espaces de l'entreprise*, Liège: Editions de l'Aube, pp. 47–79.
Verstraete, T. (ed.) (2000), *Histoire d'entreprendre: Les réalités de l'entrepreneuriat*, Caen: Éditions EMS.
Verzele, F. and H. Crijns (2001), *Les Freins à la création d'entreprise*, Brussels: Fondation Roi Baudouin, Fonds Lionel Van den Bossche.
Von Hippel, E. (1988), *The Source of Innovation*, Oxford and New York: Oxford University Press.
Weber, M. (1904–17 [1965]), *Essai sur la théorie de la science*, French translation, Paris: Plon.
Weber, M. (1920), *L'Éthique Protestante et L'Esprit du Capitalisme*, Paris: Pocket Press.
Weber, M. (1922), *Economie et Société*, Paris: Plon.
Wennekers, S. and R. Thurik (1999), 'Linking entrepreneurship and economic growth', *Small Business Economics*, **13** (1), 27–55.
Williamson, O. (1985), *The Economic Institution of Capitalism*, New York: Free Press.
Wtterwulghe, R. (1998), *La P.M.E. Une entreprise humaine*, Brussels: De Boeck Université.
Yeung, H. (2000), 'Organizing the "firm" in industrial geography I: networks, institutions and regional development', *Progress in Human Geography*, **24** (2), 301–15.
Yeung, H. (2001), 'Regulating "the firm" and sociocultural practices in industrial geography II', *Progress in Human Geography*, **25 (**2), 293–302.

APPENDIX 6A

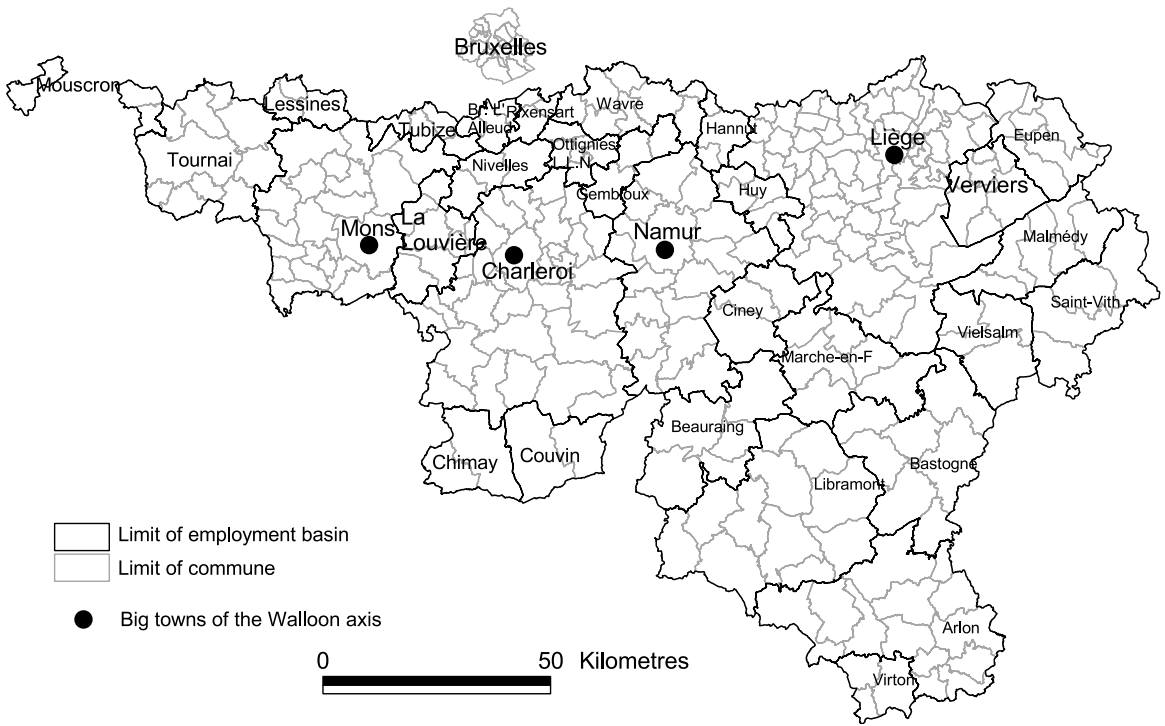


Figure 6A.1 Geographical outline of Wallonia: some markets

7. The importance of cooperation and support for technology start-ups: a comparison of the Eindhoven and Darmstadt areas

Johannes Halman, Jan Ulijn, Vareska van de Vrande and Frank Umbach*

INTRODUCTION

The EU Lisbon agreement of 2000 sets a target for the European Union (EU) to be the most competitive knowledge market in the world in 2010. To achieve this, one of the elements would be the creation of a lot more successful technology-based start-ups. The integrated European regions play a key role in this context and have therefore enjoyed substantial support since the last five-yearly framework programmes proposed by the European Commission (EC) in Brussels. However, do these programmes really help and is support in this sense appreciated? Although support can be seen as a kind of cooperation (but not so much on an egalitarian basis, since the sponsor might determine the outcome!), the argument against it is that too much incubation and support 'falsifies' the natural competition of markets (see also Drnovšek et al., ch. 3 in this book). It might also kill survival initiatives. On the other hand, the preparation of technology start-ups in particular demands a lot of pre-competitive R&D effort that has nothing to do with the jungle of the market: the survival of the fittest. Being too much on your own as a techno-starter in the beginning might put you off from cooperating with your former colleagues from a research and development (R&D) environment of a large multinational corporation (MNC) or from the university you graduated from. It might have an 'alienating' effect from the original source of innovative ideas. Cooperation and networks are no doubt needed, but what are techno-starters themselves thinking of this, in particular if they are in one specific European region, such as the Eindhoven area in the Netherlands and the Darmstadt area in Germany? What could they

learn from each other; could they contribute to a European integration in this sense?

This chapter describes the results of a survey that was conducted among technology start-ups in the Eindhoven and Darmstadt regions. The focus of the study is on cooperation among technology start-ups and their cooperation with other institutions. Cooperation between technology start-ups as well as cooperation with supporting institutions (also referred to as 'support' in this chapter for clarification reasons) can be an important source for these firms to survive. Clearly, technology entrepreneurs lack the resources that large, established companies have, in terms of money and knowledge. Financial resources are difficult to obtain, especially in the earliest stages of firm foundation. In addition, small, start-up firms might have difficulty accessing knowledge that is needed to establish their company or to bring their products to the market. To support technology entrepreneurs in the early stages of their new business foundation, programmes and institutions are set up, on a European level as well as on national and regional levels. However, the question remains: to what extent are these endeavours desired and used by technology-based start-ups? In order to answer this question, a survey research has been carried out among 83 technology start-ups in the Eindhoven region. In addition, as a first step towards an interregional and international benchmark of the initial results, a replication of this study was carried out in the Darmstadt area.

In the remainder of this chapter, we shall start by providing some more detailed background for this study and the relevance of choosing the Eindhoven and Darmstadt areas as comparable settings to carry out this research. Next, we shall describe how the study was set up, the methods used for data collection, and the main results. Finally, we shall conclude with a discussion of the results and their implications for entrepreneurs and policy makers, followed by suggestions for future research.

BACKGROUND

Without any doubt, technology-based entrepreneurship plays an important role in today's economy and in bringing new products and technologies to the market. Not only do technology-based start-ups play an important role as a significant source of new, innovative ideas, but they also play a key role in the creation of jobs. Van Elk (1997) observed employment growth among technology-based start-ups to be four times as high as among other new businesses. In addition, such start-ups have the potential to disrupt established companies, causing them to lose leadership or even fail in their prime markets (Christensen and Bower, 1996).

In particular, large MNCs need SMEs (small- and medium-sized enterprises) and start-ups, since the potential of innovative products, processes and services of their R&D efforts is much bigger than they could spin in themselves. On the basis of the SAMPLES technology transfer model, Walsch and Kirchhoff (2002) illustrate the commercialization of disruptive technologies within 100 firms, confirming the empirical evidence that small firms are more efficient innovators and develop more 'major' innovations than large firms, especially for bringing device prototypes and agile proto modules to the market. Additionally, technology-based start-ups often play an important role in evaluating new scientific knowledge and contribute to the strengthening of the competitive position of already established firms (OECD, 1997, 1998). The apparent time to market obviously decreases when an MNC can spin in a promising venture or technology.

On the other hand, small groups of entrepreneurial researchers or mostly individuals might leave their secure jobs to venture into spin-offs or spin-outs with the support of their original employer, as illustrated by the examples of ASM Lithography (ASML) and Fludicon GMbH. ASML is a chip engine manufacturing firm created in the early 1990s, as one of the new 300 techno-ventures in the Eindhoven area, now an MNC in its own right. In the Darmstadt area, Fludicon was founded in 2001 as a spin-off of the Dürr Schenck Gruppe. Its products are based on electro rheological fluids technology. The company entered the market successfully in 2004. Support is often needed to speed up this spin-off process into new techno-ventures.

Due to its important contributions to society, it is not surprising that the level of interest for technology-based start-ups has increased considerably in the last few decades, both from an academic as well as from a political perspective. Especially in a regional setting, cooperation and support as a way to foster the development of technology-based start-ups, has become particularly important, because of the potential benefits that these start-ups can provide to a region (for example, closing technological gaps (Koch and Kautonen, 2005) or helping towards a technologically leading position (Mueller, 1998)).

Defining Technology-based Start-ups

While researchers seem to have agreed on the importance of technology-based start-ups or new technology-based firms (NTBFs) (Oakey, 1995; Storey and Tether, 1998), a clear conceptualization of the concept is lacking. Many definitions come up, ranging from very broad ones including all new firms operating in high-technology sectors to narrow ones describing the new firm in terms of ownership and age (Storey and Tether, 1998). Since our study is based on a survey among technology start-ups, a clear and

well-established definition was needed in order to univocally determine the sample used for our study. However, the many different descriptions that exist share at least some common concepts. The sectors in which these entrepreneurs operate are generally high tech (Burgel and Murray, 2000); and the employees of the firm are highly educated (Roberts, 1991; Hoffmann et al., 1998; Storey and Tether, 1998). In addition, we wanted our study to focus on technology start-ups, aiming at techno-entrepreneurs in the earlier stages of company foundation. Because high-tech entrepreneurs generally need more time to start their business (Braaksma, 1995; Boussouara and Deakins, 1999), we decided to include those firms that were established less than five years ago. In addition, since technology start-ups are innovative firms, we include only those companies that devote at least 10 per cent of their time to R&D. As a result, technology-based start-ups in this study are defined as companies that:

- were founded during the last five years;
- are currently developing or distributing knowledge-intensive products, processes or services;
- have devoted a high proportion of their activities to R&D (more than 10 per cent); and
- are run by an entrepreneur with higher education (polytechnic or academic).

This working definition allows us to select the sample for our study very carefully. In addition, a well-defined description of our sample makes replication of the study at a later stage or in a different setting possible.

THE EINDHOVEN AND DARMSTADT REGIONS

We shall examine cooperation and support in two European regions, with a potential for entrepreneurs to cooperate with one another and others even more than is the currently the case. Both areas host, apart from an impressive industrial activity, a major university of technology which belongs to CLUSTER (Consortium Linking Universities of Science and Technology for Education and Research), a network of 12 leading universities of technology in Europe. Can those regions at least learn from one another in an academic–industrial cooperation? How do they relate to the context of the national states as a whole? Both economies are strongly intertwined in the eurozone (see Dana, 2006 for a recent overview on entrepreneurship and SMEs for the 10 countries that implemented this new currency in 2001), but lagging behind in the creation of technology-based start-ups

notwithstanding their potential. This might be due to a certain fear of taking risks and failing (see Groen et al., 2006 for a comparison with the US and other EU member states). Both neighbouring countries have a similar culture, although the two countries are not comparable in size, the Netherlands being the biggest of the small European member states (16 million inhabitants) and Germany the biggest with 80 million, which leads to a kind of small-brother big-brother syndrome in the Netherlands.

Although Dutch and Germans engineers have a common professional culture (see also Wakkee et al., ch. 9 in this book), recent studies in comparing the two countries, with respect to innovation cultures, also indicate some differences. For instance, the transition from technology to market orientation occurred earlier among Dutch engineers (Ulijn et al., 2001). Additionally, the Dutch might be better equipped to initiate innovations and commercialize them, whereas the Germans are the better implementers and manufacturers (Ulijn et al., 2004). The profile of innovative entrepreneurs in Germany and the Netherlands shares the importance of analytical skills, ranking it second in order of priority, but a sense of realism ranks first in the Netherlands, whereas the so-called 'helicopter view' (see Trompenaars and Hampden-Turner, 1999 for a study on the ideal innovator profile within Shell) ranks last in Germany (Ulijn and Fayolle, 2004). However, one should avoid generalizing over the whole country. In the Netherlands, the west is more business, service and logistics centred, whereas the southeast connects to a technological innovation centre in the larger Belgian and German euro-region (Louvain and Aachen). Since 1990, there are big differences in the reunited Germany between the Ruhrgebiet and the Stuttgart and Munich areas and between East and West in particular. Therefore, if more insight is gained into specific comparable areas such as Eindhoven and Darmstadt, a fair comparison might benefit both existing MNCs and SMEs and (future) techno-ventures by a mutual learning effect and a possible cooperation.

The Eindhoven Area: Methods and Results

Eindhoven is the largest city in the North Brabant province, close to the German and Belgian border. The Eindhoven area can be characterized as being one of the 'brainports' of Europe, and R&D intensity in the Eindhoven region is higher than the national average. In 2002, North Brabant had an outstanding performance in terms of patenting, being the leading region in terms of patent applications as a proportion of inhabitants in the European Union. Moreover, North Brabant was the region with the highest patenting growth of 21.6 per cent, in contrast to the European average of 7.0 per cent (Frank, 2004). Furthermore, innovation in the

region is fostered by the presence of leading technological companies (for example, Royal Philips Electronics and ASML), research institutions such as the Philips Physics Laboratory and the TNO Institute of Industrial Technology, and the presence of the Eindhoven University of Technology, a leading institution in research and education in engineering science (ranking behind Oxford and Cambridge as the best-cited university in Europe for a number of years). Taking all these factors into account, Eindhoven is an interesting area to start a high-tech company and to study technology-based entrepreneurship.

In terms of support available for technology-based start-ups, the region is of course home to the common institutions such as the chambers of commerce, universities, banks and IP consultancy firms. In addition, two other supporting institutions can be found in the region: Syntens (one of the 12 regional innovation relay centres in the Netherlands) and NV Rede. Syntens is an innovation consultancy network organization, focusing primarily on technology start-ups and fast-growing SMEs. Because it is a government affiliation, Syntens can be considered as an independent source of advice, supporting entrepreneurs free of charge. The services they offer to technology-based entrepreneurs are orientated on technological and marketing aspects, ranging from workshops and tailored advice to setting up innovation trajectories and helping entrepreneurs to increase their professional network (source: Syntens). NV Rede is also a government agency, focusing on SMEs in the industrial and service sectors. The objectives of NV Rede include stimulating economic activity and strengthening the economic structure in the region. Additionally, they provide information and practical assistance to entrepreneurs on various aspects, including site selection, logistic strategies and legal matters. Furthermore, NV Rede can provide financial support and office space (source: NVRede).

Research method

The study in the Eindhoven area was carried out in two stages. First, a selection of all potential technology start-ups was made, based on the companies' BIK codes which are used by the chambers of commerce to classify all registered companies. This classification is based on the European classification system (NACE), which is comparable to the Standard Industrial Classification (SIC). All the companies that were potentially a technology start-up were contacted by telephone to verify whether they met our working definition for technology start-ups (see above).

From the 1507 companies that were contacted, 86 met our definition and 49 did not meet our criteria although they did identify themselves as a technology start-up (response rate = 43 per cent). After the identification of the technology start-ups, a telephone enquiry was held among the

86 companies that met our criteria. The enquiry followed a pre-structured protocol by means of a questionnaire (see Appendix 7A) including questions regarding:

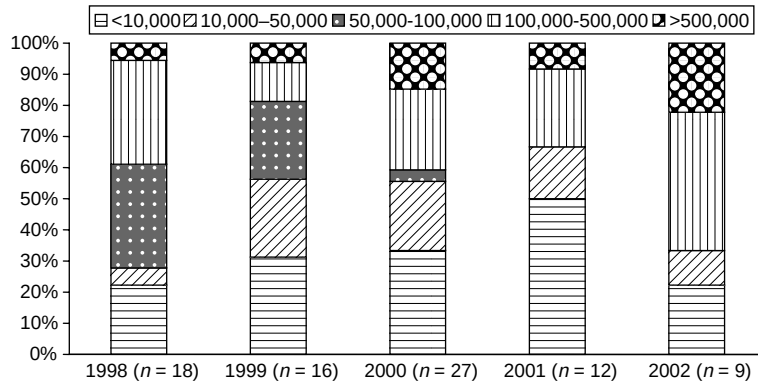
- the characteristics of the company;
- the support that is currently received or that is desired in the future;
- considerations for starting a business in the Eindhoven area;
- problems experienced; and
- characteristics of the entrepreneur.

We received 83 responses, including seven companies that strictly speaking did not meet our criteria because of the education level of the entrepreneur. However, during the interviews these companies turned out to be technology start-ups indeed and were therefore included in the results. For a detailed overview of the questionnaire, see Appendix 7A.

Results

Number of technology start-ups in the Eindhoven area To determine the total number of technology start-ups, it is necessary to correct for non-response, after which the total number of technology start-ups in the area was estimated to be 112 companies. Thus, out of 7825 start-ups in general, technology start-ups in the Eindhoven area comprise only 1.43 per cent of the total number. The reason why this number may seem somewhat low compared to previous estimations of around 3 per cent (for example, Prince, 2002), can be found in the fact that we use a very strict definition for this study. As mentioned in the introduction, one of the rationales for choosing such a strict definition is that this makes it easier to replicate the study at a later point in time or in a different setting. The same definition is also applied by the Ministry of Economic Affairs in their formal policy and subsidy programmes.

Company characteristics and characteristics of the entrepreneur The questionnaire included a number of questions regarding the characteristics of the entrepreneur and the start-up company. The results show that on average, 80 per cent of the firms included in our sample are currently profitable. In addition, most respondents with a profitable company indicated their annual sales to be between €100,000 and €500,000. Because the companies in our sample are between zero and five years old, we also classified these results according to the year in which the company was founded, expecting to find a positive relationship between the company's age and yearly sales figures. Remarkably, there seems to be no correlation (Figure 7.1).



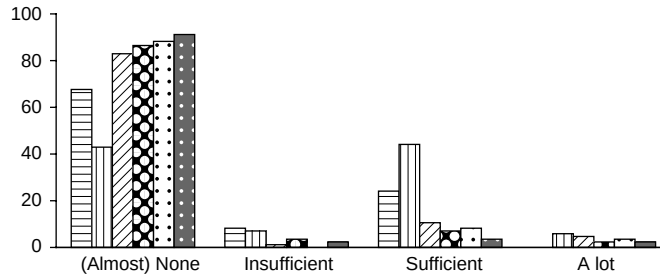
	1998 (*n* = 18)	1999 (*n* = 16)	2000 (*n* = 27)	2001 (*n* = 12)	2002 (*n* = 9)
>500,000	6%	6%	15%	8%	22%
100,000–500,000	33%	13%	26%	25%	44%
50,000–100,000	33%	25%	4%	0%	0%
10,000–50,000	6%	25%	22%	17%	11%
<10,000	22%	31%	33%	50%	22%

Figure 7.1 Distribution of sales

With regard to the number of employees, the expectation again is that older companies have more employees on average than younger firms, though this cannot be confirmed using our dataset. The overall average number of employees is 3.13 (SD = 4.96). The high standard deviation shows that the average number of employees is the result of a few companies with a much higher than average number of employees.

Another indicator to describe the characteristics of a technology start-up can be found by looking at their R&D activities. In accordance with our working definition, we included all companies which initially responded that they devoted more than 10 per cent of their time to R&D activities. In the survey that was held among the respondents, this question was again included to gain a better insight into this particular aspect of the characteristics of technology start-ups. The respondents were asked to rate the time devoted to R&D on a five-point scale. The results demonstrate that 36 per cent of the respondents devote even more than 50 per cent of their time to R&D.

Finally, we added a question concerning the time devoted to preparation, such as writing a business plan before starting the business, and some questions regarding the characteristics of the entrepreneur. The results indicate that technology starters prepare for an average of 7.8 months before starting a company, although answers range from zero months to 10 years (SD = 15.21). With respect to the characteristics of the entrepreneur, it can be concluded that almost all entrepreneurs have a higher education (polytechnic



	(Almost) None	Insufficient	Sufficient	A lot
Banks	67	8	24	0
Chambers of Commerce	43	7	44	6
Syntens	83	1	11	5
NV Rede	87	4	7	2
Universities	88	0	8	4
IP Consultancy	91	2	4	2

Figure 7.2 Support currently received by start-ups in the Eindhoven area (%)

or academic), most are between 30 and 49 years old, and most have no relatives that are entrepreneurs.

Cooperation and support The focus of our study is on the support that technology start-ups in the Eindhoven area receive and their attitude towards this kind of cooperation with supporting institutions. With respect to the support that is currently received, we included six questions, each to be rated on a four-point ordinal scale, and each representing a source of support. Although the focus of these institutions is to provide support to entrepreneurs, the majority of the respondents indicate that they receive no, or insufficient support from most of these institutions (the chambers of commerce being a remarkable exception, Figure 7.2).

On the question concerning the support desired for the future, respondents had to rate six types of support, indicating whether or not they would desire that kind of support in the future. As shown in Figure 7.3, most respondents replied that no support was desired in the future.

Problems To determine the types and number of problems experienced by technology start-ups, the respondents were asked two questions to indicate in which field they experienced most of their problems (technical, organizational, financial or commercial) both for when they started the company and at the present time. According to the results, most of the problems experienced at the time of start-up were organizational problems. However,

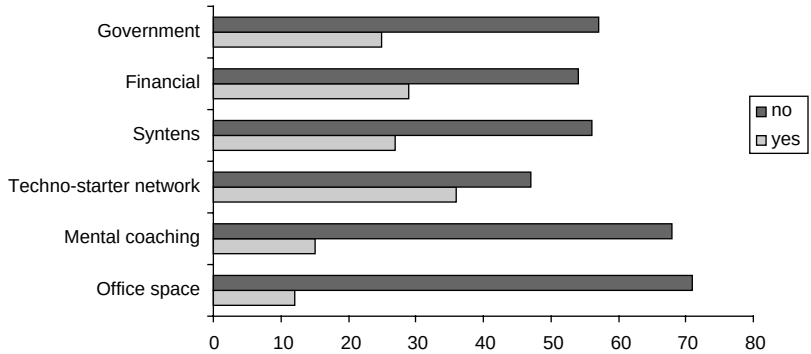


Figure 7.3 Support desired in the future in the Eindhoven area (% of start-ups)

the results also suggest that the average number of problems experienced decreases over time, and the type of problems experienced shifts from organizational towards commercial problems.

The Darmstadt Area: Methods and Results

As a first step towards international and regional benchmarking, the study conducted in the Eindhoven area was replicated in the area of Darmstadt. North Brabant and Darmstadt are comparable in terms of R&D intensity in the business enterprise sector. Both regions are ranked in the top 15 in the EU in terms of R&D, North Brabant being tenth (2.82 per cent GDP) and Darmstadt holding the 14th position (2.55 per cent GDP). In addition, both areas have an R&D intensity that is higher than the national average of 2.51 per cent GDP for Germany and 1.89 per cent GDP for the Netherlands (Götzfried, 2005). The Darmstadt region is one of the most promising ones in Germany. In 2004 it was ranked at fourth position for its future prospects in a study published by Prognos: *Zukunftsatlas 2004*. The same document also ranks Darmstadt at fourth position for innovation (Prognos, 2004). The bigger Starkenburg region surrounding Darmstadt was ranked at third position for technological capability in another Prognos study: *Technologieatlas 2002* (Bornemann et al., 2002). At the same time, this technological potential is largely unused so far (ibid.). In August 2005, the German government published *Raumordnungsbericht 2005*, in which the Starkenburg region received the best value possible for R&D (Bundesamt für Bauwesen und Raumordnung, 2005). Since the report's emphasis was on shortcomings, this rating implied that there is no shortcoming at all in R&D.

In addition to these promising facts about the region, there are also several kinds of support available for start-ups. Similar to Eindhoven, common support for technology-based start-ups from the chambers of commerce, universities and banks also exists in the Darmstadt region. Furthermore, the centre for technology and innovation (Technologie- und Innovationszentrum: TIZ) is another institution specially orientated towards technology-based start-ups. TIZ was set up by the city of Darmstadt in cooperation with the two local universities, the chambers of commerce and a local bank. Its services include general advice, information workshops, a network of information and cooperation as well as accommodation for the start-ups.

Methods

The main objective of the Darmstadt study was to provide an overview of the number of techno-starters in the area. The aim was to use the same questionnaire, corrected for Germany. This means that with respect to the questions concerning the support that technology start-ups receive or desire, we had to replace some of the regional Dutch institutions by their German equivalents. In addition, we extended the questionnaire with some questions concerning the cooperation between technology start-ups, the orientation of start-ups towards market or technology, and a number of extra questions concerning the characteristics of the entrepreneur.

The sample for the Darmstadt area was selected using the same definition for technology start-ups as was used in the Eindhoven study. This and the same sample selection method are particularly important to enhance comparability of the results. For the Darmstadt area, this led to 21 usable responses. The next subsection will describe the main results, in more detail in comparison with the Eindhoven study.

Results

The Darmstadt study shows largely the same results as that for Eindhoven with regard to the entrepreneurial and company characteristics (Table 7.1). The technology-based entrepreneurs included in our study of both regions are on average in their late thirties, have higher or university-level education and the majority are not from an entrepreneurial family. In addition, most of them run a profitable company, with average annual sales being slightly higher in the Darmstadt area.

The most notable differences between the Eindhoven and Darmstadt studies can be found in the results for sales and time devoted to R&D. With regard to current sales of the technology start-ups, those included in the Darmstadt sample have on average higher current sales than our

Table 7.1 Entrepreneurial and company characteristics (Eindhoven and Darmstadt compared)

		Eindhoven	Darmstadt
Age	Mean	39.4	37.0
	SD	10.09	7.86
Educational background (%)	< HE*	8.4	9.5
	HE*	60.2	19.0
	University	27.7	52.4
	PhD	3.6	19.0
Entrepreneurial family (%)	Yes	33.7	19.0
	No	61.4	81.0
Profitable (%)	Yes	75.9	76.2
	No	20.5	19.0
Sales (%)	<10,000	19.3	4.8
	10,000–50,000	16.9	4.8
	50,000–100,000	13.3	0.0
	100,000–500,000	26.5	52.4
	>500,000	12.0	28.6
	no response	12.0	9.5
Employees	Mean	3.1	8.7
	SD	4.96	12.40
Time for preparation	Mean	7.8	5.4
	SD	15.21	5.81

Note: * HE (higher education) is the Dutch HBO (higher professional education) comparable with the German *Fachhochschule* or polytechnic.

respondents in the Eindhoven area, where sales are distributed almost evenly among the categories defined (Table 7.1). In addition, Figure 7.4 shows a difference in the time the companies devote to R&D. In the Eindhoven area, we found that 36 per cent of the technology start-ups invest more than 50 per cent of their time to R&D, compared with the 20–30 per cent invested by the majority of the respondents in the Darmstadt area.

Support We had to replace a number of Dutch institutions from the original questionnaire with their German equivalent. After doing so, we decided to include a new category, family and friends, who are a source of support commonly used in the earliest stages of new business foundation (Birley, 1985). Because the Dutch study showed that most of our respondents did not receive any support at all, we expected that including family and friends might change this picture somewhat. With respect to the

Table 7.2 Support currently received (Eindhoven and Darmstadt compared) (%)

		(Almost) None	Insufficient	Sufficient	A lot
Banks	Eindhoven	67.5	8.4	24.1	0
	Darmstadt	76.2	0	23.8	0
Chambers of commerce	Eindhoven	42.7	7.3	43.9	6.1
	Darmstadt	52.4	23.8	19.0	4.8
Governmental institutions	Eindhoven	87.1	2.4	7.3	3.2
	Darmstadt	71.8	10.3	10.3	7.7
Universities	Eindhoven	88.0	0	8.4	3.6
	Darmstadt	81.0	4.8	9.5	4.8
Family, friends	Eindhoven	n.a.	n.a.	n.a.	n.a.
	Darmstadt	23.8	4.8	42.9	28.6

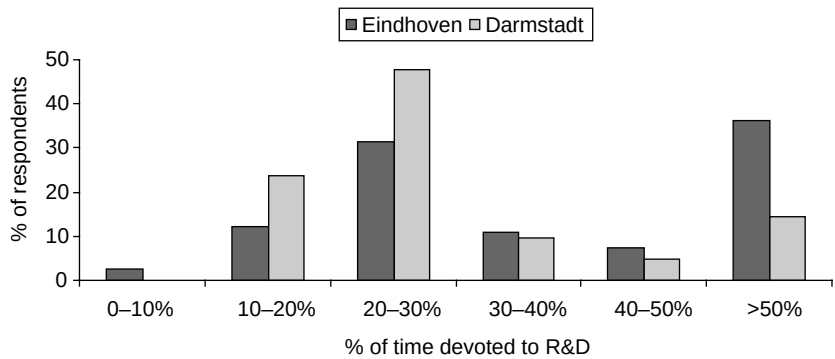


Figure 7.4 Average time devoted to R&D (Eindhoven and Darmstadt compared)

support received from banks, the chambers of commerce and governmental and regional institutions, the results obtained for Darmstadt show the same picture as those for Eindhoven: most technology start-ups receive no or insufficient support from these institutions. However, the results show that more than 70 per cent of the respondents receive sufficient or a lot of support from family and friends (Table 7.2).

But the main difference, in terms of support, can be found in the amount of support desired for the future. Figure 7.5 shows that in most of the categories, more than 60 per cent of the respondents from the Darmstadt area would like to receive future support in a particular field. This is remarkable

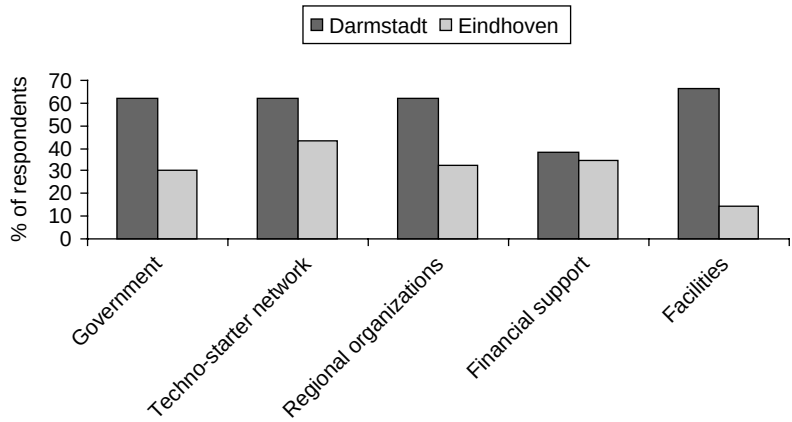


Figure 7.5 Support desired in the future (Eindhoven and Darmstadt compared)

when compared with the results of the Dutch study, where most of the respondents did not desire any of these kinds of support in the future.

Cooperation among technology start-ups Evidently, cooperation among technology start-ups might also be a useful way for entrepreneurs to tap into each other's knowledge or to overcome high R&D or production costs. Therefore, we included some questions concerning the cooperation that currently exists among the technology start-ups in our sample and the propensity to engage in cooperation with other start-ups in the future. Results show that about 50 per cent of the respondents are currently cooperating with other start-ups, whereas more than 90 per cent indicate that they can imagine cooperating with other start-ups in the future. Of the technology start-ups that currently cooperate with others, the majority do so in R&D. Figure 7.6 provides an overview of the fields in which they currently cooperate or might do so in the future. In addition, 81 per cent of the respondents indicate that they could imagine cooperating with foreign start-ups in the future as well.

DISCUSSION

The results of the studies carried out in Eindhoven and Darmstadt give us an overview of the characteristics of technology start-ups in these regions. Moreover, the results provide further insight into the support that is currently provided to technology-based start-ups and their attitude towards

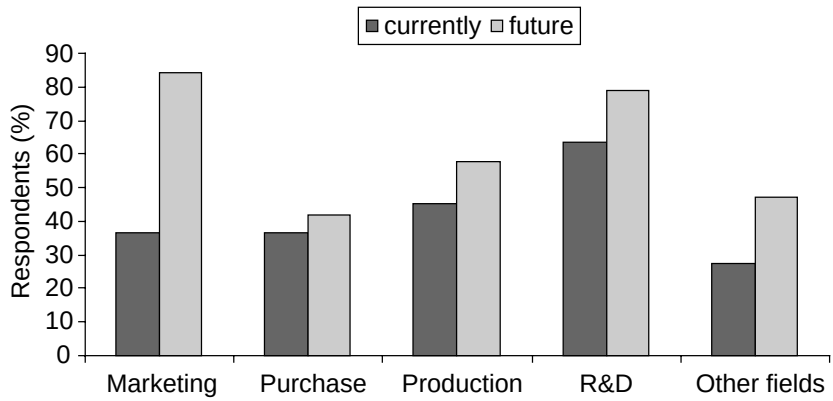


Figure 7.6 Cooperation between technology start-ups (Darmstadt) %

this kind of support. The studies show that most of the technology start-ups in these areas currently receive no or insufficient support. Previous studies on the role of formal institutions to foster entrepreneurial success and innovation show comparable results. Birley (1985) conducted a survey among 160 entrepreneurs in the state of Indiana, to determine the extent to which the entrepreneur seeks and receives support. The results show that from a list consisting of seven formal and four informal sources of help, the formal sources were hardly used. In addition, a study conducted by Kaufmann and Tödtling (2002) in Upper Austria, shows that SMEs, as opposed to large firms, barely interact with universities, research organizations, technology centres or training institutions. With respect to the interaction with the university, this might be better in Eindhoven than in Darmstadt, since exchange students from Darmstadt report the good cooperation between industry and the university as one of the main drivers to come to Eindhoven.

In our questionnaire we used the term 'insufficient' when asking for the support they currently receive, anticipating that if no support is received, then it is certainly desired. However, contrary to our expectation, the results show that most of our respondents do not desire support in the future, either. In addition, we found no significant correlation between the size of a company (number of employees) and the extent to which they receive support. Previous research suggests that small firms often lack time or knowledge to become informed about the existing sources of support in their region. O'Donnell (2004) echoes Curran et al. (1993) who believe that the considerable time constraints, which owners are subject to, make inclusion in intensive networks impossible. According to Curran et al. there is

abundant research suggesting that owner-managers stress independence very strongly. This produces a 'fortress enterprise' mentality in dealing with the wider environment and a low likelihood of participation in networking activities of all kinds. Similarly, O'Donnell also refers to the suggestion made that participation in networking is 'antithetical' to owner-manager cultures. However, this could not be confirmed by our data.

Important differences that arise when the Eindhoven and Darmstadt studies are compared, are the amount of time devoted to R&D and the attitude towards future support. In the Eindhoven area, almost 40 per cent of the respondents claimed that they devoted more than 50 per cent of their time to R&D, compared to only 20–30 per cent spent on R&D by the majority of the respondents in the Darmstadt region. In addition, the two regions differ fundamentally in their opinions on the support desired in the future. Although respondents from both regions are currently receiving no or insufficient support, the respondents in the Darmstadt region, as opposed to the Eindhoven technology start-ups, would like to receive significantly more support in the future. A possible explanation for this difference might be the tighter informal connection between industry and the university in the Eindhoven area. Other factors that could account for this difference include: personal characteristics, the type of technology-based start-ups included in our sample, or in the difference between national cultures. While Burns and Dewhurst (1996) believe that the psychological characteristics of people who set up their own business often cause them not to participate in networking, Kaufmann and Tödtling (2002), on the other hand, differentiate between different types of SMEs and their attitudes towards support, finding that in general innovation support was regarded as being necessary. However, SMEs engaged in research form an interesting exception to this rule, with one-third of the respondents indicating support as being unnecessary. The authors attribute this to the difference between resource-intensive and knowledge-intensive innovation projects (ibid.).

The difference between the attitudes towards support in the future between the Eindhoven and Darmstadt areas might also be caused by cultural differences. According to Hofstede's dimensions to describe national cultures, the Dutch are more individualistic than the Germans (80 against 67, Hofstede, 2001). While this difference seems to be rather small, previous studies (see, among others, Ulijn et al., 2004) show that the Dutch use their individualism more for innovation initiation and exploration and the Germans use their collectivism more for team spirit in innovation implementation and exploitation. This and other cultural factors such as uncertainty avoidance (which is higher in Germany than in the Netherlands) may partially explain the difference between the Eindhoven and Darmstadt

respondents. A study by Ulijn et al. (2006a), which includes the two countries compared in this chapter, concludes that cooperating in technology start-ups is not only a local, but also a European entrepreneurship challenge on the basis of a benchmark of 20 Italian start-ups with five British, five Dutch and 24 German ones. All Dutch respondents find teamwork useful and 83 per cent of the German start-ups agree on this. However, from the answer to the question concerning whether one works now as a team and would prefer this as the future business organization, it is striking to see that the Dutch respondents, who now work more as a team than the Germans, would prefer to do it less in the future, whereas the Germans would prefer more. Both samples were comparable at least in so far as they were from contexts without too much support, although in Darmstadt they were perhaps a little closer to the University of Technology (at least formally) than in Eindhoven. Nevertheless, further research is needed to get a clearer view on the circumstances in which support or cooperation is desired and to what extent.

Another interesting finding is the attitude of the technology entrepreneurs to cooperation with other technology start-ups. Technology-driven entrepreneurship incorporates a high level of R&D intensity. Therefore, it is not surprising that techno-starters cooperate with other start-ups in the field of research and development. Additionally, the answers given with respect to the problems experienced currently indicate that most of the problems can be found in the field of marketing. Therefore, the outcome that those entrepreneurs would like to cooperate in the field of marketing with other start-ups in the future is in line with our expectations.

Finally, the characteristics of the technology entrepreneurs in terms of education level seem to differ remarkably. In the Eindhoven region, most technology starters have a higher education (polytechnic) degree, whereas in the Darmstadt region, most technology entrepreneurs have a university degree or higher. This is in line with Ulijn and Fayolle (2004), who argue that as a result of the German education and apprentice system, about two-thirds of the German supervisors hold a Master's degree. The fact that the 21 Darmstadt techno-starters are mainly academic and the 84 Eindhoven ones are mostly from higher professional education (*HBO*, more practice orientated, comparable with the German *Fachhochschule* or polytechnic, see Table 7.1), does not result in receiving currently more support from universities by any category with regard to significantly more science-orientated academic research (88 per cent for Eindhoven, 81 per cent for Darmstadt, see Table 7.2). So this element of incomparability of our two samples does not seem to bias the difference of accessibility of this knowledge resource to techno-starters in either geographical area.

IMPLICATIONS AND FURTHER RESEARCH

The results of our survey have important implications for entrepreneurs as well as for policy makers. To start with, there seems to be a gap between the support offered and the entrepreneurs that should be receiving this support. Not only do the technology start-ups claim that they have received little or no support when starting up their business, but the results on their attitude towards support in the future also differ. Thus, it might be the case that supporting institutions are offering a type of support that does not meet the requirements of the entrepreneurs. This is also pointed out by Kaufmann and Tödtling (2002), who suggested that there are two types of 'mistargeting': a mismatch between the support offered and the support desired, and a mismatch between the firms targeted and the firms in need of support. Further research in this area might be needed to get a better picture of the reasons why these technology start-ups do not receive any support and why it is not desired. This research could, for instance, take the form of a study of the problems experienced in the early phases of start-up and later on, and more tailored types of support for entrepreneurial firms in the different stages of firm funding.

Next, the findings of the study in the Darmstadt area already evidence a high interest among technology start-ups in cooperating with other start-ups, both now and in the future, nationally and internationally. A large body of literature exists on the benefits of strategic alliances, however, largely focusing on alliances among established firms or between start-ups and established firms. Further research in the field might focus on alliances or networks among technology start-ups. Important reasons for established companies to engage in a strategic alliance are to reduce time to market and sharing the sometimes tremendous costs of R&D. Those are the more valid for start-up firms, since their financial resources are often very limited and short-term return on investment can be a precondition for continuation of the business (Shrader and Simon, 1997; Lee et al., 2001).

In addition, replication of the kind of study described in this chapter is needed to get a better picture of the international aspects of entrepreneurs' attitudes towards support. More, longitudinal research is needed in the various regions in Europe, to support and improve European incentives for the fostering of technology-based entrepreneurial behaviour. Moreover, further research might also take the form of in-depth case studies, or differentiate among different stages of development in new venture creation in order to get a better view of the extent to which support and cooperation are desired, when they are mostly desired and how. Only then, can a full picture be obtained which can be used as a first

step towards an integrative framework on formal and informal sources of support and how technology-based new firms can maximize their benefits. In the long run, this will be beneficial to regional, national and European levels of innovation and the strengthening of our competitive position on a worldwide level.

To this point we have dealt mainly with cooperation on the rather individual level of the techno-starter, such as with supporting organizations: universities, R&D labs, governmental innovation relay centres or banks or sponsors, but Dorf and Byers (2005) also rightly point out that successful technology entrepreneurship not only requires teamwork. A value network for university or college (*HBO*, *Fachhochschule*) could encourage techno-starters to form an alliance with other techno-starters, SMEs or MNCs to foster the exchange of knowledge in addition to the flow of products, capital or technology. One must realize that strategic alliances are not always easy: 70 per cent of them fail within 5 years, not only because of the lack of technological, financial or strategic fit, but also due to the hidden factor of culture, human or social aspects. In particular, national culture is the scapegoat in cross-border alliancing (see Ulijn et al., forthcoming a). The same authors indicate in a comparison of six Dutch firms and six German ones having an alliance with a German party and a Dutch party, respectively, that both sides agree on Germans being more team workers (collectivistic), assertive (masculine) and uncertainty avoiding. This confirms the observation by Ulijn et al. (2004) that Germans might be the better implementers of an innovation and might need bigger start-ups to warrant team work as the main study in this chapter shows. Given the same level of performance, however, Germans perceive a better cultural fit in the strategic alliances with the Dutch than the other way around.

So far we have discussed a possible 'national culture' effect on the cooperation between techno-starters in both the Eindhoven and the Darmstadt areas. It is clear, as our previous Dutch–German comparative studies suggest, that also in strategic alliances between techno-starters in particular, the professional culture of Dutch and German engineers would create many commonalities towards the much-needed marketing culture. It might be the case that engineers in both areas form an alliance with more market-orientated starters in both countries separately, or cross-border with, for instance, the Dutch being more focused on marketing and sales. In this way, each other's markets can also be explored in a win–win situation for the innovative product, process or service that the techno-starters have in mind. A good example of this is the information and communication technology sector in banks, where the UNICO consortium combining at least seven European banks shows many similarities between the German and Dutch level of assertiveness and sense of cooperation (see the study by Ulijn et al.,

forthcoming b). Could this mobilization of a professional culture also be transferred to techno-starters?

When it comes to the support by EU programmes, such as IRE and (former) EUREKA, ESPRIT and PHARE, which are used to strengthen the common professional culture of engineering in a pre-competitive phase, alliances can also be a powerful tool to increase the benefits for techno-starters. For instance, for the exploration of the market they could form an alliance in European regions where Eindhoven and Darmstadt are located. In this way, technology-based start-ups could benefit even more from strategic alliances as a form of cooperation.

NOTE

* The authors would like to thank Hanns Menzel, HIWI (scientific assistant) at TU Darmstadt and PhD candidate and ECIS researcher at TU Eindhoven; TIZ director Heiner Stoecker; Professor Horst Geschka of TU Darmstadt; Erdem Baris, student at TU Darmstadt; and Unipartners in Eindhoven for their contributions and helpful comments on this chapter.

REFERENCES

Birley, S. (1985), 'The role of networks in the entrepreneurial process', *Journal of Business Venturing*, **1**, 107–17.

Bornemann, H., M. Bucksteeg, T. Koch, R. Schüssler and Jan Limbers (2002), *Technologieatlas*, Prognos AG.

Boussouara, M. and D. Deakins (1999), 'Market-based learning, entrepreneurship and the high technology small firm', *International Journal of Entrepreneurial Behaviour and Research*, **5**(4), 204–23.

Braaksma, R.M. (1995), *Technostarters onder de loep genomen* (Taking a close look at techno-starters), Zoetermeer: EIM.

Bundesamt für Bauwesen und Raumordnung (2005), *Raumordnungsbericht 2005*.

Burgel, O. and G.C. Murray (2000), 'The international market entry choices of start-up companies in high technology industries', *Journal of International Marketing*, **8**(2), 33–62.

Burns, P. and J. Dewhurst (1996), *Small Business and Entrepreneurship*, Basingstoke: Macmillan.

Christensen, C.M. and J.L. Bower (1996), 'Customer power, strategic investment, and the failure of leading firms', *Strategic Management Journal*, **17**(3), 197–218.

Curran, J., R. Jarvis, R.A. Blackburn and S. Black (1993), 'Networks and small firms: constructs, methodological strategies and some findings', *International Small Business Journal*, **11**(2), 13–25.

Dana, L.-P. (2006), *Entrepreneurship and SMEs in the Euro-zone: Toward a Theory of Symbiotic Entrepreneurship*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.

Dorf, R.C. and T.H. Byers (2005), *Technology Ventures: From Idea to Enterprise*, Boston, MA: McGraw-Hill.
Frank, S. (2004), *Patent Applications to the EPO from the EU Regions 1997–2002*, Eurostat Statistics in Focus, No. 7/2004.
Götzfried, A. (2005), *R&D Expenditure and Personnel in the European Regions, Statistics in Focus – Science and Technology*, Volume 6, Luxembourg: Eurostat.
Groen, A., J. Ulijn and A. Fayolle (2006), 'Educational diversity in technology entrepreneurship: some experiences from France and the Netherlands', *International Journal of Entrepreneurship and Small Business*, **2**(1).
Hoffmann, K., M. Parejo, J. Bessant and L. Perren (1998), 'Small firms, R&D, technology and innovation in the UK: a literature review', *Technovation*, **18**(1), 39–55.
Hofstede, G. (2001), *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations*, 2nd edn, London: Sage.
Kaufmann, A. and F. Tödtling (2002), 'How effective is innovation support for SMEs? An analysis of the region of Upper Austria', *Technovation*, **22**, 147–59.
Koch, L.T. and T. Kautonen (2005), 'Organizing new venture support in regional networks: exploring evidence from, "EXIST – Entrepreneurs from Universities" in Germany', *Journal of Enterprising Culture*, **13**(2), 127–44.
Lee, C., K. Lee and J.M. Pennings (2001), 'Internal and external networks and performance: a study on technology-based ventures', *Strategic Management Journal*, **22**, 615–40.
Mueller, D.C. (1998), 'On the decline of nations: a historical Analysis', in P. Bernholtz, M.E. Streit and R. Vaubel (eds), *Political Competition, Innovation and Growth*, Berlin and Heidelberg: Springer.
O'Donnell, A. (2004), 'The nature of networking in small firms', *Qualitative Market Research*, **7**(3), 206–17.
Oakey, R. (1995), *High Technology New Firms*, London: Paul Chapman.
Organization for Economic Cooperation and Development (OECD) (1997), Job Creation and Growth, Paris: OECD.
Organization for Economic Cooperation and Development (OECD) (1998), Technology, Productivity and Job Creation: Best Policy Practices, Paris: OECD.
Pinchot, G. III (1985), *Intrapreneuring: Why You Do Not Have to Leave the Corporation to Become an Entrepreneur*, New York: Harper & Row.
Prince, Y.M. (2002), 'An introduction to entrepreneurship and its role in dynamism and innovation', in J. Snijders and A. Van der Laag (2002), *Entrepreneurship in the Netherlands: Innovative Entrepreneurship, New Policy Challenges*, The Hague: Ministry of Economic Affairs.
Prognos (2004), *Zukunfstatlas 2004*: Prognos AG.
Roberts, E.B. (1991), *Entrepreneurs in High Technology: Lessons from MIT and Beyond*, Oxford: Oxford University Press.
Shrader, R.C. and M. Simon (1997), 'Corporate versus independent new ventures: resource, strategy and performance differences', *Journal of Business Venturing*, **12**, 47–66.
Storey, D.J. and B.S. Tether (1998), 'New technology based firms in the European Union: an introduction', *Research Policy*, **26**, 933–46.
Trompenaars, F. and C. Hampden-Turner (1999), *Riding the Waves of Culture: Understanding Cultural Diversity in Business*, London: Nicholas Brealey.
Ulijn, J., I. Aaltio, P. van der Sijde and H. Menzel (2006b), 'Engineers as intrapreneurs, implications from their perception for their education: some Dutch-German evidence', in T. Brown (ed.), *Entrepreneurship in Action for Engineers*,

first volume in a series of 4, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Ulijn, J., G. Duijsters, R. Schaetzlein and S. Remer (forthcoming a), 'Culture and its perception in strategic alliances, does it affect the performance? An exploratory study into Dutch–German ventures', in J. Ulijn and G. Duijsters (eds), *Strategic Alliances and Culture: How Does It Matter?*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Ulijn, Jan and Alain Fayolle (2004), 'Towards cooperation between European start-ups: the position of the French, German, and Dutch engineer', in T. Brown and J. Ulijn (eds), *Entrepreneurship, Innovation and Culture: The Interaction Between Technology, Progress and Economic Growth*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar, pp. 204–32.
Ulijn, J., R. Festen and G. Duijsters (forthcoming b), 'Managing potential conflicts in a European banking alliance: a study of intro- and mutual perception combined for a better cultural fit', in J. Ulijn and G. Duijsters (eds), *Strategic Alliances and Culture: How Does It Matter?*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Ulijn, J., G. Guerra, S. Chiolo, R. Masiello and M. Pozzi (2006a), 'Cooperating in technology start ups, a local or a European entrepreneurship challenge? An Italian study compared with Dutch, British and German findings', *International Journal of Entrepreneurship and Small Business*, **3**(1).
Ulijn, J.M., A.P. Nagel and W.-L. Tan (2001), 'The impact of national, corporate and professional cultures on innovation: German and Dutch firms compared', *Journal of Enterprising Culture*, special issue on Innovation in an International Context (edited by A. Nagel, J. Ulijn and W.-L. Tan), **9**(1), 21–52.
Ulijn, J., F. Wynstra and A. Lincke (2004), 'The effect of Dutch and German cultures on negotiation strategy: an exploratory study to compare operations and innovation contexts', *International Negotiation*, special issue, on Innovation and Negotiation: Content and Style (edited by J. Ulijn and D. Tjosvold), **9**(3), 201–28.
van Elk, K. (1997), *Technology Entrepreneurs and Employment Growth*, Zoetermeer: EIM.
Walsch, S.T. and B.A. Kirchhoff (2002), 'Technology transfer from government labs to entrepreneurs', *Journal of Enterprising Culture*, **10**(2), 133–49.

Internet Sources

Syntens: www.syntens.nl.
NV Rede: www.rede.nl.

APPENDIX 7A

Table 7A.1 Questionnaire

	Question	Category	Type
1	Does your firm meet this description?	Yes No	Nominal
2	What percentage of your time is devoted to research and development?	0–10% 10–20% 20–30% 30–40% 40–50% >50%	Ordinal
3	What was your highest level of education before starting your own business?	<HBO HBO WO PhD	Ordinal
4	How many months did you devote to preparation before starting the business?	Number	Value
5	Is your company entitled to the so-called, 'WBSO subsidy'?	Yes No	Nominal
6	Is your company profitable at the moment?	Yes No	Nominal
7	What is the annual turnover of your company?	<10,000 euros 10,000–50,000 euros 50,000–100,000 euros 100,000–500,000 euros >500,000 euros	Ordinal
8	How many employees does the company have? (number of FTEs)	Number	Value
9	What is the average education level of your employees?	Mediate education Higher professional education University PhD	Ordinal
10	To what extent did you receive support from the following?		
	A Banks	(Almost) None Insufficient Sufficient A lot	Ordinal

Table 7A.1 (continued)

	Question	Category	Type
	B Chambers of commerce	(Almost) None Insufficient Sufficient A lot	Ordinal
	C Syntens	(Almost) None Insufficient Sufficient A lot	Ordinal
	D NV Rede	(Almost) None Insufficient Sufficient A lot	Ordinal
	E Universities	(Almost) None Insufficient Sufficient A lot	Ordinal
	F IP consultancy firms	(Almost) None Insufficient Sufficient A lot	Ordinal
	G* Governmental or European organizations	(Almost) None Insufficient Sufficient A lot	Ordinal
	H* Family and friends	(Almost) None Insufficient Sufficient A lot	Ordinal
11	What kind of support would you like to receive in the future? (Yes/No)	Government Techno start-ups Network Syntens (regional organizations) Financial Mental coaching Office space	Nominal
12	Why is your company based in the Eindhoven area? (Yes/No)	Social reasons Studied in Eindhoven Network of knowledge and customers	Nominal

Table 7A.1 (continued)

	Question	Category	Type
		Image of Eindhoven Other	
13	Please indicate in which field you experienced most of the problems during the start-up of your company?	Organizational Financial Commercial Technical	Nominal
14	Please indicate in which field you experience most of the problems now?	Organizational Financial Commercial Technical	Nominal
15	What exactly did you study at which university?	Study University	String String
16	What is your age?	Age	Value
17	Are you from a family with entrepreneurial background?	Yes No	Nominal
18*	What was your motivation to become an entrepreneur?	Motivation	String
19*	Do you work together with other start-ups?	Yes No	Nominal
20*	If yes, in which field? (Yes/No)	Marketing Purchasing Production R&D Other	Nominal
21*	Can you imagine working together with other start-ups in the future?	Yes No	Nominal
22*	If yes, in which field? (Yes/No)	Marketing Purchasing Production R&D Other	Nominal
23*	Can you imagine working together with start-ups from abroad in the future?	Yes No	Nominal
24*	In which field are your strengths?	Strengths	String
25*	In which field are your weaknesses?	Weaknesses	String
26*	How do you perceive your company in terms of market or technology orientation? More market orientated or more technology orientated?	1 Market orientated 2 3 4	Ordinal

Table 7A.1 (continued)

	Question	Category	Type
27	Non-response (internal question)	5 technology orientated Could not be reached No cooperation Delayed to: <time>	Ordinal

Note: *These questions are only part of the Darmstadt survey.

8. European territorial cooperation to improve competitiveness in the Union: the case of EU-funded cooperation in Central and Southeastern Europe

Ulrich Graute

INTRODUCTION

The history of European integration over the past five decades has been a striving for two different objectives: to foster economic competitiveness and to reduce regional discrepancies (Middlemas, 1995; Camagni, 2000). The economy may be competitive but if society and the environment suffer too much, the country will face major difficulties. The same happens when the economy is too weak. Therefore governments in the long run cannot focus solely on the economic competitiveness of their country; instead they need an integrated approach in order to govern effectively. The same is true on a European level and here the key term used is 'cohesion' – economic, social and recently also territorial cohesion of the Union.

Although the European Union (EU) is no state with one nation, one government and a common territory, it has developed an institutional setting which in many respects is similar to that of a state. European institutions such as the European Council, the European Parliament and the European Commission take decisions which affect the lives of all EU citizens. Competitiveness of the economy and its enterprises matters, but at the same time it is in competition with other policy objectives of the Union and its members.

This chapter features a newly emerging field: European spatial development and European territorial cooperation. While the first term applies to the informal policy of EU member states to better coordinate the territorial development of the Union, the second applies to the proposal of the European Commission to introduce a new objective into the already existing cohesion policy. Both terms have a cross-sector orientation and do not

focus on economic competitiveness. None the less, economic competitiveness is a high-ranking policy objective and therefore has to be mainstreamed into other policies such as cohesion policy. This view shows how difficult it is to mainstream an objective like competitiveness into the complex reality of Europe.

APPROACH AND METHODOLOGY

Analysing a new policy field is difficult because the subject of analysis is mainly an open process with many variables and has no clearly defined institutional context, and this is even more difficult if a new policy has a cross-sector and multilevel orientation as dealt with in this chapter. The purpose of the emerging European policy is to coordinate all national and European policies which are relevant for a 'balanced and sustainable' development of not less than the entire territory of the Union. This is an extremely ambitious objective. If a new policy grows out of existing policies (here the cohesion and regional policies of the European Community) this can be seen as an indicator for a spillover, and thus an effect which is seen by neo-functionalists as a driving force for European integration (Stone and Sandholtz, 1997). On the other hand, liberal intergovernmentalists argue that European integration is to be understood as a process following a general model of intergovernmental cooperation and not a functional automatism (Moravcsik, 1993). These two basic models have dominated discussions within integration research since its inception (Cram, 1996; Richardson, 1996; Giering, 1997). None the less, neither theory is suited to analyse the emerging new policy field: it is not clear whether such a field will be established as a permanent one and for the moment this limits an argument along (neo)functionalist model lines. In addition, the member states are the main actors and thus a driving force in the field. It is difficult to explain this using a functionalist model; on the other hand, these main actors do not strive for a clear institutional context. They are opposed to a formal EU competence in the new policy field but support the use of existing EU instruments to implement policy objectives. Is this indicative of a non-rational intergovernmental policy (Coleman and Fararo, 1992), or an innovative international regime outside the EU system (Müller, 1993)? The comparison of international regimes as analysed, for example, by Haas et al. (1993), gives some indication that the latter may be true. However, none of the approaches – (neo)functionalist, intergovernmental or regime – seems suited to explain the specific actor constellation (EU institutions plus member states), the very ambitious but vague objectives and at the same time the resistance against a new EU competence. It is even more important

to identify in this context the foreseen and real role of non-governmental actors and especially of private entrepreneurs. Therefore another approach was chosen: actor-centred institutionalism (Scharpf, 1995; Braun, 1997), which allows us to analyse the institutional context but leaves it open to consider the macro and the micro levels. This makes it possible to look for explanations for a given development by looking at general models and/or individual actions. During the 1990s, this approach became increasingly applied to the analysis of multilevel governance in Europe (Benz, 2004). With respect to the new policy field, this approach was applied by the author of this chapter within the framework of another study (Graute, 2002a).

The specific role of private actors has so far never been analysed. Policies relating to the development of the territory are traditionally dominated by the public sector. Nevertheless, when it comes to questions of competitiveness, either the private sector should be involved or it should at least benefit from the policy. Therefore underlying questions of the analysis were: how can small and medium-sized enterprises (SMEs) contribute to and benefit from transnational cooperation in the field of EU cohesion policy? How do public actors handle the challenges to promote competitiveness and at the same time to support a balanced and sustainable development of the territory? What has been achieved so far and what can and will be improved for the future?

Because of the complexity of related cross-sector, multi-actor and multilevel cooperation with its longer-term orientation, this chapter cannot deliver an analysis of the efficacy of the policy towards private actors in the field and certainly it is not possible to analyse the entire policy field. Vagueness of policy objectives and often not defined competence of actors are a day-to-day challenge for public and private actors in the field, which is why an analysis is needed, although the emerging status of the policy field limits efforts to evaluate effectiveness and efficiency of policies and politics. As a first step, we need to analyse what is happening in the field. Who is doing what and in cooperation with whom? In this respect, this chapter provides a snapshot of the current situation. The intention is to provide descriptions and to facilitate further research on and development of the cooperation between public and private actors.

THE EUROPEAN POLICY FRAMEWORK: TOWARDS COMPETITIVENESS AND SUSTAINABILITY

Cohesion Policy to Make Europe More Competitive and Sustainable

In Lisbon in March 2000, the European Council set itself a new strategic goal for the Union in the next decade: 'to become the most competitive and

dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion' (European Council, March 2000). At the Gothenburg European Council in 2001, member states agreed on a strategy for sustainable development and added an environmental dimension to the Lisbon process (European Council, June 2001; European Parliament, 2005). Five years after Lisbon, the European Commission proposed a new Partnership for Growth and Jobs (European Commission, 2005a) to the European Council of March 2005 and the Council concluded that there is still 'a gulf between Europe's growth potential and that of its economic partners'. The Council confirmed its objectives but also underlined the need to re-launch the Lisbon strategy. It was concluded that this renewed effort requires that 'the Union must mobilise all appropriate national and Community resources – including cohesion policy' (European Council, 2005). In addition, greater ownership of the Lisbon objectives on the ground was considered to be necessary, involving regional and local actors and social partners. This would be of particular importance in areas where proximity matters, such as in innovation and the knowledge economy, employment, human capital, entrepreneurship, support for SMEs or access to risk capital financing.

The relevance of cohesion policy was not a new idea. Cohesion policy had already contributed to the achievement of the Lisbon strategy before it was established in 2000. Independent evaluations show that the policy had a substantial macroeconomic impact, especially in the less-developed regions, with multiple effects on the EU as a whole (Heinelt, 1996; Hooghe, 1996; European Commission, 2004a: 149). By mobilizing the potential for growth that exists in all regions, cohesion policy improves the geographical balance of economic development and raises the potential rate of growth in the Union as a whole. Consequently, the Presidency of the Council concluded that, if the EU is to achieve its Lisbon targets, all regions – especially those where the potential for higher productivity and employment is greatest – have their part to play.

The quotations from EU institutions, cited above, are by no means exhaustive with respect to innovation, technology and entrepreneurship. Not quoted are documents such as those of the Enterprise and Industry Directorate-General of the Commission, whose policies are more directly targeted on the needs and opportunities of ventures but none the less they might raise false expectations regarding the overall and cross-sector policy of the Union. If not harmonized with other policies, the results might become counterbalanced by the results of other policies. The advantage of the selection presented above is that it indicates the interrelations between and interdependency of sector policies. Cohesion policy has a cross-sector orientation. It is the only redistributive policy of importance in an almost

regulatory project of European integration and – this should not be ignored – in terms of European financial resources, cohesion policy is second only to the Common Agricultural Policy (Hooghe, 1996: 6). This cohesion policy is aimed at greater competitiveness, but this is done within the context of other strategic objectives targeted by the European Council. The development of enterprises, high-tech and other ventures, is an instrument to make Europe more competitive and to contribute to a more balanced and sustainable development of the Union. In return it may be concluded that the relevance which entrepreneurs, their technologies and cooperation can gain depends on two aspects: first, the relevance which economic competitiveness gains within cohesion policy and, second, the products and services which economic partners develop for the achievement of overall objectives of cohesion policy.

Territorial Cooperation to Strengthen Economic and Social Cohesion

Within the framework of cohesion policy, the terms 'European territorial cooperation' and 'European spatial development' are relatively new. The former is a new objective introduced by the European Commission into the draft Structural Funds regulations for the funding period from 2007 to 2013. Cooperation is a subject of analysis in political science (Axelrod, 1997) but it is usually not discussed as a policy objective. For the Commission, cooperation on territorial development is now a target in its own right. The objective will replace the current Community Initiative INTERREG and its intention is

> to promote stronger integration of the territory of the Union in all its dimensions. In doing so, cohesion policy supports the balanced and sustainable development of the territory of the Union at the level of macro-regions and reduces the 'Barrier effects' through cross-border co-operation and the exchange of best practices. (European Commission 2004b and 2005b: 10)

Over the last five decades a complex multilevel, multisector and multiactor institutional setting has been developed step by step in Europe. Since 2004, this institutional setting has comprised the territory of 25 member states. The awareness of the related territorial dimension is relatively new, although several community policies in the 1970s and 1980s had already had a territorial impact. Most notably among them are the agricultural, regional, environmental and transport policies. None the less, for the institution which started as a European community for economic cooperation, the territory remained an issue not of European but of national relevance and competence. Eventually the discussion about the development of the European territory was intensified in the early 1990s, and in 1999 the plans

for a first European Spatial Development Perspective (ESDP) (European Commission, 1999) were finalized among member states (Williams, 1996; Faludi and Zonneveld, 1997; Blaas, 1998; Graute, 2002a, 2002b). Although it remained an informal and therefore not binding but only indicative document, it is a milestone towards shared development strategies of all member states. For the first time, EU member states recognized that the territory matters even beyond own national borders and that coordination is necessary.

Member states agreed and stated in the ESDP that the development of the territory needs to be coordinated, but also that no new competence on a European level was needed and that no centralized planning was envisaged. Therefore, no regulations were envisaged, but voluntary cooperation was considered as the key to achieve the ambitious objectives (European Commission, 1999: 35; Graute, 2004). Commonly understood is that the objectives of the economy–society–environment triangle are not independent but interrelated and interdependent. Less clearly perceived is the idea that most relevant trends take physical shape in the territory and that in return a coordinated development of the territory is necessary to contribute to the efforts of the Union to become the most competitive and dynamic knowledge-based economy in the world.

Politicians and experts are still discussing what is the most appropriate approach to develop the territory of the Union. The situation recalls the discussion on sustainability during and after the UN conference in Rio de Janeiro in 1992: all agreed in principle about the need for an integrated development but started to disagree when the common principles had to be specified and applied in practice (Graute, 1998). Yet there is a difference, because decision makers in member states and within the European Commission nowadays apply a learning-by-doing approach: while discussions about the principle of sustainability, its terminology and approaches are still going on, they take the second step in parallel and set up programmes and funding instruments to put the results of the discussions to a reality test.

Participation in European Territorial Cooperation

The challenge linked with cohesion policy and European territorial cooperation is exciting and at the same time puzzling. On the one hand, to contribute to a more sustainable development and the long-term preservation of living conditions means working at the cutting edge of life. In addition, this cross-sector thinking and working avoids the often self-made trap of a purely sector-specific view on the world. On the other hand, the subject is extremely complex and the involvement of a large number of actors from

several sectors and all political levels in the long-term process of territorial cooperation makes any prognosis on the process itself and its future achievements difficult. There is a serious risk of getting lost in the wide context of cohesion policy and territorial cooperation.

Furthermore, actors who for the first time are becoming transnational often underestimate the difficulties in setting up a transnational partner structure and in developing a common project. Time not invested in the definition of terms of reference during the early stage of cooperation often generates major problems at a later stage.

The policy framework as described so far shows that there is an ongoing process whereby governmental institutions formulate ambitious objectives for a new policy but that the same policy still remains vague. To be involved in a newly developing field is challenging and can offer many (business) opportunities: the early bird catches the worm. At the same time there is a risk of becoming confused in the unpredictable process of cross-sector and multilevel cooperation. Therefore the question of joining or not joining the cooperation process should at least be considered carefully.

European institutions in the context of their ambitious strategy for a sustainable future of the Union put considerable emphasis on the relevance of entrepreneurship, technology and cooperation. Hayek's (1983) analysis of state-initiated ventures resulted in a scepticism that was shared by others but at the same time they see a necessity for such activities (Koch and Kautonen, 2005: 129–32). With respect to the newly emerging policy field the same is true. The institutional context calls for a cautious approach, but in principle there are at least two reasons for private actors to keep an eye on the development of territorial cohesion, spatial development and related strands of cooperation.

First, in spite of catchphrases like 'virtual economies', the emergence and survival of most ventures are linked to the location of a business and its (physical) distance from the market. Even without any own interest in territorial policy, a company might be affected indirectly by a change in cohesion policy: to increase its effectiveness, structural funds are concentrated in the territory according to objectives; therefore, the location of a competitor in what is defined by the general regulation of structural funds as an objective 1 area would in itself offer this company a comparative advantage. Eligible institutions can apply for funds provided under this objective while the same would be denied outside this particular area.

Second, private firms, including high-tech ventures, are already or could become in future actively involved in European territorial cooperation. Special attention should be paid to the new policy of enterprises that offer products and services useful for territorial cooperation.

FIRST LESSONS IN TERRITORIAL COOPERATION DURING THE EARLY 1990s: THE CASE OF COOPERATION AMONG EU MEMBER STATES AND TRANSITION COUNTRIES IN CENTRAL AND EASTERN EUROPE

Limited Opportunities for Enterprises Interested in Territorial Development

In the 1990s, during the transition period of former socialist countries in Europe, the demand for expertise could not be satisfied. One of the problems was the lack of reliable data for planning. Economic and social conditions and the indicators for their assessment changed rapidly and much of the environmental information had not yet been collated. Nobody could provide the missing data. For example, there was little information on the development of transport corridors between East and West. Germany, together with Poland, Belarus and Russia, started to analyse the potential development of the transport corridor from Berlin to Moscow (Ivlichev and Khazdan, 1998) but how could this be done if data for a valid estimation of future demand were missing? This situation in the early and mid-1990s would have been an excellent opportunity for private entrepreneurs, but public and private institutions experienced the same problem: little or no access to reliable data.

In this situation the German Federal Ministry for Regional Planning, Construction and Urban Development applied a novel approach. Faced with the lack of information, in 1992 it initiated a network of spatial research institutes in Central and Eastern Europe (CEE Net) which served as an early platform to exchange information, ideas and to stimulate cooperation. The interesting point about CEE Net is that the ministry did not establish a network of ministries but rather a network of research, monitoring and planning institutions. Networking can be a stimulus for informal cooperation. Of course, it also applied to official cooperation on a governmental level but the establishment and maintenance of cooperation on this level was difficult during the transition of political systems where responsible persons and their tasks kept changing. In this situation, cooperation with researchers or other experts was without diplomatic problems and promised to generate the data and analysis necessary for planning (Graute, 1996a, 1998). CEE Net was financed with a low budget, which was just enough to organize annual conferences and the printing of a newsletter. The internet was used as an additional support tool but the limited access to the internet in most eastern countries prevented it from becoming a main networking tool during the 1990s.

Private enterprises managed to join this early cooperation only occasionally. Certainly experts and especially academics from universities and research bodies in transition countries tried to establish spin-offs. CEE Net conferences and those of other institutions were used to contact possible clients among the participating governmental bodies. Unfortunately, start-ups had practically no chance of coping with common administrative requirements such as retrospective payments: they would have had to pay for work and other related costs in advance, before their expenditures were refunded by a client. The financial support which CEE Net could give was not even sufficient to refund the travel costs of all partners of the network. Business incubators and regional development agencies did not yet exist and most Central and Eastern European governments had insufficient funds for direct support. Western governments looking for expertise in a transition country were usually not ready to take the risk of prepaying a start-up or other company without proved business competence. Altogether this generated a situation where private entrepreneurs would have needed own sources to have had a realistic chance of survival.

It would be wrong to conclude that there were no funds at all available in transition countries. Indeed, even several international agencies and foundations were active throughout the 1990s in Central and Eastern Europe. Unfortunately, their activities and those of informal networks like CEE Net too often acted in parallel and did not generate synergies. That this did not happen is less a sign of mismanagement than of different priorities. The example of the German ministry demonstrates that main actors in the field were public bodies with limited funds but with a specific need for information and cooperation. Business development in foreign countries was not their task; nor had they the necessary qualification. Instead this knowledge was available at international banks and foundations, but they had their own objectives, approaches and developed their own networks.

It is difficult to verify whether the example of CEE Net was more the rule or the exception. What can be concluded is that during the dynamic transition period many national and international institutions offered support and opportunities. None the less these were not coordinated in a way that development of a private sector was encouraged. Certainly this was not a deliberate policy. Capacity building in the private sector was not one of the priorities.

As described above, the two objectives to foster competitiveness (indicated here by adequate business opportunities for entrepreneurs) and spatial development cooperation of mostly public institutions were not coordinated. As a consequence, many opportunities to generate, for example, information and information systems, and the possibility of giving demand-driven incentives to the development of the private sector

in transition countries were missed. What happened instead was that related public institutions exchanged staff and organized other forms of know-how transfer between West and East. Certainly, this did not contribute to the development of a private sector alongside the existing old public institutions.

It would be interesting to know how many participants of networks and respective conferences used these opportunities as a starting-point either to set up an own company or to just change the employer. Unfortunately, networks were too dynamic and unstable, and no longer-term analysis of the career of participants was carried out. What can be said is that many conference participants, in spite of the many changes of the transition period, later managed to continue their career within the public sector. The important informal contacting and cooperation via networks was useful and indispensable to encourage any cooperation at all, but in the long run this approach was not sufficient. Nor was any infrastructure or framework provided for stable and longer-term cooperation for public institutions or appropriate incentives for start-ups, spin-offs or other forms of private capacity building.

In the second half of the 1990s, the situation diversifies increasingly in Central and Eastern European countries. National policies, development agencies, business incubators and so on start to give more effective support to private entrepreneurs. None the less, on the international level such companies are still not playing any significant role by the end of the decade. What does prevail is the individual expert who is still contracted to a public institution, either part- or full-time.

The lack of private entrepreneurs in transition countries offered opportunities for companies from Western Europe. They could provide know-how and organize data collections in several countries at once. It was apparently easier for already established companies from Western Europe to contribute to and to profit from East–West cooperation than it was for newcomers from the East.

Increasing Awareness of the Territorial Dimension

With the intensifying discussion on eastern enlargement of the EU in the late 1990s, the situation changed and awareness of the territorial dimension started to grow. Governments and enterprises along borders and especially along the eastern external border of the EU became aware that there are comparative advantages and disadvantages linked to the location of competitors in neighbouring countries. Nevertheless, knowledge about what would really happen following eastern enlargement was limited. Rumours and fears grew and the discussions steadily gained impetus. Again there was

the situation of the early 1990s when data and information on the real situation and a perspective on future development were missing. This time the readiness to invest was bigger and several studies have been carried out. One of them was part of the PREPARITY project which analysed the situation, formulated a forecast and aimed to prepare regional policy makers for the EU enlargement (see the section below on the Saxony/Bohemia/Lower Silesia triangle).

COOPERATION IN THE FRAMEWORK OF INTERREG PROGRAMMES FOR TRANSNATIONAL COOPERATION

The European Community Enters the Scene

Already in the mid-1990s it was clear that the dynamics and informal cooperation were insufficient to achieve targets beyond simple networking. The growing demand and interest needed a minimum of formalization and this came with the introduction of the EU Community Initiative INTERREG. Since 1989, cross-border cooperation has received financial support from the European Regional Development Fund (ERDF), one of the structural funds of the Community. The ERDF and national cofinancing constitute the financial backbone of INTERREG, which was originally committed exclusively to cross-border cooperation. In the mid-1990s, member states and the European Commission identified more and more challenges that go far beyond the smaller border area and often affect more than two countries. The development of trans-European transport corridors and flood prevention in large river catchment areas are outstanding fields where there is a need for action and intensified cooperation. This should extend not only beyond border regions but also beyond the informal interactions of the early 1990s. Effective planning of transport corridors and measures for flood prevention need a strong commitment by all areas and actors concerned. Therefore in 1996 the European Commission proposed adding a strand C to the existing INTERREG initiative and thereby established a financial instrument for transnational cooperation in the field of spatial development. The INTERREG II C initiative lasted from 1997 to 1999 (Böhme and Kokkonen, 1999; European Commission, 2000) and has been continued by the European Community since 2000 and until 2006 as INTERREG III B (European Commission, 1999: 39–41; Graute, 2002a; 2002b).

That the new initiative from the beginning was called 'transnational' and not 'international' is of relevance for the actor constellation. The difference

is that in the case of a transnational cooperation not only governmental but also non-governmental institutions are invited to cooperate. This is a specific challenge in planning-orientated policy fields such as territorial cooperation, and urban and regional planning where public actors are traditionally key players and certainly cannot be fully substituted by private institutions. Of course, coordination and planning of territorial development is generally undergoing a major change in many European countries. As part of the efforts to move from government to governance, planning is becoming even more than before a process- and dialogue-orientated activity of all relevant public and private actors. Besides the public administration, every major planning activity also usually concerns private actors, be they citizens or property owners affected by planning. None the less, governments remain key players when it comes to the development of their territory (European Commission, 1997; Müller et al., 2004).

Cooperation Mushrooms

With transition in former socialist countries proceeding, their international links intensifying and with a funding instrument such as INTERREG, the attractiveness of transnational cooperation grew enormously. In the framework of INTERREG III B, 13 programmes are being carried out. To demonstrate its growing impetus, one of the programmes, INTERREG III B CADSES Neighbourhood Programme, will be described and analysed in the following. CADSES stands for the Central, Adriatic, Danubian and Southeastern European Space, an area comprising 18 countries (Figure 8.1). Nine of them are located outside of the Union and this is why the programme is not only part of cohesion policy within the Union but it is also part of the Union's neighbourhood policy to strengthen ties with partners on the other side of the EU's external borders.

How the partnership mushroomed was analysed by the author and the result is demonstrated in Table 8.1 (see below). The first outstanding finding is how the total number of partners developed. In the section describing the informal cooperation of the early and mid-1990s, single partners were mentioned and the total number of partner institutions for most of the time was far below 100 in all Central and Eastern Europe. In the first funding period of the CADSES programme for Central and Southeastern Europe, between 1997 and 1999, a total of 211 partners made a binding commitment to one of the approved projects. In the new funding period, by autumn 2005 this figure is already more than four times higher – and the fourth call for new project proposals has just started. It is also noticeable that the number of involved partners from new member states is considerably smaller than the number for so-called old member

Source: JTS (2005).

Figure 8.1 INTERREG III B CADSES cooperation area

states: Italy, Germany, Austria and Greece. Certainly this is linked to the fact that financial beneficiaries have to be located within the Union to be eligible for funding.

The eligibility of funding is a big advantage for member states, so it is even more remarkable that most of the partners from new member states had already joined the programme before their countries became members and therefore eligible for structural funds in 2004. The same is true for the group of non-member states, with its 43 partner institutions in the old, and now already 185 institutions in the new, funding period. They are not

Table 8.1 CADSES partnership development per country between 1997 and 2005

INTERREG III B CADSES	INTERREG II C 3 calls, 1997–99	INTERREG III B 3 calls, 2002–05
Austria	30	144
Germany	27	159
Greece	10	152
Italy	15	281
Old MS	82	736
Czech R.	17	56
Hungary	27	82
Poland	13	42
Slovakia	14	33
Slovenia	15	49
New MS	86	262
Ukraine	6	5
Moldova	0	1
Romania	13	47
Bulgaria	14	39
Croatia	3	42
B+Herz	2	6
Ser+Mon	3	22
FYroMac	0	7
Albania	2	16
Non-MS	43	185
Total	211	1183

Source: JTS (2005).

eligible for funding but the non-financial benefits are apparently attractive enough to join the cooperation. Reasons for this interest are mainly linked to longer-term strategies. Partners want to join the new cooperation field as early as possible; they want to benefit from possible know-how transfer to their own institution and to make themselves ready for more substantial contributions and benefits at a later stage. Accession countries preparing for EU membership provide another reason why institutions are interested in learning how EU internal funding instruments work. A further impetus to the attractiveness of neighbourhood programmes comes with the decision to integrate within the CADSES programme not only the ERDF but also EU funds dedicated to the support of external policies. Therefore during the fourth call of the CADSES programme, partners from all partner states can apply for funding for the first time. Funding is available

through three instruments of the European Commission which are all linked to EU external policies: the PHARE programme as an instrument to prepare accession countries for EU membership is used for partners from Bulgaria and Romania; the TACIS programme providing technical assistance for the Community of Independent States is used for Ukraine and Moldova; while the CARDS programme with its focus on the Western Balkans is used for the Balkan states. The implementation of multifund projects will be complex and it is expected that implementation will cause difficulties; however, the big improvement is that for the first time partners from up to 18 countries can apply for funding with a single application.

COOPERATION IN THE FRAMEWORK OF TRANSNATIONAL PROJECTS

Up to 2006, a total of 134 projects have been selected and more than €109 million out of €161 million from the ERDF have been allocated. Including national cofinancing, a total of €279 million is available for the entire programme.

The activities undertaken are understood as a system, comprising among others transnational studies and planning activities such as development concepts or projects, programme and policy assessments (for example, environmental impact assessments/EIAs or territorial impact assessments/TIAs), the establishment of new, and extension and intensification of cooperation in existing transnational networks and associations of actors of spatial development policy, and network-related activities (staff exchange – joint training facilities and programmes). Other activities are exchange of know-how and experience between actors of spatial development policy (comparative analysis of instruments, methodologies, standards and concepts) and feasibility studies for investments. Also envisaged are small-scale investments (for example, information and innovation centres of transnational importance, information and communication technology (ICT) networks and buildings), proposed by transnational strategic concepts.

The project level is the part of the INTERREG programmes for which 95 per cent of the funds are allocated and this is also where most opportunities for non-governmental partners can be found. The partner structure developing the policy field was described by Faludi (1997) as a 'roving band of planners'. Project partners within INTERREG represent the following types of institutions: national administration for spatial and regional planning and/or in charge of implementing policies, regional and local self-governments, semi-public institutions, associations of enterprises, economic

and social partners, foundations, private companies, international organizations, universities and the media. Out of four calls for project proposals, the Steering Committee for the CADSES programme approved a total of 134 projects with 1598 partner institutions (Table 8.1). Most partners are public bodies with a strong representation of local and regional self-governments and of national authorities. Only about 10–15 per cent of partners represent private companies, foundations and other non-governmental bodies. Another 10 per cent are universities and other research institutions. Like in other contexts (Koch and Kautonen, 2005: 132), the actor structure in projects is typically heterogeneous, one reason being the potential synergies sought from cooperation between different types of institutions.

A Private Company and a University Stimulating Spatial Development and Research

Among the lead partners of projects, private companies and other non-governmental institutions are the exception. Two of the running projects where this exception applies are PLANET CENSE with the private Austrian Institute for Regional Studies and Spatial Planning (ÖIR) and ESTIA-SPOSE with the Institute of Urban Environment of the Panteion University of Athens as lead partners.

Considering the ambitious but poorly specified objectives in the policy field, INTERREG III B guidelines and the ESDP have to be specified for the application of programmes and projects in CADSES. Two flagship projects 'Vision Planet' and 'ESTIA' were already implemented as part of the INTERREG II C between 1997 and 2000. While Vision Planet was mainly concerned with the Central European, Adriatic and Danubian space, ESTIA is considering the southeastern European space. One of the aims was to formulate guidelines for strategies and policies for an integrated spatial development of CADSES. As one tangible result, the project published 'Vision Planet: Guidelines and Policy Proposals (Vision Planet GPP)' in January 2000. A working team elaborated the Vision Planet GPP with key experts from 12 countries. Documents as the guidelines for INTERREG III, the ESDP, the CEMAT Guiding Principles, together with Vision Planet GPP and ESTIA, were considered as the main reference documents for the member states when they developed the new programming period in 2000 and 2001. The Vision Planet project is currently continued in the framework of the PLANET CENSE project with 25 partners, while ESTIA-SPOSE with its 14 partners is the follow-up to the ESTIA project. Both follow-up projects are needed to maintain an in-depth dialogue. In contrast to the first funding period they now go beyond the discussion of visions and general policy options. The focus is now more on

analysing scientific and technical aspects such as the development and test application of the planning instrument for TIAs. The lead partners of these projects are involved on two levels in a public–private partnership (PPP). Not only were their projects selected by the national delegations acting as decision makers on the programme level, but PPP is also a day-to-day task since some national ministries are directly participating in projects. In this way non-governmental bodies stay in close contact with their clients and thus ensure the dialogue envisaged by the projects (Project codes: ESTIA-SPOSE 3B036 and PLANET CENSE 3B077; see Vision Planet, 2000; CIP, 2005; JTS, 2005).

Public and Private Lead Partners Striving for Competitiveness

The Go Network project

Twelve partners from seven countries have created a pilot project, intended as a form of technical assistance to the creation of a specific guarantee system to the improved implementation of an already existing guarantee scheme. As a result, among things, it is expected to extend the existing 'SME Guarantee Facility' operated by the European Investment Fund (EIF) to EU accession countries (Project code: 3B059; see JTS database and JTS, 2005).

The TECPARKNET project

TECPARKNET is led by Innofinanz, a research and development agency of Styria in Austria. It is a project interlinking existing technology parks or business incubators in order to search for synergies and to prevent overincubation or other unsound developments. The benefit for entrepreneurs and especially for high-tech ventures coming from this project is indirect: it will be the improved institutional setting and concept of technology parks that improves their services for private companies (Project code: 2A076; see JTS database and JTS, 2005).

The READY project

Rehabilitation and development of former coalmining areas is the focus of this project, initiated by the German municipality of Ölsnitz, together with other small and medium-sized cities in Central Europe. Starting-points for the project are the large-scale environmental impact and the urban development problems which form a barrier for structural change. Private entrepreneurs are mainly involved as contractors for related engineering tasks, but the private sector will also profit from the better knowledge, for example concerning the geological risks of investments in former mining regions (Project code: 3B054; see JTS database and JTS, 2005).

The IMONODE project

The Hellenic Institute of Transport is lead partner of IMONODE, a project searching for the efficient integration of cargo transport modes and nodes mainly in the Adriatic region. The present supply chain of perishable products is based on a highly fragmented production system in all countries of the CADSES area and a progressive development of the modern retail formats (multiple and supermarket chains) in the southern and eastern parts of this area. Through the works of pilot action FRESHLOG of the project it was found possible to adapt and develop the wholesale market structures by encouraging and supporting the development of a distribution platform of multiple chains within or in proximity to the wholesale markets area with the aim of increasing the critical masses of goods per single destination through the utilization of full cargoes. These 'new' structures, such as Cesena-Taranto platforms and distriparks, provide an example of PPP with major forwarders, producers, municipal and regional authorities targeting the same market field (Project code: 2A077; see JTS, 2005; Regione Emiglia Romagna, 2005 and information provided by the lead partner).

What is not visible from the statistics of project partners is the role of private and other non-governmental bodies such as subcontractors of official partners. Most public partners use at least a part of their funds acquired with the project approval to pay experts to manage the projects on a day-to-day basis, to carry out studies or to develop IT-based tools for analysis and cooperation. One example where subcontractors were the driving force in the background and produced the results is the PREPARITY project. Ministries from Germany and Austria were defined as project partners in the terms of reference for the study, and after the approval of EU funding they tendered for the study. It is precisely this strong project involvement of subcontractors which allows the statement that most output produced and impacts stimulated by the programme are due to contributions from private or semi-public institutions.

The Saxony/Bohemia/Lower Silesia Triangle: Transnational and Cross-border Projects to Improve Conditions for Economic Development and Cooperation

Economic analysis and perspective

The transnational PREPARITY project of INTERREG II C CADSES aimed to prepare policy makers of the regions located on the Central European border of the EU for EU enlargement. Initiators and partners of the projects were national ministries for the economy of Germany and Austria. Between 1998 and 2001, institutes for economic research in

Germany (Institut für Wirtschaftsforschung, Ifo and GEFRA), Austria (WIFO) and Italy (ISDEE) carried out a study to develop decision-making aids in preparation for the accession of Central and Eastern European countries to the EU. PREPARITY delivered the basis for a strategic concept for economic regional development and planning for the Central European border areas. Geographically, the study concentrated on the Austrian, German and Italian regions on the EU border. Five neighbouring Central European states (Poland, the Slovak Republic, Slovenia, the Czech Republic and Hungary) were included in the analyses. The Saxony/Bohemia/Lower Silesia triangle is a focus of the study but it is analysed in parallel which allows comparisons with other areas. The interdisciplinary approach of the project (economics, regional planning and geography) guaranteed that a variety of instruments in the area of policy consulting were provided for decision makers and that the final draft concept is operational.

The results of the project were mixed with respect to the relevance of eastern enlargement but they did not confirm widespread fears of private companies. Instead, they demonstrated new opportunities resulting from opening the borders. For example, the border regions of eastern Germany and Bavaria were about to gain centrality. None the less, competitiveness would be influenced in a positive or negative way depending on the sector and location along the border. Studies like these provided public and private institutions alike with important data and information they needed to prepare for the 2004 enlargement. At the same time, the study specified the impact which national policies for the development of the territory have on economic development. The various studies cannot, and therefore usually do not intend to, deliver blueprints for individual business strategies. They merely help public and private partners to find their own way in a situation which is becoming both more differentiated and more complex (Ifo Dresden studien, 2001).

Economic cooperation

Practical cooperation across the border started slowly. During the 1990s, actors on the German side were busy with German economic integration and with transition within Eastern Germany. Early promotion efforts to stimulate cooperation along the border between Saxony and Lower Silesia were not very successful. For example, in the early 1990s the 'Perlen entlang der Neiße' project tried to stimulate investments into research and innovation on the German side, while indicating that on the Polish side investors could take advantage of the low labour cost for production (Graute, 1993).

Nevertheless, the use of comparative advantages on both sides of the border for a common benefit has remained part of the Saxon strategy for

economic cooperation (Saxon State Minister, 2005). In recent years many initiatives have been launched. Studies such as PREPARITY helped to outline perspectives while the EU Community Initiative INTERREG III A helped to prepare the ground for entrepreneurs. The 'A' stands for cross-border cooperation and this means that all projects have a direct focus on the threats and opportunities of border regions. What developed in Saxony and its neighbouring regions are economic forums like the Polish–German 'info' days for economic cooperation. They provide information on funding opportunities but most importantly they bring together entrepreneurs from both sides of the border. In 2004, 68 German and 59 Polish companies availed themselves of this opportunity. In addition, some branches of industry developed cross-border networks like the 'Unternehmerkreis Metall- und Maschinenbau Oberlausitz' (MEMA), which is a network of companies in the field of ceramics and engineering. This cooperation receives financial support from INTERREG while state aid to national or transnational companies is not subject to INTERREG funding (www.interreg 3a.infi).

In conclusion it can be said that public efforts to support economic cooperation via INTERREG are efforts to lower and remove barriers. They can also stimulate cooperation between companies, but the success of economic cooperation ultimately depends on the use which entrepreneurs make of it. This also means that scepticism of relevant state-initiated impulses should be limited to the efficacy of the stimulation given and should not be mixed up with the efficacy of the resulting cooperation between entrepreneurs.

Risks and Opportunities: Cooperation in a Multilevel Institutional Context

Each project described above has its own objectives and internal work scheme. Beugelsdijk and Noorderhaven (2003) found that regions differ in entrepreneurial attitude, and that a high score on entrepreneurial characteristics is correlated with a high rate of regional economic growth. The analysis carried out for this chapter confirms related findings to a certain extent. The reservation comes from the fact that analysed projects have by definition a cross-border or transnational structure which makes it difficult to differentiate projects according to characteristics and the rate of one entrepreneur or one region. In addition, the work of private and public institutions is also interrelated with cooperation on the programme level. This makes the institutional context more complex but it offers additional opportunities.

In political and administrative science the risks related to such complex settings are a matter of concern, because structures of manifold interrelated

arenas include the risk of ending in a joint decision trap (Scharpf, 1985) where a veto position by one actor or arena can prevent progress. This risk can at least be reduced by keeping the coupling between the arenas loose (Benz, 1998). The term 'loose coupling' goes back to earlier approaches in administrative science (Weick, 1976, 1985) which focus on coupled elements within and between organizations. These elements are interrelated and interlinked but they also have '[their] own identity and some evidence of [their] physical and logical separateness' (Weick, 1976: 3). Loose and tight coupling are to be understood not just as two opposite models. Instead they may apply at the same time and be responsive. The links between the arenas are not always formalized and actions taken in one arena do not always depend on those in another.

To understand this is essential for any public or private actor trying to survive in, and to profit from a complex institutional context. Figure 8.2 shows the cooperation scheme of the analysed programme as a composition of different arenas (that is, contexts of cooperation like committees, secretariats, projects and so on which are connected with one another). To reduce complexity, different tasks are assigned to different arenas. A close look at the structure in INTERREG cooperation also shows that many actors are involved in more than one arena. This offers private actors, for example, several options to contribute to cooperation. A company may be involved as a partner or even act as lead partner in a project arena while at the same time it participates on a European level in open discussions about the future development of cohesion policy.

According to Figure 8.2, several arenas like the European Commission and the Monitoring Committee are without private participation. None the less, these arenas and related institutions need, for example, expertise, and they receive it from external experts working for them. In this respect the Commission or national delegations may prepare their committee participation by using external expertise from a consultant or research body. Among these consultants are international consulting firms but also individual experts. It may and does happen that, for example, a Czech delegation attends a committee meeting with support given by a Greek consultant, or that a German lawyer consults a group of member states regarding their possible reaction on a proposal of the Commission. The role of private companies differs here from case to case and depending on the request of the client.

There are also standardized forms of external input, for example each programme is monitored before the beginning (*ex ante*), halfway through its implementation (mid-term) and at the end (*ex post*) according to rules fixed in the general regulation of the structural funds. Of course, detailed fixing of the terms of reference is done by each programme and may differ

Level	Arena	Actors	Primary function of actors
Community level	European consultations	← Commission, member states, regions, respectively other public and non-governmental institutions	← Information, exchange of experiences and discussion
	European Commission	← General directorates, members of Commission, EU delegation	← Decision about interventions, approval of operational programme
Transnational programme cooperation	Programming	← Commission, member states; partly supported by non-governmental institutions	← Development of operational programme
	Monitoring Committee	← Commission, member states, regions	← Monitoring of programme implementation
	Steering Committee	← Member states, regions (Commission)	← Approval of project proposals
	Managing and Paying Authority (MA/PA)	← Italian Ministry of Infrastructure and Transport	← Contracting, monitoring etc.
	Joint Technical Secretariat	← Employees of the JTS	← Coordination, assessment and consulting
National programme cooperation	National Committees	← National and regional administration; representatives of economic and social partners	← Decision about national project proposals
	CADSES contact points in partner states	← Located either at governmental, close to government or non-governmental bodies	← Coordination, assessment and consulting
Project level	Project coordinators and partners	← Private and public legal bodies	← Project development and implementation
	Initiators of projects	← Private and public legal bodies, individuals	← Initiating of innovations in spatial development and spatial development policy

Source: Based on Graute (2002a: 190–91).

Figure 8.2 Multilevel cooperation in the framework of INTERREG III B CADSES neighbourhood programme

depending on programme priorities. Institutions contracted for these evaluations can be private or public, but to prevent conflicts of interest, public bodies working for one of the national governments have only limited opportunities. As a consequence, most evaluations are carried out by private companies or other independent experts (for example, experts from universities or research institutions). Because of the mostly policy- or management-orientated tasks of programme bodies, high-tech ventures are only in specific situations required on levels higher than the project level. One of these situations is the period when the management system has to be set up. In some cases, ICT-based management and monitoring systems are only self-made products of public bodies without external support.

INTERREG cooperation is a specific example of a 'loose coupling' (Kent County Council, 1999; Graute, 2002a, 2002b, 2004). Transnational cooperation in the field of spatial development does not have a hierarchy with one actor or arena inhabiting a central decision-making competence. It is unusual that an informal and thus indicative policy is financed by a formal instrument belonging to a different policy field. The reason is that member states want territorial cooperation on the European level but they do not want to have an additional decision-making competence on the European level. Therefore they keep the policy informal and instead of institution building they just use an already existing funding instrument. The competence for planning remains at the national, regional and local levels. With respect to the coupling, this means that it is relatively tight as far as it is regulated via the structural funds regulation of the European Council. It is relatively loose as far as the common implementation of European and national policies for spatial development is concerned. Member states have an exit option and often mixed interests on the European level. These mixed interests are relevant for the understanding of decision making by national delegations in transnational committees. Knowing that more and more problems in spatial development need cooperation with neighbouring and other countries, member states are ready to foster transnational cooperation and development. Knowing that the legitimate task of national and regional administration is to implement national and regional policies, they raise their voice or even veto developments not in line with national interests. The ambitious objective of a balanced and sustainable development of the territory in Europe will be achieved, but for this no structural changes are considered necessary. There is no proof of validity of this argument but certainly it is useful to prevent a reduction of national competence and an establishment of a new European competence.

Although fostered by themselves, the protection of own competence has negative consequences for national and regional actors. They hesitate to delegate more innovative work to non-governmental institutions. As a

consequence, many governmental actors find themselves in a situation where they deal with technical details of day-to-day project management instead of focusing on political decisions, their preparation and strategies for their implementation.

Politicians and administrators need external input but they remain hesitant towards external influence. Representatives of governmental institutions tend to control procedures and they try to prevent the case where the process of a cooperation is controlled by others and their own influence is reduced. To understand this better it has to be understood that the public institutions are liable for the funds they spend, and they are responsible to parliaments and governmental leaders for the policies they implement. Therefore the readiness to delegate any responsibility is usually limited to small work packages that can be supervised easily. The hesitation is understandable but it has the consequence that not all the innovative potential and not all the advantages of a loose coupled institutional setting can be utilized.

CONCLUSION AND OUTLOOK

The development of the territory is part of the services of general interest (*Daseinsvorsorge*). It is within the responsibility of governments to ensure that minimum living conditions are provided for each individual and for the whole of society. Formal competences for territorial planning vary from country to country but in principle territorial planning and European territorial cooperation are necessary everywhere in order to fulfil this responsibility. Therefore it would make no sense to fully privatize coordination of spatial development and European territorial cooperation. None the less, there is no reason why all developments related to the territory should be understood only as a public issue.

A balanced and sustainable development of the territory and at the same time fostering global competitiveness of the EU are extremely ambitious objectives, but to put them on the agenda of politics and administration is a reaction to a given challenge. What is surprising is that spatial development and European territorial cooperation are issues which so far have been addressed by a relatively small number of mainly public actors. Partly this is due to the informal character of the policy but in principle, territorial development is affecting every EU citizen and therefore more should raise their voice when it comes to related discussions and developments.

At first glance it seemed that there would be a declared but not real link between the Lisbon objectives (competitiveness) and practical work to achieve more competitiveness. Is the Lisbon strategy just a label which

hides other interests? The strategy matters for European territorial cooperation but with a wider perspective. It can be concluded that actors in such cooperation primarily mean competitiveness of the regions (sic!) when they talk about the Lisbon objective 'to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion' (European Council, March 2000). Competitiveness of entrepreneurs, high-tech ventures and their cooperation is not ignored. It is even the focus of many projects, as the description of projects in this chapter demonstrates. None the less, it is just one – although an important – aspect of the cross-sector cohesion policy. For entrepreneurship this might appear to be only a secondary role assigned to the private sector but instead it is the integrated view of the private sector economy as part of an overall context.

In spite of the fact that a strong role of governmental and other public institutions is appropriate in spatial development and European territorial cooperation, the relatively small number of private and other non-governmental institutions acting as lead and project partner is questionable. Many opportunities to outsource tasks and to use external input remain unused although the institutional setting offers flexibility (for an alternative model, compare Flyvbjerg, 1998). The loose coupling allows various forms of cooperation among public and private partners even on higher political levels while the project level is suited to outsourcing even those tasks which require the intensive work of experts over a number of years. In this way, INTERREG programmes like INTERREG III B CADSES offer numerous options for innovative forms of governance.

That these options are used only cautiously is because the cross-sector, multilevel and multi-actor constellation is apparently too complex. While it is necessary to keep the view on the challenge as it is, the same challenge needs to be and can be reduced to an extent that it is operational for day-to-day work. A minimum harmonization regarding a better clarification of the terminology, objectives, priorities and the institutional setting would certainly make the development of terms of reference for cooperation partners easier. Once harmonization of a minimum number of aspects is achieved these aspects do not have to be discussed again as it is in informal cooperation where achievements can be questioned and changed at any time. The cooperative work on harmonization helps all actors to reduce complexity. As long as this is not done the risk of investments by private actors remains too high and innovation will depend primarily on the innovative potential of actors from the public sector.

Provided that the objectives and other terms of reference are further developed, funding instruments like INTERREG or the future objective 3 of structural funds will become more effective and efficient instruments for

a development towards competitiveness and sustainability. The problem-solving capacity of the related European institutions could be increased (Scharpf, 1997; Benz, 2000). Considering the cross-sector, multi-actor and multilevel orientation, these instruments are unique and indispensable for an integrated development in Europe. Certainly, the ambitious objectives in the field can only be achieved with a long-term orientation. It is difficult to harmonize fast-changing economic conditions in a globalizing world with an integrated and long-term coordination of territorial development, but this is exactly the challenge that has to be faced.

BIBLIOGRAPHY

Axelrod, R. (1997), *Die Evolution der Kooperation*, München und Wien: Oldenbourg Verlag.

Benz, Arthur (1998), 'Politikverflechtung ohne Politikverflechtungsfalle – Koordination und Strukturdynamik im europäischen Mehrebenensystem', *Politische Vierteljahresschrift*, **3** (39), Opladen: Westdeutscher Verlag, pp. 558–89.

Benz, Arthur (2000), 'Entflechtung als Folge von Verflechtung, Theoretische Überlegungen zur Entwicklung des europäischen Mehrebenensystems', in Edgar Grande and Markus Jachtenfuchs (eds), *Wie problemlösungsfähig ist die EU? Regieren im europäischen Mehrebenensystem*, Baden-Baden: Nomos Verlagsgesellschaft, pp. 141–63.

Benz, Arthur (ed.) (2004), *Governance – Regieren in komplexen Regelsystemen*, Wiesbaden: Verlag für Sozialwissenschaften.

Beugelsdijk, Sjoerd and Niels G. Noorderhaven (2003), 'Opening the black box of regional culture. Entrepreneurial attitude and economic growth in 54 European regions', in Wil Arts, Jacques Hagenaars and Loek Halmann (eds), *The Cultural Diversity of the European Union*, Leiden: Brill, pp. 95–117.

Blaas, Wolfgang (ed.) (1998), *A New Perspective for European Spatial Development Policies*, Aldershot: Ashgate.

Böhme, Kai and Merha Kokkonen (1999), 'INTERREG II C CADSES Interim Evaluation', Nordregio Working Paper no. 7, Nordregio: Stockholm.

Braun, Dietmar (1997), 'Handlungstheoretische Grundlagen in der empirischanalytischen Politikwissenschaft', in Arthur Benz und Wolfgang Seibel (eds), *Theorieentwicklung in der Politikwissenschaft – eine Zwischenbilanz*, Baden-Baden: Nomos Verlagsgesellschaft, pp. 45–73.

Camagni, Roberto (2000), 'Giustificazione teorica, principi e obiettivi di politiche di competitività territoriale in un'era di globalizzazione e nuovi ruoli per la pianificazione', in Umberto Janin-Rivolin (ed.), *Le politiche territoriali dell'Unione europea – esperienze, analisi, riflessioni*, Milan: Franco Agneli, pp. 165–93.

Coleman, James S. and Thomas J. Fararo (eds) (1992), *Rational Choice Theory, Advocacy and Critique*, Newbury Park, CA, London, New Delhi: Sage.

Community Initiative Programme (CIP) (2005), 'INTERREG III B CADSES Neighbourhood Programme', approved 17 December 2004 by the European Commission, last modification 24 November 2005, C(2005)4643, Brussels.

Cram, Laura (1996), 'Integration theory and the study of the European policy process', in Jeremy Richardson (ed.), *European Union, Power and Policy-making*, London and New York: Routledge, pp. 40–58.
European Commission (1997), 'The EU compendium of spatial planning systems and policies', *Regional Development Studies*, **28**, Luxembourg.
European Commission (1999), 'ESDP – European Spatial Development Perspective, towards balanced and sustainable development of the territory of the European Union', Luxembourg.
European Commission (2000), 'Community initiative INTERREG II 1994–1999: An initial evaluation', January, Brussels.
European Commission (2004a), 'A new partnership for cohesion: convergence–competitiveness–co-operation: third report on economic and social cohesion', Luxembourg.
European Commission (2004b), 'Proposal for a Council regulation laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund', COM(2004)492, 14 July, Brussels.
European Commission (2005a), 'Communication to the Spring European Council "Working together for growth and jobs – a new start for the Lisbon Strategy" ', COM(2005)24, 2 February, Brussels.
European Commission (2005b), 'Cohesion policy in support of growth and jobs: community strategic guidelines', 2007-2013, COM(2005)0299, 5 July, Brussels.
European Council (2000), 'Presidency conclusions', 23 and 24 March.
European Council (2001), 'Presidency conclusions', 15 and 16 June.
European Council (2005), 'Presidency conclusions', 22 and 23 March.
European Parliament (2005), 'Adaptation of cohesion policy to the enlarged Europe and the Lisbon and Gothenburg Objectives', study, provisional version, Directorate-General for Internal Policies, IP/B/REGI/ST2004-2008, January.
Faludi, Andreas (1997), 'A roving band of planners', *Built Environment*, **23** (4), 281–7.
Faludi, Andreas (ed.) (2002), *European Spatial Planning*, Cambridge, MA: Lincoln Institute of Land Policy.
Faludi, Andreas and Wil Zonneveld (eds) (1997), 'Shaping Europe: the European spatial development perspective', *Built Environment*, **23** (4), 257–66.
Flyvbjerg, Bent (1998), *Rationality and Power, Democracy in Practice*, Chicago and London: University of Chicago Press.
Giering, Claus (1997), *Europa zwischen Zweckverband und Superstaat, Die Entwicklung der politikwissenschaftlichen Integrationstheorie im Prozeß der europäischen Integration*, Bonn: Europa Union Verlag.
Graute, Ulrich (ed.) (1993), *Wirtschaft in Sachsen*, Dresden: Landeszentrale für politische Bildung in Sachsen.
Graute, Ulrich (1996a), 'The European dimension in regional sciences and the network of spatial research institutes in Central and Eastern Europe', in Wotte et al. (eds), pp. 279–92.
Graute, Ulrich (ed.) (1996b), *Vision and Strategies Around the Baltic Sea 2010 and their Relevance to Central and Eastern Europe*, IÖR-Schriften, vol. 17, Dresden: Institut für ökologische Raumentwicklung.
Graute, Ulrich (ed.) (1998), *Sustainable Development for Central and Eastern Europe: Spatial Development in the European Context*, Berlin, Heidelberg and New York: Springer.
Graute, Ulrich (2002a), 'Kooperation in der Europäischen Raumentwicklungspolitik – Mehrebenenkooperation in komplexen Politikprozessen analysiert am Beispiel

der Formulierung und Implementierung einer Politik zur integrierten Entwicklung des europäischen Raums', IÖR-Schriften, vol. 34, Dresden: Institut für ökologische Raumentwicklung.

Graute, Ulrich (2002b), 'ESDP and INTERREG II C – applying an informal policy of the member states with help of a formal intervention of the Community', in Borislav Stojkov (ed.), *Danubian and other Planning Issues*, Belgrade: University of Belgrade, pp. 1–16.

Graute, Ulrich (2004), 'Politikverflechtung in der Politikverflechtungsfalle. Kooperation im Mehrebenensystem der Europäischen Raumentwicklungspolitik', *Raumforschung und Raumordnung*, **1** (62), Jahrgang, Carl Heymanns Verlag: Cologne, 18–26.

Haas, Peter M., Robert O. Keohane and Marc A. Levy (eds) (1993), *Institutions for the Earth, Sources of Effective International Environmental Protection*, Cambridge, MA and London: MIT Press.

Hayek, F.A. (1983), *Knowledge, Evolution, and Society*, London: Adam Smith Institute.

Heinelt, Hubert (ed.) (1996), *Politiknetzwerke und europäische Strukturfondsförderung, Ein Vergleich zwischen EU-Mitgliedstaaten*, Opladen: Leske & Budrich.

Heinelt, Hubert, Tanja Kopp-Malek, Jochen Land and Robert Reissert (eds) (2005), *Die Entwicklung der EU-Strukturfonds als kumulativer Politikprozess*, Baden-Baden: Nomos.

Hooghe, Liesbet (ed.) (1996), *Cohesion Policy and European Integration: Building Multi-Level Governance*, Oxford: Oxford University Press.

Ifo Dresden studien (2001), *EU-Osterweiterung und deutsche Grenzregionen*, 2 vols, Jürgen von Riedel and Gerhard Untiedt (eds), no. 28/I, Munich.

INTERACT (2005), *A Study of the Mid Term Evaluations of INTERREG Programmes for the Programming period 2000 until 2006*, carried out by University of Strathclyde, European Policy Research Centre, Glasgow, UK, Vienna: INTERACT Programme Secretariat.

Ivlichev, Ivan and Isaac Khazdan (1998), 'Regional development concept for the Brest–Minsk–Orsha section of the Berlin–Moscow Trans-European transport corridor', in Graute (ed.), pp. 281–97.

Joint Technical Secretariat (JTS) (2005), *INTERREG III B CADSES Neighbourhood Programme: Project Book*, 2nd edn, JTS: Dresden.

Joint Technical Secretariat (JTS) (2006), *Projects in Progress INTERREG III B CADSES Neighbourhood Programme: Project Book*, 3rd edn, JTS: Dresden, pp. 160.

Kent County Council and European Commission – Directorate XVI: Regional Policy and Cohesion (1999), *Study of the Role and Operation of Transnational Management Structures in Achieving Effective Implementation of Transnational, Cross-border and Inter-regional Programmes*, Final Report, Revised Version, June 1999, Bristol: University of the West of England.

Koch, Lambert and Teemu Kautonen (2005), 'Organizing new venture support in regional networks: exploring evidence from "EXIST – entrepreneurs from universities" in Germany', *Journal of Enterprising Culture*, **13** (2), June, 127–44.

Middlemas, Keith (1995), *Orchestrating Europe, The Informal Politics of the European Union 1973–1995*, London: Fontana.

Moravcsik, Andrew (1993), 'Preferences and power in the European Community: a liberal intergovernmentalist approach', *Journal of Common Market Studies*, **31**, 473–524.

Müller, Bernhard, Stephan Löb and Karsten Zimmermann (eds) (2004), *Steuerung und Planung im Wandel*, Wiesbaden: Verlag für Sozialwissenschaften.
Müller, Harald (1993), *Die Chance der Kooperation: Regime in den internationalen Beziehungen*, Darmstadt: Wissenschaftliche Buchgesellschaft.
Regione Emiglia Romagna, Assessorato Mobilitá e Trasporti (2005), *Perishable Goods Logistics, Feasibility Analysis and ICT Solutions*, Quaderni del Servizio Pianificazione dei Trasporti e Logistica, Bologna: Servizio Stampa e Informazione della Giunta Regionale.
Richardson, Jeremy (ed.) (1996), *European Union, Power and Policy-making*, London and New York: Routledge.
Saxon State Minister – Staatsminister Winkler (2005), 'Sachsen, Böhmen und Niederschlesien sollen wieder ein zusammenhängender starker Wirtschaftsraum werden', press release, Sächsische Staatskanzlei, Dresden, 28 November.
Scharpf, Fritz W. (1985), 'Die Politikverflechtungs-Falle: Europäische Integration und deutscher Föderalismus im Vergleich', *Politische Vierteljahresschrift*, **26**, 323–56.
Scharpf, Fritz W. (1995), *Games Real Actors Play: Actor-Centered Institutionalism in Policy Research*, Boulder, CO and Oxford: Westview Press.
Scharpf, Fritz W. (1997), 'Introduction: the problem-solving capacity of multi-level governance', *Journal of European Public Policy*, **4** (4), December, 520–38.
Stone Sweet, A. and W. Sandholtz (1997), 'European integration and supranational governance', *Journal of European Public Policy*, **4** (3), 297–317.
VASAB 2010 Secretariat (1994), 'Vision and strategies around the Baltic Sea 2010: towards a framework for spatial development in the Baltic Sea region', Baltic Institute, Karlskrona.
Vision Planet (2000), 'Strategies for integrated spatial development of the Central European Danubian and Adriatic area: guidelines and policy proposals', approved at the seminar of the project panel Vienna, 12 January.
Weick, Karl E. (1976), 'Educational organizations as loosely coupled systems', *Administrative Science Quarterly*, **21** (1), 1–19.
Weick, Karl E. (1985), *Der Prozess des Organisierens*, Frankfurt: Suhrkamp.
Williams, Richard Hamilton (1996), *European Union Spatial Policy and Planning*, London: Paul Chapman.
Wotte, Joris, Bernd J. Kramer and Wolfgang A. Halang (eds) (1996), *Environmental Engineering and Pollution Prevention. European Network of Excellence and Partnership*, Dordrecht, Boston and London: Kluwer Academic Publishers.

PART THREE

The cultural levels of nation, gender, profession, sector and region in emergence, cooperation and survival

9. High-tech start-ups and innovation journeys: strategic shifts, culture and networks

Ingrid A.M. Wakkee, Aard J. Groen and Reinier Heerink

INTRODUCTION

Although the need for sustained and ongoing industrial innovation on the micro, meso and macro levels seems to be clear for theory and practice (Van der Ven et al., 1989; Rip, 2004), there is only limited transparency regarding the successful organization of innovation processes in entrepreneurial ventures and how this led to value creation (Rip, 2004). Innovation processes evolve simultaneously over time on micro, meso and macro levels of aggregation; they are complex, contingent and uncertain expeditions into unexplored areas, and as such they can be characterized as 'innovation journeys' (for example, see Van der Ven et al., 1989, 1999; Rip and Groen, 2001). During the innovation journey, entrepreneurs encounter tensions due to the conflicting demands of exploration and exploitation activities (March, 1991; De Weerd-Nederhof, 1998; Rip and Groen, 2001; Nooteboom and Gilsing, 2004; Gilsing and Nooteboom, 2005). These tensions must be resolved in order to be able to create both short- and long-term value and to ensure company survival. In doing so, entrepreneurs have to take into consideration the emerging company culture and the culture of the profession or industry. The culture, after all, provides the framework in which the company operates and as such it sets the boundaries between which managers can manoeuvre. In this chapter we therefore explore the following question: how do new technology-based ventures use social networking to create value in the short and long terms through the pursuit of different opportunities from a single technological innovation, in a way that fits the entrepreneur's professional culture and the venture's emerging corporate culture?

In order to answer this question we consider the following subquestions:

- How do entrepreneurs use their network for exploration and exploitation of knowledge and technology?

- How do entrepreneurs use their network to determine which opportunities to pursue?
- What is the role of professional culture in the innovation journey of young high-technology ventures?

We argue that by combining a social-system perspective (Groen, 2005), with the concepts of strategic flexibility and operational effectiveness (as a specification of exploration and exploitation) (for example, De Weerd-Nederhof, 1998; Groen et al., 2002), a theoretical framework emerges that can guide the analysis of how high-tech small firms (HTSFs) and their founders manage the tensions along the innovation journey and in the process of pursuing opportunities for business. Our empirical exploration in which we shall apply this framework is based on a comparison of two Dutch cases (Eisenhardt, 1989; Yin, 1994). From the observations of these case studies and a discussion of the findings we formulated several implications for managers.

THEORETICAL FRAMEWORK

Entrepreneurship and Innovation

In this study, we explore the link between entrepreneurship, opportunities and innovation journeys. It was Schumpeter who pointed at innovativeness as the key ingredient of entrepreneurship (Schumpeter, 1934). He defined innovation as the introduction of a new product or a new quality of a product, a new method of production, a new market, a new source of supply of raw materials or half-manufactured goods and finally, implementing the new organization of any industry (ibid.). Defined in this broad sense, all entrepreneurial behaviour can thus be considered innovative as it entails the discovery and implementation of new ideas, or in other words, the recognition and exploitation of opportunities for business (Venkataraman, 1997; Davidsson, 2004; Van der Veen, 2004). However, innovation does not always result in the creation of profit or wealth (Guth and Ginsberg, 1990; Rogers, 1995), or an impact on the market (Stopford and Baden-Fuller, 1994; Wiklund, 1998). It is the exploitation of opportunities resulting in economic value creation that separates entrepreneurship from innovation (Sexton and Camp, 1993; Churchill and Muzyka, 1994).

Here, we study innovation processes based on new technological developments, thus specifying a technological dimension of the entrepreneurial process. In short, the entrepreneurial process can be defined as a process that starts when an individual or organization gets a business idea, leading

to the recognition of an opportunity; develops it to a business concept and prepares for exploitation; and finally brings it to the point of exploitation and seeks growth in value creation. This process is driven by the entrepreneur (or entrepreneurial team). Also it takes place in the context of the network and is influenced by this network (Elfring and Hulsink, 2003; Van der Veen and Wakkee, 2004; Groen, 2005). The development and introduction of new technologies (or other types of new combinations) offers opportunities for knowledge-intensive entrepreneurship, and as such may form the starting-point for entrepreneurial processes (Walsh et al. 2002; Groen, 2005). Alternatively, by pursuing different opportunities, as they come along, ventures create value (and build a capital base) that can be used to invest in the entrepreneurial process, ensuring both long- and short-term survival. These relationships are graphically represented in Figure 9.1

As suggested by Shane (2000), Garud and Karnoe (2001) and Rip (2004), often a single scientific or technological discovery leads to multiple possible paths. Each of these paths can lead to technological options or novelties, just like a mutation in biological evolutionary theory. In some cases, it is apparent from the start that the discovery can be used to create value in multiple ways, but in other cases the different opportunities for business only become apparent during the entrepreneurial process. We regard the combination of development of technologies in interaction with entrepreneurial processes as the process we call 'innovation journey', extending the primarily project-orientated view from Van der Ven et al. (1999) to a firm-level view. In this chapter we focus on the micro level of firms developing in the context of a technological development.

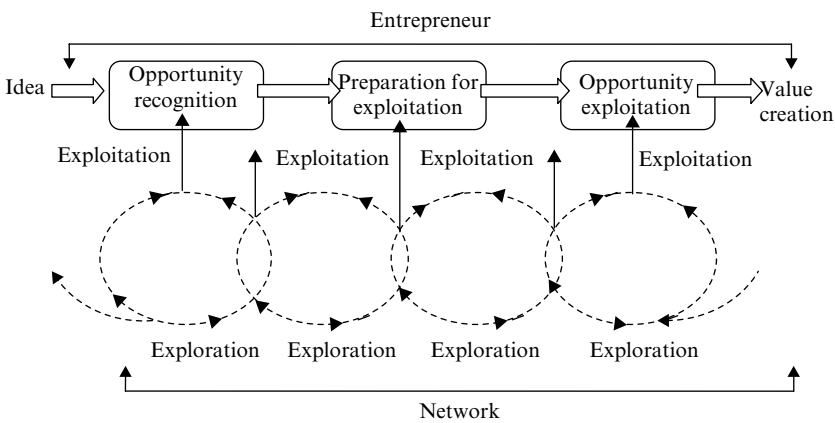


Figure 9.1 Entrepreneurial process and innovation journey

Analysing Exploration versus Exploitation and Shifts in Opportunities

Which of the potential paths is followed and what opportunities will be pursued is dependent on a large variety of variables, including the personal preference of the key decision maker and the presence of competitors and competing technologies. In individual companies working on aspects of the innovation journey, the path is influenced by the professional culture of the most dominant functional departments, for example, marketing, production or research and development (R&D). Further, the entrepreneurial process is also affected by the climate or culture of the industry or sector (Ulijn and Weggeman, 2001). Culture refers to the behaviour of people based upon a mental programming (Hofstede, 1980; Trompenaars and Hampden-Turner, 1999) and like the layers of an onion it includes a multitude of dimensions, from the clearly visible and explicit such as language and technology and symbols, to the invisible and highly implicit norms and values. Culture exists at many different levels including family, national, corporate and professional. Here, we are mostly interested in professional culture.

To ensure value creation in the long term, ventures have to engage in exploratory activities. Exploration refers to experimentation with new alternatives and creation of diversity (March, 1991), in a context that is highly uncertain in terms of future technical standards and volatility of prototyping and that is characterized by a great deal of trial and error and tacit knowledge (Gilsing, 2003; Nooteboom and Gilsing, 2004). The path from the initial idea for exploration to the creation of value is often very long (Markham, 2002), and while considerable time and resources have to be committed in order to achieve a successful end result, this does not lead to financial (or other) revenues at present.

To create value in the short term, ventures must engage in activities that build on available knowledge and experience (De Weerd-Nederhof, 1998; Volberda and Elfring, 2001) This process is called 'exploitation'. In exploitation, technical development is consolidated and uncertainties with regard to market demands are reduced, while knowledge has become more codified (Nooteboom and Gilsing, 2004) and the focus will be increasingly on optimization of production and marketing processes (Volberda and Elfring, 2001). Such exploitation activities do yield (financial) revenues in the short run and, thus enabling venture survival in the short term. However, at the same time these activities also require the investment of capitals that can then no longer be invested in exploratory activities. Due to product and industry life cycles, the value-creation potential of specific (innovative) opportunities is limited/ending (see, for instance, Nadler and Tushman, 1999); too much focus on exploitation

alone may therefore be a threat to company survival in the long run. Therefore, although exploration and exploitation build on each other, exploration develops into exploitation and exploration emerges from exploitation (Rothermael and Deeds, 2004); pursuing both thus leads to tensions. These tensions, arising from the need to create value in both the long and the short terms under resource constraints, also explain why some paths are explored or exploited and others are not (Tushman and Nadler, 1986; March, 1991; Levinthal and March, 1993; Van den Bosch et al., 1999; Volberda and Lewin, 2003; O'Reilly and Tushman, 2004). In previous research, De Weerd-Nederhof (1998) introduced the concepts of strategic flexibility and operational effectiveness as specifications of exploration and exploitation (see also Groen et al., 2002) in relation to the management of innovation in larger established firms. Basically, strategic flexibility refers to the extent to which organizations are able to react to changes in the environment and create innovations that in the long term create value (Johnson et al., 2003). Strategic flexibility refers to further working towards long-term results and short-term exploration of new technologies and innovations. Operational effectiveness, like exploitation, is about having functions in the organization that work well. In terms of the innovation journey, operational effectiveness refers to the extent to which organizations can meet their short-term goals, enabling them to continue to work on exploration projects (De Weerd-Nederhof, 1998; Groen et al., 2002).

In order to deal with these tensions and to gain access to sufficient capital to pursue both short- and long-term goals, ventures must engage in interaction and a variety of exchange processes with multiple actors. The need to gain access to new resources is one important reason for looking beyond the boundaries of the individual venture. Also, it is seldom that only a single individual actor is involved in a particular innovation journey (Rip, 2004). Rather, innovation is initiated and pursued by many different actors who separately, together or as cooperators and competitors work at the same time on the development and advancement of a technological innovation (Rip and Groen, 2001; Rip, 2004). In the context of emerging technologies, this not only includes commercial organizations, but also research institutes, pressure groups, governmental agencies and other organizations. Sometimes these different organizations cooperate or interact directly, but often they are working independently from each other or in some form of competition. The actions of each of these different actors influence the development of the individual organizations and of the technology or innovation itself. In the next part of this section we develop a framework for analysis which accommodates the analysis of such complex developments.

So processes of enterprising in a new technological context involve many actors, many aspects seem to be important and the dynamics over time need to be considered. The focal type of actor of this study, the new firm, develops its position in a multilevel and multidimensional space by accruing resources and building up a sustainable organization in a competitive environment. Based on these considerations we opted for a social-system perspective as originally developed by Parsons (for example, 1951 [1964], 1977) and adapted to an entrepreneurship context by Groen (Groen et al., 2002; Groen, 2005) as the basis of our framework.

In this theoretical framework it is argued that social systems are formed in the interaction between actors. To build a sustainable social system, for example, a new venture, four functions known under the 'AGIL acronym' need to be performed:

- Adaptation: the continuous striving for optimization of rewards, leading to more efficient allocation of resources in processes;
- Goal attainment: actors strive to reach certain goals (functionalistic approach);
- Integration of actions in (direct and indirect) interaction with other actors, thus building networks of actors with relational and positional characteristics (Burt, 1982, 1992); and
- Latent-pattern maintenance: actors develop new action patterns or maintain existing patterns in existing culturally shared patterns of behaviour (compare the earlier mentioned mental programming of culture).

Each of these four functions is performed in interactions between actors and relate to specific mechanisms of change (for example, growth) or stability (for example, survival). These mechanisms result in the development of specific flows of resources into and out of the social system. This in turn leads to the development of four types of capital; one type for each function or mechanism: first, strategic capital (for example, vision, power, authority, influence) for goal attainment processes; second, cultural capital (Bourdieu, 1986) is related to connections in cultural patterns such as value and norm systems and also to knowledge necessary to maintain (or change) the patterns of behaviour (compare the onion model, mentioned above); third, economic capital relates to money and this relates to the efficiency of processes; and fourth, social capital relates to the network connections that an actor can access directly or indirectly (Granovetter, 1973; Burt, 1992). Groen (2005) further argues that, from a social-system perspective, every exchange between actors involves each of the four types of capital rather than only one or two. For instance, each economic

transaction is governed by the use of strategic capital (for example, vision, power and authority) which leads to the build-up of social capital between the actors, while at the same time cultural capital (for example, knowledge) is enhanced.

When relating this to the creation of new ventures, we conclude that each of the four capitals must be developed up to a minimal level to be able to exploit opportunities successfully. Beyond that minimal level, a strong position on one capital may counter a weak position in one of the others (Groen, 2005). Actors develop each of these capitals in a social system where actors exist empirically on several aggregation levels. Individuals, groups, organizations or a network of organizations are examples of levels of aggregation that we could analyse in a particular part of research. As a consequence of the system perspective it is assumed that the four mechanisms are determining processes on each of the aggregation levels, and that there are interactions between levels.

In order to describe how the development of capitals takes place in relation to the exploration–exploitation of innovations, Groen et al. (2002) developed a matrix placing the four dimensions on one axis and the time scale on the other. This matrix can be used to define goals (in terms of exploration and exploitation), determine how value can be created in both the long and the short runs and justify claims on assets of the venture or of other actors in their network during the pursuit of opportunities in high-tech small firms (ibid.).

In this matrix, exploration and exploitation are specified in terms of strategic flexibility and operational effectiveness (see above). The reason for this is that the exploration–exploitation concept is not (yet) converging towards a distinctive theoretical concept (see Li et al., 2005). So far it has mostly been described in several empirical sets of activities, whereas we look for *managerial mechanisms* related to actions of purposeful entrepreneurs.

The matrix is presented in Table 9.1: in the left-side column the four mechanisms of the social system are shown (goal attainment, optimization, pattern maintenance and social networking). The next two columns show what capitals (and resources deduced from the capitals) are involved in these mechanisms in relation to achieving operational effectiveness and strategic flexibility. It should be noted that the listed resources should be considered as exemplary rather than comprehensive.

In order to fully understand how management of the tensions between operational effectiveness and strategic flexibility leads to chances in the pursued opportunity and eventually to value creation, we would need to include all four dimensions in the analysis. However, because we consider (shifts in) the pursuit of opportunities to be most strongly related to the goal-attainment mechanism, and want to discuss the role of corporate-culture

Table 9.1 Social system of the innovation journey

Dimension	Exploitation	Exploration
Strategy/scope: which strategic goals are to be attained? What contribution to strategic capital (power base of the company) is made?	Better matching of technology; patent and publication portfolio to product roadmap; maintaining licence to operate; improvement of efficiency	No. of patents and licences; business opportunity rating; strategic compatibility of R&D
Scale/economic efficiency: which economic scale is necessary (operational goals)? What contribution can be expected to economic capital?	Working more efficiently; budget and timing control; enhancing return on investment	Enhancing performance on return on investment; time to market; return on knowledge; developing new products
Skills, competences and values: how and which patterns are to be maintained (adaptive goals)? What contribution is made to cultural and human capital?	Regular reviews of projects; focus teams on knowledge sharing; improve employability and working conditions	Maintain interdisciplinary development teams across functional areas; R&D contributes to core competence; more attractive for higher-educated employees as well as for rest of company
Social networks: which position and relationship contacts are used/usable? What contribution is made to the social capital?	Network with local knowledge institutes; using contacts from symposia, conferences and projects; providing knowledge and reputation to other departments	Future access to knowledge networks; networking around core competence areas; rapid receipt of new developments; enhance the positive image

Source: Groen et al. (2002).

development in this process, we shall focus on these dimensions (goal attainment/strategy and cultural-pattern development) along with the social networking dimension in our analysis. So changes in strategic direction will be discussed. Also the effects on and of cultural capital instantiated in entrepreneurial attitudes, knowledge of organizational, market and technological processes will be examined in depth.

CASES OF HIGH-TECH START-UPS

Method

The objective of this exploratory study is to contribute to theory building concerning the way managers can manage tensions between short- and long-term objectives and value creation from the exploration and exploitation of innovations and the pursuit of opportunities. The data collection and analysis are guided by the research questions (Pettigrew, 1990) and the research framework (Eisenhardt, 1989) as presented above. Our case-based investigation is divided into several steps.

The first step was to select two high-tech start-ups from the Netherlands using a theoretical sampling strategy (ibid.). We wanted firms that present opposite sides of the continuum: the first venture, Motion Inc.,[1] made multiple shifts in the opportunity being pursued as a result of its interaction processes, while the second venture, Sound Inc., persisted in the original opportunity throughout its early years. We tried to keep many other variables equal or at least similar. Both ventures were active in sensor development (Case 1) and involved in radical innovation trajectories and were founded in the late 1990s. Further, both ventures are located in the region of Twente and can be considered spin-offs from the local university, where the founders studied and where the sensors were originally developed.

The second step involved the collection of data and analysis. This part of the study was conducted through semi-structured interviews of about two hours with the company's founders, analysis of company websites, business plans and, in the case of Sound Inc., archival records and company emails. The data were collected between May 2001 and May 2005 and included information that was collected both in real-time and post-date. This was done to ensure a longitudinal process perspective.

Finally, to analyse the data, we developed specifications of constructs relevant to high-tech ventures – strategic flexibility, operational effectiveness, opportunity pursuit as well as goal attainment and social networking. The constructs were derived from the matrix presented in Table 9.1. We used multiple sources of data, to allow for checks of validity of the data and the

constructs. For both the cases themselves and across the cases we examined particular social networking behaviours and shifts in opportunities (strategic orientation or goal attainment) in relation to tension 'episodes'. Following the replication logic as explained by Eisenhardt (1989) by comparing contrasting (polar) cases we sought to find evidence of emergent relationships between constructs.

Motion Inc.

Motion Inc. was established in 1999 when a running-enthusiastic technology and management student asked two applied physics students whether it would be possible to build a measuring device that could measure his running speed. Triggered by this technological challenge they started to explore whether it would be possible to make such a device. In cooperation with the Bio Engineering department of the Electro Engineering faculty of their university, the necessary technological principle for the 'runner's watch' was soon discovered. The idea to exploit this technology commercially was quickly born. In June 1999, they set up a venture under the provisional name JJ&J. Their main goal was 'to develop and put on the market a speed measuring device for runners. We aim to have sold 140,000 pieces in five years' (Business Plan JJ&J, June 1999).

Over the following years, however, it proved to be difficult for the small venture to gain a toehold in this market and as a result, several shifts were made: from running shoes to more general sports technology, from sports to rehabilitation technology and finally into more general motion technology for bio-medical and military applications. Following these shifts, the company's name was also changed several times to fit the company's mission.

By 2005, the venture's product line consists of

> miniature motion sensors, software, measurement equipment and accessories, well organized around the flagship product SMI7 . . . Motion Inc. further assists its customers with services varying from feasibility studies or new concept testing to the custom development and OEM [original equipment manufacturer] supply of dedicated sensor units or (embedded) software. . . . Customers from various countries have adopted Motion Inc.'s technologies for various applications such as robot or vehicle navigation, virtual reality applications and biomechanical research or gait analysis. (Company website, May 2005)

Today, Motion Inc. seeks to create value from their applications in the following segments: augmented reality; animation; training and simulation; and biomechanics. Motion Inc.'s products are also widely used for industrial purposes in the following fields: aerospace; mobile robots; marine technology; and automotive.

Besides two owner-managers, the venture has an external adviser and six employees. Further, the company has sales representatives in France, Italy and Spain. Throughout its development, the venture has had strong connections to the University of Twente and to a regional rehabilitation research centre.

Because motion-sensing technology is still in its infancy, it is not surprising that the sector is dominated by a high level of fragmentation. Indeed, there is no one clear sector. Motion Inc. is introducing a new technological platform which can be used in many fields as shown above. For each of these fields, other sector characteristics apply. One of the strategic difficulties of the case is whether to go for one or two applications or broaden the portfolio.

Sound Inc.[2]

While working on his Master's thesis at the University of Twente in 1994, Mr Wide made a chance discovery: originally, he was conducting research on flow sensors for liquids. Together with a student from the polytechnic, he examined in vain the application of flow sensors in petrol cables. Yet as Mr Wide explained: 'the device only started to work after I talked to it authoritatively. When it talked back to me, I suddenly realized the sensor unintentionally worked like a microphone'.

In the 10 years that followed this 'chance discovery', a lot has happened. During the first two years, scientific R&D mainly took place within the laboratories of the university. Although the work was largely an academic effort, Mr Wide soon recognized the potential value that his discovery might have for commercial applications. Therefore, to come up with ideas and gain feedback for potential applications and to identify potential partners and lead users, he began to talk to many people in the scientific and business community.

Early in 1997, Mr Wide began to search for business partners to be able both to obtain financial resources to finance additional R&D to develop more sophisticated sensors and wider applications and to simultaneously introduce the existing sensor into the market. Although, an alliance was established, it did not survive very long as a result of different goals and an unbalanced distribution of power. Despite this setback, Mr Wide persisted, and together with his newly found business partner, Mr Path, he officially established Sound Inc. in the beginning of 1998. In the first year, their business included both 'sound-consultancy' assignments and the sale of some of their sensors. In the next few years, the amount of consultancy work decreased while the sales of sensors increased. Despite growing sales, it continues to be essential to create and expand both awareness and acceptance

of the technology and its applications, as the majority of potential users are still wary of the technology because it is so different from the most dominant technological standard (that is, the microphone). To that end, the entrepreneurs present their increasing product line at trade fairs, discuss scientific findings and implications at conferences, invite researchers around the world to conduct tests and continue to publish new developments on their website.

The sound-intensity market has basically been dominated by five large microphone manufacturing companies that accounted for over 85 per cent of the global sales for many years. In recent years, both these five companies and a large number of small new entrants, such as Sound Inc., have introduced new sound-sensing technologies that are based on new and innovative technological principles that are very different from traditional microphone technology. Despite the smaller size and different functionalities these new sensors have not yet replaced the traditional microphone, nor has it become the standard in its particular niche. Nevertheless the sensor is now being sold to commercial and non-profit research institutes, small and medium-sized enterprises (SMEs) and multinationals in the aviation, automotive and acoustics industries in 35 countries on six continents through both direct sales and globally dispersed distributors. Since the introduction of the Sound Inc. sensor, other firms have introduced a number of competing sensors with very similar functional characteristics.

ANALYSIS OF THE CASES

The cases are analysed by looking at the way Motion Inc. and Sound Inc. have used their network to overcome tension between strategic flexibility and operational effectiveness and how this has affected the pursuit of opportunities. First, we identify three and four episodes, respectively, in the development processes of both firms in which the tension was felt most strongly by the entrepreneurs. Next, we analyse these episodes by examining what actions were taken by the entrepreneurs, which network contacts were involved in the creation of the tension or its resolution and what effects the managerial actions had on both the innovation journey and the opportunity being pursued.

Tension Episodes

When looking at the start-up process and innovation journey of Motion Inc. we can identify the following three tensions:

- *M1. Runner's watch* After developing the necessary technology to measure a runner's speed, the sensor had to be implemented in an actual device (the 'runner's watch') and a marketing channel had to be chosen. It seemed that Motion Inc. could either produce and sell the watches itself, or it could search for a partner that could take care of production and distribution for it. Unfortunately, several more established companies were working on the development of a similar device and Motion Inc. realized that it was actually behind the competition. Therefore, in-house production and distribution would be impossible. In search of a partnership, Motion Inc. contacted one of the competitors, Sports 1–2 to discuss possibilities for cooperation. Sports 1–2 had quite a lot of entrepreneurial and market experience but lacked the specific necessary technological knowledge. Such cooperation would have enabled Motion Inc. to work both on the further development of the technology and also on a wider range of applications that would ensure value creation in the long run (strategic flexibility), while already exploiting the existing sensor by producing and selling the runner's watch to generate income in the short run (operational effectiveness). Unfortunately, negotiations failed and when Nike announced the launch of a similar device, Motion Inc.'s founders recognized that they had to venture into a new path.
- *M2. Sports technology* Revalidation technology: when the runner's watch concept failed, Motion Inc. saw possibilities for its sensor in wider biomedical applications in the field of sports technology. However, this would require further R&D on its original technology and the discovery of new applications that were both feasible and desirable, but such exploration would only be possible if the venture survived in the short term. Therefore, the entrepreneurs needed to generate some form of revenue.

  Fortunately they were invited to join various other parties in a project called Impuls. This project was funded by the science foundation STW and Innofonds,[3] and this provided Motion Inc. with a sufficient income base to continue its operations and explorations. In this project, Motion Inc.'s original sensor was incorporated in a revolutionary electro stimulator that would empower 'drop-foot' patients to walk more smoothly and naturally.

  As a result of these activities, however, time and resources could no longer be devoted to the introduction of the runner's watch as such and so the majority of the venture's financial 'income' was obtained through research grants rather than sales activities, making the venture vulnerable and dependent on others for survival.

- *M3. From sports to motion technology* The experience gained in this project and in the field of motion technology aided the company to develop other new applications, such as the MI2 motion tracker and the recognition of multiple opportunities in several market segments such as rehabilitation, ergonomics, automotive and robotics. These developments resulted in the final alteration in the venture's name and of its mission: as of April 2001 Motion Inc.'s CEOs referred to their company as an 'innovations factory' (*Financieel Dagblad*, 9 April 2001). This shift enabled the venture to increase its strategic flexibility further and allowed Motion Inc. to work on the development of a wide range of innovations and applications that would create value in both the long and short runs: by no longer fixating on just one or two industries or applications, every potential opportunity could be exploited. However, as a result of the focus on innovation, the operation effectiveness of the venture remains limited because no standardized production or sales procedures can be put in place.

For Sound Inc. we identified four distinct periods in which the entrepreneurs experienced considerable tensions with respect to creating value in both the short and long terms.

- *S1. PhD trajectory* The first tensions became apparent soon after the initial discovery of the technology when Mr Wide tried to obtain a research grant from the Stichting Technische Wetenschappen (STW) to cover the costs of a doctoral research (PhD trajectory). Obtaining such a grant would pay for both the basic and the applied research that would help him uncover and fully understand the principles underlying his discovery and provide him with a personal income. When he did not obtain this research grant he was allowed to become a PhD student with access to support and facilities but without financial assistance. Although very frustrated and required to live off his girlfriend's income, this situation was the main reason why he finished his doctoral research in only two years and possibly why he stayed ahead of the competition.
- *S2. Alliance with Pfon* Towards the end of his PhD trajectory, Mr Wide started searching for partnerships to be able to bring the technology to the market and to obtain sufficient financial resources to continue R&D activities necessary to improve the sensor and develop additional applications. An alliance was formed with Pfon, a German multinational. Yet, rather than solving the problem this created additional tensions as the parties could not agree on the work

to be done and results to be achieved and because, in the end it kept Sound Inc. from its exploration activities.

- *S3. Other employment* The third episode followed the decision to found the company officially. Mr Wide and his business partner Mr Path realized that in the short run, the venture would not provide them with a sustainable income. Therefore, both of them sought other occupations and devoted their spare time to Sound Inc. Mr Wide secured a position as a postdoctroal researcher at the university where he had discovered the technology and where he had done his PhD, while Mr Path became the owner-manager of an established metal-sheet company.
- *S4. Testers* The fourth and final episode involved the use of external researchers who could obtain sensors for free or at huge discounts in exchange for scientific publications or presentation at a conference or trade fair. This strategy was initiated as Sound Inc. needed to find a way to increase the awareness and acceptance of its technology and the applications. At the same time this approach extended the R&D capacity of the venture virtually and at a low cost.

Shifts in Opportunities/Scope

The first dimension of the framework on which we focus here is the strategy or scope dimension. This dimension refers to the strategic goals that are being attained and the contribution to strategic capital (that is, the power base of the venture) that is being made. In other words: what opportunities are being pursued by the venture? In terms of exploitation, scope refers to questions such as how technology can better match the demands from the market; how patents and publication portfolios can lead to product roadmaps; how the firm can maintain the licence to operate; and how innovation efficiency can be improved. In terms of exploration, scope refers to how the number of licences can be increased, how business opportunities can be rated and how strategic compatibility of R&D can be enhanced (Groen et al., 2002).

While Motion Inc. changed its strategy and goals a number of times to deal with changes in the environment and to benefit from recent innovations, the shifts in the general opportunity being pursued by Sound Inc. were minor (see Table 9.2). It is quite obvious that Motion Inc. continues to strive for strategic flexibility and exploration of motion-sensing technology. This surely is a positive sign, because companies have to keep innovating in order to survive in the market. Because Motion Inc. had a concrete goal from the beginning, namely the production of the runner's watch, its exploratory activities might have stopped when it was possible to

start producing its innovative watch. But as things did not go as expected, the exploratory activities never stopped because new applications and opportunities came along. Once the MI2 was developed and proved to be successful, on the base of this working technology more applications could be developed and the core business was settled, that is, Motion Technology. Today Motion Inc. is still searching for and exploring more applications of its technology and it is still busy with improving its products. From this it can be concluded that the search for new opportunities, from innovation, is the central force driving the development of the company. Strategic flexibility has obtained a more dominant position than achieving operational effectiveness.

Alternatively, from several possible lines of application (including mobile telephony and hearing aids), Mr Wide decided to focus exclusively on the exploitation of the sensor as a sound-measuring device, which would yield relatively high revenue per sensor and for which there would be no necessity to build a large production facility. Mr Wide could not envisage himself as the owner-manager of a large company, nor did he want to give up too much control over his venture by attracting venture capital or forming and maintaining strategic alliances with large multinational partners, as was shown from the alliance episode. Interestingly, activities that were being pursued in order to achieve operational effectiveness and generate income now, such as taking on other employment, typically turned out to yield strategic flexibility as well (in the case of the other employment episode, Mr Wide could spend most of his time working as a postdoctoral researcher on fundamental and applied research on his sensors). Alternatively, the venture used external testers to increase awareness of the sensors and thereby increase the future sales of the company, but in the process of doing so the

Table 9.2 Comparison of strategic shifts

	Motion Inc.	Sound Inc.
Exploration	Multiple shifts to benefit from new innovations	Clear dedication to focus on niche market; exploration was mainly done in relation to specific applications
Exploitation	Using of current knowledge in joint R&D projects and in applications in less volatile revalidation industry to generate income for more innovative projects	Conducted contract research at university and for Pfon in exchange for income and funding of a patent

operational effectiveness of the R&D activities was also increased as more people were conducting R&D on the sensors, without Sound Inc. having to hire additional personnel or setting up larger R&D facilities.

Shifts in Networks

Both Sound Inc. and Motion Inc. devoted considerable efforts to becoming established in (international) networks (Table 9.3). For Sound Inc. the use of trade fairs and conferences were some of the most important strategies to establish new contacts and develop contacts further. Also, this company actively used internet and email to approach both new and established contacts around the world. Motion Inc.'s networking strategy included the use of brokers or intermediaries, as well as local and international network events.

Interestingly, despite the early search for partnerships with large multinational players in the industry, academic institutions remain an important share of Sound Inc.'s network. These academic contacts include customers, testers, research partners and general knowledge providers. This does not mean however, that Sound Inc.'s network is purely academic: it also includes a huge number of large, commercial customers, distributors and so on. Nevertheless, in comparison it seems that Motion Inc.'s network is more market based and includes R&D partners in a

Table 9.3 Comparison of network development

	Motion Inc.	Sound Inc.
Exploration	Network consisted of both academic and business organizations with a focus on the latter; network was increasingly international	Strong focus on research institutes and academic networks as shown from working with the university and using external testers; conferences were used to disseminate findings; the network contained a large share of international ties from inception
Exploitation	Network for exploitation consisted of business domestic and international partners	Network for exploitation consisted of business partners and many academic partners; use of conferences and trade fairs and online media to build global contacts

wider range of industries. Whereas the introduction to new networks and new contacts was often followed by a shift in strategic focus by Motion Inc., Sound Inc.'s founders actively sought to establish ties to those players that would allow the venture to pursue the already recognized opportunity.

Emerging Cultural Patterns

According to Ulijn and Weggeman (2001), for example, culture is considered to be an important determinant of innovation as it regulates behaviour and leads to specific patterns and procedures. As mentioned, here we are mainly interested in the role of professional culture in the innovation journey of both companies. In order to understand the professional cultures of both ventures, we need to look at the background of the founders. The reason for this is that the entrepreneur's way of working is developed predominantly through exposure to other organizational environments and to the behavioural patterns in these organizations. Both the founders of Motion Inc. and of Sound Inc. were recent graduates from a technical university and they owned a technology-based venture. In that sense they can be considered technical entrepreneurs (Jones-Evans, 1995). Typical for technical entrepreneurs is their focus on, clearly, technology and innovation. However, previous research by Jones-Evans showed that within the group of technical entrepreneurs we can distinguish four types:

1. the 'researcher', who has been or still is involved in scientific or technical development, either at an academic level at a higher educational establishment or in a non-commercial research laboratory. This type has also been called a 'scientist-entrepreneur' (Samson and Gurdon, 1990). The researcher has little or no exposure to either the business world or entrepreneurship – and had no formal business training whatsoever with team management. Often it seems that their interpersonal skills and skills related to marketing and finance are poorly developed (ibid.);
2. the 'producer', whose background is one in which the entrepreneur has been involved in the direct commercial production or development of a product or process, usually in a large organization. As a result of their exposure to a commercial environment this type of entrepreneur has developed a more application or usefulness orientation than their 'researcher'-type counterparts;
3. the 'user', whose background will have been a support or peripheral role in the development of the technology (for example, technical sales

or marketing). Alternatively, the user technical entrepreneur may have been involved as an end-user in the application of the specific product or technology (perhaps in support services such as technical support), but without direct involvement in the actual development of the technology; and

4. the 'opportunist', who is actually a non-technical entrepreneur who has identified a technology-based opportunity and, while initiating and managing a small technology-based venture, either has little or no technical experience or whose previous occupational experience was within non-technical organizations.

Although, none of the entrepreneurs had extensive experience as they had only recently graduated from university, the founder of Sound Inc. can best be classified as a researcher as he worked as a PhD student and later as a postdoctoral researcher at the university while working on the development of his product. His business partner, Mr Path, on the other hand could best be considered an opportunistic entrepreneur. Although Mr Path's influence on the company's culture increased over time, in the early stages of company development the research culture was clearly more dominant, also as a result of the group of Master's and PhD students working for the company. As a result of this 'research' or 'academic' orientation, technical optimization and striving for perfection of their sensor dominated their strategic behaviour. Continuous improvement of the sound-measuring sensors kept other scientists around the world interested and did lead to a good product in the end, but it also resulted in a situation where many commercial companies could not get used to the sensors as new versions were introduced in rapid succession. Also, Mr Wide was using a rather scientific type of technical language, which was readily understood by other scientists but less clearly by non-scientists or non-technical customers.

The founders of Motion Inc. had no previous work experience. Yet, from the start they were behaving in a way similar to the 'producer', that is, as application engineers looking for new ways to create value from the technology. This might be explained by the fact that these entrepreneurs were 'simply' looking for a solution to a practical problem (whether it be measuring running performance, supporting revalidation processes or other motion-related issues), rather than seeking problems for an already-found solution. This orientation resulted in a culture that was directed at problem solving and straightforward – through high technology – product development. It also enabled them to enter a more heterogeneous network than Sound Inc. as they could communicate more easily across different fields (both in academia and in the business arena) (see Table 9.4).

Table 9.4 Comparison of cultures

	Motion Inc.	Sound Inc.
Exploration	Producer culture dominated	Scientific culture dominated; extended exploratory research sometimes delayed introduction of new products and applications
Exploitation	Market-orientated focused combined with strong problem-solving culture; strong ties with science remained	Research orientation continued to be dominant but was balanced increasingly by a more market-orientated focus

Innovation Journeys

In Figure 9.2(a and b) we have graphically summarized the innovation journeys of Sound Inc. and Motion Inc., respectively, based on the analyses and observations presented above. In the next section a discussion and conclusion with respect to our findings are given.

In these figures we show how the different phases of the entrepreneurial start-up process are aligned with the different episodes. Also we show how the exploration and exploitation activities that took place are related to these phases of opportunity recognition, preparation and opportunity exploitation. The most obvious difference between the innovation journeys of Sound Inc. and Motion Inc. is that while the latter was using its network to come up with new ideas and act accordingly, the former was configuring its network in a way that allowed the company to work on the ideas that had already been developed in-house.

DISCUSSION

In this chapter we applied a comprehensive framework based on a social-system perspective (for example, Groen et al., 2002), in which we link the pursuit of opportunities of high-tech ventures to how managers deal with tensions arising from the need to be simultaneously strategically flexible and operationally efficient. This framework enabled us to examine systematically how entrepreneurial ventures can create value in both the short and long terms on the basis of a single scientific or technological breakthrough or innovation. The insights from our study contribute to the

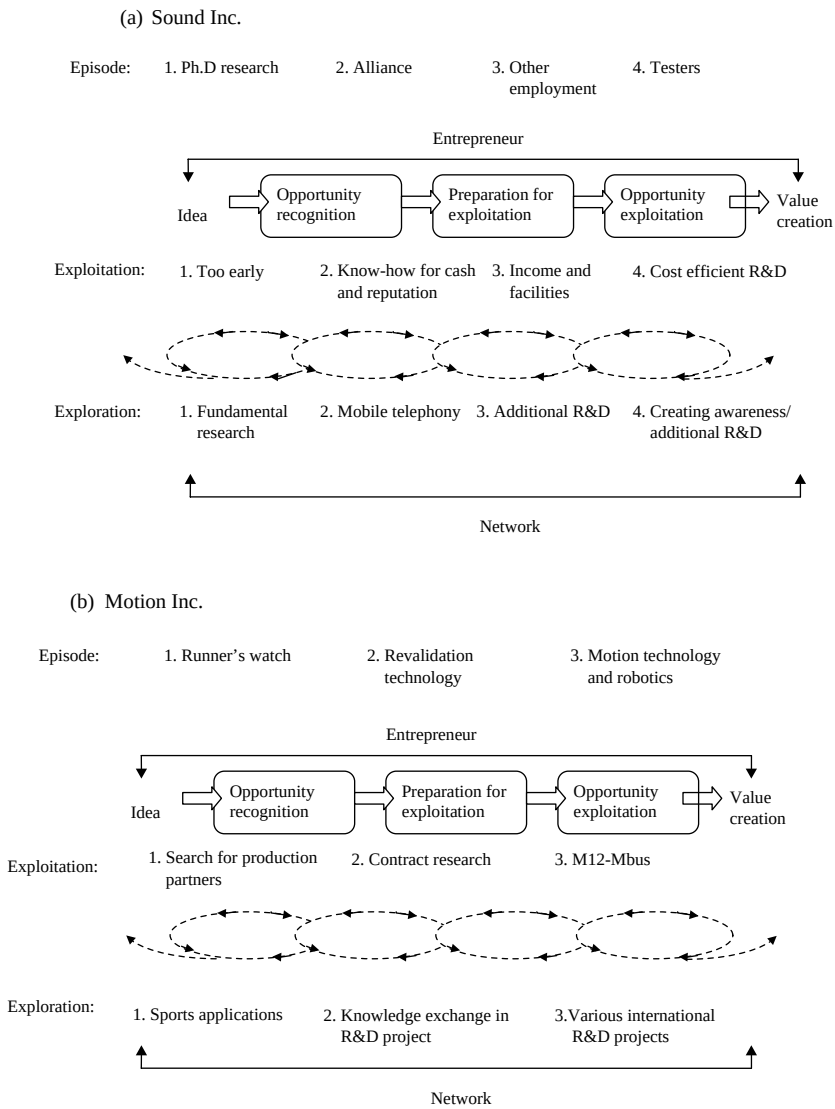


Figure 9.2 Innovation journeys

understanding of how innovation, entrepreneurship and social networking are related and how they reinforce one another.

Comparing Motion Inc.'s innovation journey with that of Sound Inc., the following differences can be observed. First, because the sensor

technology that Sound Inc. had developed was so radically new, the company was not able to find direct suitable solutions for it. This was in contrast to Motion Inc., whose applications were easily understandable and desired quickly by a wide range of users. This has had some major effect on their journeys. First of all, Motion Inc. was directly able to access potential customers with a direct proof of concept, while Sound Inc. had to start to look for possible applications. So Motion Inc.'s core challenge was how to start exploiting its technology. Sound Inc. in contrast, still had a lot of exploratory work to do before it could start to earn a revenue.

Because Sound Inc.'s technology was so radically new and exploratory activities were necessary, the company was much more dependent on the resource provided by external contacts. As a result, Sound Inc. often needed to spend time on activities it would rather not have undertaken, but was almost forced to in order to keep the partners happy. This then also created some tensions that Motion Inc. did not encounter, such as those that occurred during the alliance between Motion Inc. and Pfon and as a result of differences in goals related to both strategic flexibility and operational effectiveness. From this, it is also apparent that if we want to understand innovation journeys more completely we would have to include all participating actors in the analysis rather than only one focal actor (Rip, 2004; Groen, 2005).

Regarding network management, it is obvious that Sound Inc. put far more effort into external relations in order to find a suitable application than did Motion Inc. One important explanation is that the market did not understand its sound-measurement technology, so Mr Wide and Mr Path put a lot of time into explaining their technology to interested people at trade fairs and they stimulated other academic specialists to carry out research on their technology (Wakkee, 2004). Clearly, a large proportion of Sound Inc. network contacts were academics and the university where the sensor was first discovered remains one of the most important contacts. Such networking behaviour is not uncommon for entrepreneurial ventures that originate from universities (for example, Jones-Evans, 1995). On the other hand, Motion Inc. has been able to establish itself more strongly in commercial networks. This can again be explained by the nature of its sensor and original opportunity but also by the different professional backgrounds of the founders. Although it is clear that further research is necessary in this area, our exploratory findings do suggest that this different occupational background seems to have led to differences in the emerging culture of their companies. As a result, one company remained more research and technology-perfecting orientated while the other was more focused on problem solving and a wide application of their technology.

In addition to a difference in culture, the different backgrounds also have a more direct effect on the innovation journey: the entrepreneurs are embedded in different types of networks. Both the difference in professional (or company) culture and the difference in networks might explain why Motion Inc. has been able to become a more market- or opportunity-driven company (one might even say a more entrepreneurial venture) while Sound Inc. did not venture into different markets but tried to expand its product line based on this original opportunity.

In the case of Motion Inc., shifts in the opportunity being pursued were caused both by the need to achieve operational effectiveness (for example, the shift into revalidation technology) and by the need to achieve strategic flexibility, that is, from exploration activities (for example, the shift into military applications). In this way, the Motion Inc. case provides a good example of how a single opportunity led to a range of technological options or novelties (Garud and Karnoe, 2001). Like a biological mutation, the new options encountered by Motion Inc. started out as 'hopeful monstrosities' (Mokyr, 1990: 291) that had to be nurtured to improve and grow and survive a harsh selection – including the selection environment within Motion Inc. (for example, Rip, 2004: 2). Sound Inc. was more dedicated to sticking to the original opportunity (for example, sound-intensity measurement) even when the situation might have called for a shift. For instance, while being involved in the strategic alliance with Pfon, a clear opportunity existed to move into the mass market of mobile telephony.

Further, with regard to the tensions, we observed that these distinctions between the concepts are not as clear-cut as we had expected prior to this research. As argued by March (1991), they are strongly interrelated. Exploration leads to exploitation and from exploitation, exploration emerges. The same holds true for strategic flexibility and operational effectiveness. In particular, in the case of Sound Inc., activities that at first sight and based on our theoretical framework seemed to be directed at strategic flexibility, after further analysis, turned out to be initiated by the founders of Sound Inc. to enhance operational effectiveness. This is a further indication that the concepts are strongly linked empirically: as was already suggested by Rothermael and Deeds (2004), exploration and exploitation build on each other; exploration develops into exploitation and exploration emerges from exploitation. Our findings indicate that it can only be determined ex post and in discussion with the company's key decision makers to which goals (long or short term) specific activities contribute most strongly. Clearly this has implications for operationalization of the constructs in further research.

CONCLUSIONS AND NEED FOR FURTHER RESEARCH

In this chapter we have focused on the role of social networking and goal attainment in relation to managing tensions between achieving long-term goals and value creation (through exploration and strategic flexibility) and short-term goals and value creation (through exploitation and operational effectiveness). These are only two of four dimensions of the social systems. In order to develop a full understanding of how new technology-based ventures create short- and long-term value through the pursuit of different opportunities for business derived from a single (set of) innovation(s)/ scientific breakthrough we would have to complement our analysis with the two remaining dimensions: pattern maintenance and optimization (Groen, 2005).

Start-ups like Sound Inc. and Motion Inc. inherently do not have well-oiled organizations in place and typically lack both the capital base and experience that established firms have. As a result, start-ups might experience even more tensions in achieving both long- and short-term results than incumbents. On the other hand, start-ups are inherently innovative and do not have to reinvent themselves to adapt to changes in the environment as established firms have to do. Also, creating an ambidextrous organizational form (Tushman and Nadler, 1986) is not an option for start-ups because of their size and limited capital availability. Both cases showed how start-ups could instead build and use their network in such a way that they could overcome the tensions that they encounter. Start-ups and incumbents are both expected to experience different tensions from other parties involved in the innovation journey, such as governments and research institutes, for whom short-term profits and survival may be less of an issue. Consequently, if we want to understand the journey as a whole, we need to compare and contrast the (management of) tensions by all different actors involved in the journey.

Because no information is available on what other actors (outside the described network) have done or how independent actors have influenced the journey, we do not claim to understand technology's (or more specifically the sensor's) journey as a whole. From this we can conclude that an ego-network analysis leads to incomplete insights and that a truly multi-actor, multilevel perspective is necessary. In terms of methodology, this may call for ex post research rather than real-time following of case studies.

Also we included not only a limited set of actors in our analysis but also a limited time frame. Although during the course of the time frame the technology and sensors offered by Sound Inc. have clearly proven to be successful in the small niche it occupies, the introduction of the sensor has

not (yet) led to a shift in regimes or in the socio-technical landscape. The traditional microphone still dominates the market but at the same time a number of new technologies and sensors have been introduced into the market alongside Sound Inc.'s sensor. We may need another decade or even longer to determine whether any of the new sensors will replace the microphone and cause a regime shift. Similarly more time is needed to fully determine to what extent the numerous shifts in the opportunity being pursued allows Motion Inc. to develop and maintain a sustainable and credible position in the market.

Finally, in our analysis we included only two case studies. To improve the generalization of the results we would need to develop the propositions into testable hypotheses on the basis of a large sample of firms. Preferably such a study would include a variety of ventures: from different industries, countries and possibly size classes. We expect that the different resource bases and resource needs of different types of ventures, as well as the availability of network contacts, might affect the process and mechanisms by which tensions in short- and long-term needs are to be managed.

Implications for Management

The insights developed in this chapter can be used by entrepreneurs during their decision-making process with respect to their innovation journeys. First, the framework presented in Table 9.1 can be used by entrepreneurs to justify claims on particular resources and their dedication to specific activities. In this way it can be seen as a managerial tool in balancing short- and long-term needs for exploration and exploitation and value creation.

Second, our findings suggest that managers can either use their network to generate the resources needed to pursue the opportunities already discovered or let networking be a source of new ideas for opportunities. The appropriateness of the strategy chosen is dependent on the extent to which the entrepreneurs want to stick to the 'original' opportunity and the nature (radical) of the innovation.

Third, our findings suggest that when engaging in strategic alliances with network partners, entrepreneurs have to take into consideration their partner's exploration and exploitation objectives and they should try to formulate joint goals for the alliance in terms of exploration and exploitation. Activities that are set up to help one company create more strategic flexibility will lead to enhanced operational effectiveness in the other venture. Although in the short run this does not have to lead to problems, entrepreneurs should be aware that such differences can endanger their venture's innovation journey later on, due to different resource demands. Therefore, entrepreneurs must not only take their own projected innovation

journey into consideration when entering alliances but also try to gain insight into the projected journeys of their partners.

Finally, our findings show that professional and emerging company cultures play an important role in how tensions between exploration and exploitation dilemmas are being managed during innovation journeys. So far, both researchers and managers often overlook the cultural aspect. We propose that managers explicitly incorporate their venture's cultural identify when developing strategic plans in relation to their innovation journeys.

NOTES

1. To protect the anonymity of the ventures, aliases were used.
2. For a more elaborate narrative of the development of Sound Inc., see Wakkee (2004: 104–21).
3. Innofonds is a venture capital fund in the region of Twente.

REFERENCES

Bourdieu, P. (1986), 'The forms of capital', in J.G. Richardson (ed.), *Handbook of Theory and Research for the Sociology of Education*, New York: Greenwood, pp. 241–58.

Burt, R.S. (1982), *Toward a Structural Theory of Action*, New York: Academic Press.

Burt, R. (1992), 'Structural holes: the social structure of competition', in N. Nohria and R. Eccles (eds), *Networks and Organizations: Structure, Form and Action*, Boston, MA: Harvard Business School Press, pp. 57–91.

Churchill, Neil C. and D.F. Muzyka (1994), 'Defining and conceptualizing entrepreneurship: a process approach', in G.E. Hills (ed.), *Marketing and Entrepreneurship*, Westport, CT: Quorum Books, pp. 11–23.

Davidsson, P. (2004), *Researching Entrepreneurship*, New York: Springer.

De Weerd-Nederhof, P.C. (1998), 'Operational new product development systems. operational effectiveness and strategic flexibility', Thesis, University of Twente, Enschede, The Netherlands.

Eisenhardt, K.M. (1989), 'Building theories from case study research', *Academy of Management Review*, **14** (4): 532–50.

Elfring, T. and W. Hulsink (2003), 'Networks in entrepreneurship: the case of high-technology firms', *Small Business Economics*, **21**, 409–22.

Garud, R. and P. Karnoe (2001), *Path Dependency and Creation*, Mahwah, NJ: LEA Publishers.

Gilsing, V.A. (2003), 'Exploration, exploitation and co-evolution in innovation networks', PhD thesis, Erasmus University Rotterdam, The Netherlands.

Gilsing, V.A. and B. Nooteboom (2005), 'Density and strength of ties in innovation networks: an analysis of multi-media and biotechnology', Discussion Paper 41, Center for Economic Research, Tilburg University.

Granovetter, M.S. (1973), 'The strength of weak ties', *American Journal of Sociology*, **78**: 1360–80.
Groen, A.J. (2005), 'Knowledge intensive entrepreneurship in networks: towards a multi-level/multidimensional approach', *Journal of Enterprising Culture*, **13** (1): 69–88.
Groen, A.J., P.C. De Weerd-Nederhof, I.C. Kerssens-van Drongelen, R.A.J. Badoux and G.P.H. Olthuis (2002), 'Creating and justifying research and development value: scope, scale, skill and social networking of R&D', in *Creativity and Innovation Management*, **11** (1): 2–16.
Guth, W.D. and A. Ginsberg (1990), 'Corporate entrepreneurship', *Strategic Management Journal*, Special Issue, **11**: 5–15.
Hofstede, G. (1980), *Culture's Consequences: International Differences in Work-related Values*, Beverly Hills, CA: Sage.
Johnson, J.L., R.P.-W. Lee, A. Saini and B. Grohmann (2003), 'Market-focused strategic flexibility: conceptual advances and an integrative model', *Journal of the Academy of Marketing Science*, **31** (1): 74–89.
Jones-Evans, D. (1995), 'A typology of technology-based entrepreneurs: a model based on previous occupational background', *International Journal of Entrepreneurial Behavior and Research*, **1** (1), 26–47.
Levinthal, D.A. and J.G. March (1993), 'The myopia of learning', *Strategic Management Journal*, **14**: 95–112.
Li, Y., W. Schoenmakers, W. Vanhaverbeke and P. Goris (2005), 'The many faces of "exploitation" and "exploration" in the innovation management literature', paper presented at the INIR (International Network on Innovation Research) Conference, University of Twente, 13 June, Enschede, The Netherlands.
March, J. (1991), 'Exploration and exploitation in organizational learning', *Organization Science*, **2** (1): 101–23.
Markham, S.K. (2002), 'Moving lab to market', *Research Technology Management*, November–December, 31–42.
Mokyr, J. (1990), *The Lever of Riches*, Oxford University Press: Oxford.
Nadler, D.A. and M.L. Tushman (1999), 'The organization of the future: strategic imperatives and core competencies for the 21st century', *Organizational Dynamics*, **28** (2): 45–60.
Nooteboom, B. and V.A. Gilsing (2004), 'Density and strength of ties in innovation networks: a competence and governance view', ECIS (Eindhoven Center of Innovation Studies) working paper 04.01.
O'Reilly, C.A. and M.L. Tushman (2004), 'The ambidextrous organisation', *Harvard Business Review*, April, 74–81.
Parsons, T. (1951 [1964]), *The Social System*, New York: Free Press.
Parsons, T. (1977), *Social Systems and the Evolution of Action Theory*, New York: Free Press.
Pettigrew, A.M. (1990), 'Longitudinal field research on change: theory and practice', *Organization Science*, **1** (3): 267–92.
Rip, A. (2004), 'Technological innovation – in context', Background text for a keynote lecture at the meeting of the Lowlands Innovation Research Network, Louvain, 14 January.
Rip, A. and A.J. Groen (2001), 'Many visible hands', in R. Cooms, K. Green, A. Richards and V. Walsh (eds), *Technology and the Market Demand, User and Innovation*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar, pp. 13–37.

Rogers, E. (1995), *The Diffusion of Innovations*, 4th edn, New York: The Free Press.
Rothermael, F.T. and D.L. Deeds (2004), 'Exploration and exploitation alliances in biotechnology: a system of new product development', *Strategic Management Journal*, **25**: 201–21.
Samson, K.J. and M.A. Gurdon (1990), 'Entrepreneurial scientists: organisational performance in scientist-started high technology firms' in N.C. Churchill et al. *Frontiers of Entrepreneurship Research*, Wellesley, MA: Babson Center for Entrepreneurial Studies, pp. 437–51.
Schumpeter, J.A. (1934), *The Theory of Economic Development*, Cambridge, MA: Harvard University Press.
Sexton, D.L. and S.M. Camp (1993), 'Innovation and entrepreneurship: modeling individual and organizational factors', in M.W. Lawless and L.R. Gomez Meija (eds), *Advances in Global High Technology Management*, Greenwich, CT: JAI Press, pp. 448–69.
Shane, S. (2000), 'Prior knowledge and the discovery of entrepreneurial opportunities', *Organization Science*, **11 (**4): 448–69.
Stopford, J.M. and C.W.F. Baden-Fuller (1994), 'Creating corporate entrepreneurship', *Strategic Management Journal*, **15**: 521–36.
Trompenaars, F. and Ch. Hampden-Turner (1999), *Riding the Waves of Culture: Understanding Cultural Diversity in Business*, London: Economist Books.
Tushman, M. and D. Nadler (1986), 'Organizing for innovation', *California Management Review*, **28** (3): 74–92.
Ulijn, J. and M. Weggeman (2001), 'Towards an innovation culture: what are its national, corporate, marketing and engineering aspects? Some experimental evidence', in C. Cooper, S. Cartwright and C. Early (eds), *Handbook of Organisational Culture and Climate*, London: Wiley, pp. 487–517.
Van den Bosch, F.A.J., H.W. Volberda and M. De Boer (1999), 'Co-evolution of firm absorptive capacity and knowledge environment: organization forms and combinative capabilities', *Organization Science*, **7** (4): 359–74.
Van der Ven, A.H., H.L. Angle and M.S. Poole (1989), *Research on the Management of Innovation: The Minnesota* Studies, New York: Ballinger/Harper & Row.
Van der Ven, A.H., D.E. Polley, R. Garud and S. Venkataraman (1999), *The Innovation Journey*, Oxford: Oxford University Press.
Van der Veen, M. (2004), 'Explaining e-business adoption, innovation and entrepreneurship in Dutch SMEs', Doctoral dissertation, NIKOS, University of Twente, Enschede, The Netherlands.
Van der Veen, M. and I.A.M. Wakkee (2004), 'Understanding the entrepreneurial process', in D.S. Watkins (ed.), *Annual Review of Progress in Entrepreneurship Research, 2002–2003*, vol. 2, Brussels: European Foundation of Management Development (EFMD), pp. 114–52.
Venkataraman, S. (1997), 'The distinctive domain of entrepreneurship research', in J.A. Katz (ed.), *Advances in Entrepreneurship Research: Firm Emergence and Growth*, Greenwich, CT: JAI Press, pp. 119–38.
Volberda, H.W. and T. Elfring (2001), *Rethinking Strategy*, London: Sage.
Volberda, H.W. and A.Y. Lewin (2003), 'Co-evolutionary dynamics within and between firms: from evolution to co-evolution', *Journal of Management Studies*, **40** (8), 2111–36.
Wakkee, I.A.M. (2004), 'Starting global: an entrepreneurship-in-networks approach', PhD thesis, University of Twente, Enschede, The Netherlands.
Walsh, S.T., B.A. Kirchhoff and S. Newbert (2002), 'Differentiating market strate-

gies for disruptive technologies', *IEEE Transactions on Engineering Management*, **40** (4), 341–51.
Wiklund, J. (1998), 'Small firm growth and performance: entrepreneurship and beyond', Doctoral dissertation, Jönköping International Business School.
Yin, R. (1994), *Case Study Research: Design and Methods*, 2nd edn, Beverly Hills, CA: Sage.

10. Making the transition from entrepreneurial to professional management in small and medium-sized ICT businesses in Slovenia and Germany

Janez Prašnikar, Karl-Heinz Rau, Marko Pahor and Monika Klinar

INTRODUCTION

Organizational growth and development models offer a useful framework for assessing and analysing the growth of a company and the connected management imperatives. Several models have been postulated, ranging from three to 10 stages (Churchill and Lewis, 1983: 31; Scott and Bruce, 1987: 47; Greiner, 1998: 58; Adizes, 1999: 88), with most models identifying five stages.

While the models are distinct in the number of phases and their clarification, most of them propose that in the life cycle of organizations the transition from an entrepreneurially to a professionally managed organization may be necessary. There are many reasons for this. As Olson and Terpstraand (1992: 27) and Flamholtz and Randle (2000: 10) explained, when an organization reaches a certain size, its resources become stretched and an insatiable need for more funding arises, while operating systems are overwhelmed by the sudden surge of activity. The same applies to the entrepreneur, who will spend more and more time on administrative work and everyday activities, which has implications for the time spent on strategic issues (Barth and Hörte, 1999: 3). Roberts (1999: 389) noticed that, due to the increasing size of the organization, the entrepreneur will be unable to supervise the efforts of the workers. Finally, circumstances such as when the management is not developing, and the founder maintains close relationships with key customers, suppliers and loyal personnel instead of transferring skills to other people, create bottlenecks in operations and inhibit the organization's further development (Harper, 1995: 38; Wilson and

Bates, 2003: 119). Life-cycle organizational model researchers usually refer to the point in the life cycle described above as the transition between the second and third stages. For example, Lester et al. (2003: 346) use these stages – existence, survival, success, renewal and decline – and relate an entrepreneurially managed organization to the survival stage, while the success stage is already characterized by a professionally managed organization. Greiner (1998: 60) proposed the same: the change between an entrepreneurially managed organization to a professionally managed one should occur between the second (direct supervision) and the third (delegation) phases.

How is the transition from entrepreneurial to professional management made in the high-technology context, which includes information and communication technology (ICT) organizations? ICT represent a relatively new industry in which data on such a transformation are scarce. Could it be that this industry is so specific that even this transition differs from the one seen in a 'traditional' economy? It is not uncommon for ICT organizations to grow from start-up to maturity in just a few years and that the entrepreneurial culture, established at the beginning, prevails over the whole life cycle of the organization (Hanks et al., 1993: 18). As shown by Hitt et al. (1998: 22) and Nagel et al. (2006: 228), companies from high-tech industries are, among other things, characterized by less formal organization and a flatter organizational structure. On the other hand, high-tech companies frequently rely on a product focus, driven by innovations in technology rather than by the needs of the customer; the 'engineering mentality' of many high-tech companies leads to a 'product focus' and not a 'business focus' (Berry, 1996: 496).

In our chapter we present an in-depth study of six ICT organizations, three from Germany and three from Slovenia, each having both a considerable history and a firmly established position in the market. In addition to the above questions we shall also address the differences between German and Slovenian companies and, in particular, between German and Slovenian engineers. Ulijn et al. (2001: 21–52) and Shaw et al. (2003: 489) show that there is a significant cultural dimension in the behaviour of engineers from different countries as well as a difference in the behaviour of engineers compared to other groups (that is, marketers) in the company.

The study is organized as follows. The following section provides a description of the transition from entrepreneurial to professional management and the main hypothesis. The third section presents the methods used and the variables. In the fourth section, the results are reported while in the fifth section we discuss and summarize our findings. The final section concludes.

THE TRANSITION FROM ENTREPRENEURIAL TO PROFESSIONAL MANAGEMENT AND THE MAIN HYPOTHESES

The existing literature relates the transition from an entrepreneurial firm to a professionally managed one to factors such as changes in the organizational structure, the management style and the level of formality of internal systems and strategy (Barth and Hörte 1999: 3; Deakins 1999: 203; Lester et al., 2003: 346). Once a company reaches the stage in which the existing infrastructure no longer supports the growth and development of the company, the organization will encounter transformational growing pains, and the transition from entrepreneurial to professional management will become a necessity.

There are at least three main dimensions of such a transition. The key results in the area of organization describe a change in the organizational structure; leadership, culture and management development are all part of the management style dimension while the dimension of the level of formality of internal systems and strategy is defined by the results in the key areas of planning and control. In Table 10.1 we summarize the findings on the most important differences between the two structures of entrepreneurial and professional management.

Three sets of hypotheses are developed as the basis of our investigation. The first set relates to the change in the *organizational structure*. In order to transform the organization from an entrepreneurially to a professionally managed one, various specialized functions have to be developed and a more hierarchical organization has to be adopted. The management takes on functional specialization (H1a; see Table 10.2 for description of hypotheses and proxies). The current organizational structure has to be evaluated and adjusted, an organization chart has to be developed, a written job description has to be formulated and a more sophisticated operating system established (H1b). Everyday operating activities have to change, especially in the context of decision making, where more formal methods of making decisions should be implemented (H1c). As the number of employees increases, communication channels will become more formal and indirect (H1d).

Concerning changes in the *management style*, the entrepreneur has to learn how to delegate authority. In a professionally managed organization most decisions are delegated to employees who are responsible for the area affected by the decision (H2a). In addition, delegating could raise questions of trust by entrepreneurs in the sense of doubting whether the managers will perform their tasks as well as the entrepreneur would. The same question is also posed by customers, suppliers and even employees used to

Table 10.1 Comparison of entrepreneurial and professional management

Dimensions	Key area of results	Entrepreneurial management	Professional management
Organizational structure	Organization	Informal structure with overlapping and undefined roles; people are expected to do whatever is necessary	Formal, explicit role descriptions that are mutually exclusive and exhaustive
Management style	Leadership	Styles may vary from very directive to *laissez-faire*	Consultative or participative styles, also consensus or team-orientated styles
	Culture	Loosely defined, 'family'-orientated culture, which is not explicitly managed by the organization	Well-defined structure, treated as a variable to be managed and transmitted
	Management development	*Ad hoc* development, principally through on-the-job training; with growth managers work more, but faster than in the past	Conscious effort to develop managerial skills, the way of thinking and to prepare a pool of managers for the future
Level of formality	Planning	Informal, superficial, *ad hoc* planning in the entrepreneur's head	Regular formal, systematic planning cycle with strategic, operational and contingency planning
	Control	Partial, ad hoc control, seldom uses formal measurements, lacking in formal measurement or performance appraisal systems	Formal, planned system of organizational control, including explicit objectives, targets, feedback, evaluations and rewards

Source: Adapted from Flamholtz and Randle (2000: 38–42).

Table 10.2 Dimensions used to define the professionalizing stage

Hypotheses	Dimension	Abbreviation	Stat. – top manag[a]	Stat. – middle manag. & engin[b]
H1a	Functional specialization	*FSPECF*: Finance *FSPECM*: Marketing *FSPECRD*: R&D *FSPECHRM*: HRM *FSPECIA*: Implementation, Assembling *FSPECSMC*: Support, Maintenance, Consulting	The tasks I perform are from the fields: finance marketing R&D HRM other	
H1b	Formal job description	*JOBDC*	My subordinates perform only those tasks that are described in their formal job descriptions	I perform only those tasks that are described in my formal job description
H1c	Formalization of taking decisions	*FORMDEC*	Most of my decisions are taken based on the results of expert analyses	
H1d	Formal communication	*COM*	The communication between me and my customers (or other workers) is documented	
H2a	Delegation of decision making	*DELEG*	Most decisions I delegate to my subordinates who are responsible for the	My supervisor delegates most of the decisions that are

			area of those decisions	my responsibility
H2b	Trust	*TRST*	I trust that my subordinates will do everything as agreed, if possible	I believe that my supervisor trusts me in performing what was agreed
H2c	Respecting rules	*RESPRUL*	Breaking the predefined rules is not tolerated	
H2d	Further training and education of employees	*ADTR*	I always enable my subordinates to obtain additional training and education when a need is recognized	My supervisor always enables me to obtain additional training and education when I recognize a need for it
H3a	Clear direction (strategy and goals)	*STGOL*	I am acquainted with the business strategy and goals of my company	
H3b	Positioning of products or services	*POS*	Our products and services have a clear position in the market	Our products and services have a clear position in the market

Notes:
a. Statements of top management.
b. Statements of middle management and engineers.

having a close relationship with the entrepreneur. Therefore, trust that everything that has been agreed will be done has to be established between subordinates and employees (H2b). Moreover, during an organization's growth and development the corporate culture is slowly changing and moving away from the entrepreneur. The 'family atmosphere' is replaced by an atmosphere that is focused more on teamwork and respecting predefined rules as a way of life (H2c). Finally, if the skills and knowledge of employees are not developing according to the firm's needs, the firm might experience stagnation. Therefore, a conscious effort to develop the skills of individuals is made (H2d).

The third set of hypotheses relates to *planning and control*. Planning in entrepreneurially managed firms is mostly or entirely carried out by the entrepreneur. However, growth places demands on the entrepreneur's time and energy and a formal process of strategic planning has to be established. That is, strategies and strategic goals have to be regularly formulated, discussed and adjusted and then spread through the organization (H3a). If products are clearly positioned in the market, this is the best mechanism of control in this phase of development (H3b).

METHODS OF ANALYSIS AND VARIABLES

For this study, six ICT companies from Germany and Slovenia (three in each) were selected. The companies operated in different ICT subsectors, ranging from system integration to software development (see Table 10.3). The subsectoral composition in both countries is very similar. As a comparison, the study by Ulijn et al. (2001) uses 24 companies from Germany and the Netherlands, operating in a wider array of sectors.

The research involves a combination of qualitative multiple-case design, whereby we follow a replication rather than a sampling logic (Yin, 2003: 31), and a quantitative research using statistical analysis. In the first phase of the analysis, where we test the level of how professionally an organization is managed, we use a qualitative multiple-case approach. In the interviews (conducted in spring 2004) we discussed the organizational history, initial years, hierarchy levels, development of formal systems, planning, strategy, future challenges and issues connected to experiences with management transition. Following the interviews, the collected data were transcribed, edited and summarized in memo form.

For the second phase involving a quantitative analysis of the opinions of different groups of managers and engineers, data were gathered through questionnaires given to randomly selected employees of all six ICT companies. In the study, 121 respondents participated from three different

hierarchical levels. Whereas Ulijn et al. (2001) had to make sure by the sample selection method that interviewees had approximately the same background because of their heterogeneous sectoral composition, we are fairly confident in this because of the relatively homogeneous sectoral composition. This also allows us to interview managers as well as engineers, which is crucial for our study.

The interviewees were asked to rate the selected dimensions – measured by different statements – on a scale from 1 to 5, where 1 denoted 'I strongly disagree' and 5 denoted 'I strongly agree'. Most hypotheses are covered by one statement only, except for H1a, which is covered by six statements. The selected dimensions and accompanying tested statements are described in Table 10.2. The selected variables show good distributional properties, namely skewness and kurtosis are close to 0 and not significantly different from the binomial distribution. The sample size is also considered to be adequate.

RESEARCH RESULTS

Firms in the Study in their Life-cycle Development

As explained in previous paragraphs, the critical factors in helping organizations make the transition from an entrepreneurial to a professionally managed firm are: organizational structure, effective leadership, management development, strategic planning and organizational control systems. We summarize the features of these tools (where they exist) for each case studied in Table 10.3. First, with regard to *organizational structure*, in all the cases studied this has been formally defined and adjusted over time. It has been gaining more hierarchical levels along with the growth of employees. Second, Flamholtz and Randle (2000: 265) claim that the most common *effective leadership style* in high-technology organizations is the participative style. In general, we can argue that this was also true of the participating companies. However, we should note that with the emergence of different situations the styles were also changing. Third, in our opinion formal *management development* is more or less present in all cases especially since, due to the features of the ICT industry and the lack of qualified people in the job market, the focus in ICT companies is being placed on internal recruiting. Fourth, as to *strategic planning* in all cases studied the interviewees indicated that they are making strategic plans. However, they believe (have experience) that making them for longer than one year is useless. That is, the ICT industry is changing too rapidly to be able to predict every change and capture it in time. Finally, a firm's *control systems*

Table 10.3 A professionally managed organization

Case	Years of functioning	Number of employees	Organizational structure	Effective leadership	Management development	Strategic issues are defined	Organizational control systems	Professional manager?	Role of founder(s)
G1 (software developer)	5	24	Functional, 3 levels	Could be characterized by the sentence: 'We make decisions together, but some votes are more important than others'	Developed more or less internally, meaning that people with a technical background have over the years acquired additional managerial skills and knowledge	By the managing team for 3 years	Use of objectives, feedback, evaluations, performance measurements (e.g. appraisal meetings) and rewards – especially in 'area of sales'	Yes	Chief technology officer
G2 (IT and business consulting)	18	384	Matrix, 3 levels			By the CEO jointly with other general managers		No	CEO
G3 (online service provider)	5	386	Matrix based on project teams, 3 or 4 levels			By the managing team, especially by both founders		No	CEO, chief technology officer
S1 (systems integrator)	14	105	Process, 4 levels			By the managing team for 1 year		Yes	President of the board of directors

S2 (IT consulting)	13	34	Functional, 3 levels	By the managing team and owners for 5 years	Yes	Consultants (strategic supervisors)
S3 (software developer)	15	50	Matrix, 3 levels	By the owners	No	CEO

could at this stage be best described through the use and measurement of achieving explicit objectives and goals, where one of them could be the position of firm's product or services on market. This also holds true for the studied ICT firms which are all explicitly striving to achieve a clear position for their products or services and formally measuring the achievement of this goal. Based on these comments, we could argue that all the organizations have successfully transformed into a professionally managed organization.

How Different Groups see Organizational Development

To ensure the validity of the results we tested this statement by analysing primary data gathered through questionnaires addressed to members of the participating firms. In the first step, we looked at the differences between the various levels of management in a bivariate fashion, testing the differences between the arithmetic means of statements between the various levels of employees by applying the analysis of variance procedure, using the 'level' variable as a factor variable. Besides the main ANOVA test, which indicates where differences between the groups exist but not between which groups exactly, we also applied a *post hoc* analysis using Duncan's procedure (Winer et al., 1991) to pinpoint those groups that differ according to certain criteria. The results of these tests are summarized in Table 10.4. When we compare the three groups we see that top management excels in formal communication, and is more functionally specialized in marketing and less in research and development (R&D) than the two other levels. They delegate more decisions to others and are more acquainted with the strategy and goals of the company. On the other hand, engineers are less functionally specialized in finance, marketing and human resource management (HRM). Interestingly, they do not seem to be significantly more specialized than (especially middle) management in R&D, implementation and assembling and consulting, support and maintenance. These results clearly indicate differences with regard to the tested dimensions that define the company as being professionally managed between the top managers and engineers, but less can be said about the role of middle management. Thus, we decided to continue with the analysis. To control for the effects of the interrelation between the variables and differences in the corporate culture we also tested the differences between the three groups of employees multivariately using a multinomial logistic regression.[1]

In our specific case we model the probability of belonging to a particular employee level,[2] based on the same variables as described above. In addition, we added a variable denoting the company in order to control for the impact of the corporate culture on a particular company. We started with a model

Table 10.4 Results of ANOVA testing

Variable	*F*	Engineer	Middle management	Top management
N	121	56	43	22
Functional specialization – finance (*FSPECF*)	18.34***	*1.94*	2.76	**3.47**
Functional specialization – marketing (*FSPECM*)	19.73***	*2.42*	3.67	3.73
Functional specialization – R&D (*FSPECRD*)	7.95***	3.93	3.64	*3.00*
Functional specialization – HRM (*FSPECHRM*)	13.10***	*1.80*	2.71	3.05
Functional specialization – implementation, assembling (*FSPECIA*)[a]	3.31**	3.20	3.40	2.99
Functional specialization – support, maintenance, consulting (*FSPECSMC*)	11.42***	**3.71**	3.07	3.15
Formal job description (*JOBDC*)	2.80*	2.75	2.19	2.50
Formalization of taking decisions (*FORMDEC*)	0.13	3.45	3.37	3.41
Communication (*COM*)	9.87***	3.48	3.07	**4.23**
Delegation of decision making (*DELEG*)	18.58***	*2.70*	3.23	**3.86**
Trust (*TRST*)	1.86	3.84	3.84	4.27
Respecting rules[a] (*RESPRUL*)	3.09**	2.64	2.28	2.68
Further training and education of employees (*ADTR*)	4.75**	3.63	4.05	4.32
Strategy and goals (*STGOL*)	56.65***	*3.27*	4.09	**4.82**
Positioning of products or services (*POS*)	2.84*	3.61	3.84	4.14

Notes:
Groups with means significantly lower than the other two are in italics, groups with means in boldface are significantly higher than the other two at a significance level of 0.05.
a. There is a significant difference between the highest and lowest value, however the value in the middle is not significantly different from either of them.
* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

containing only the controls and gradually built the model up by adding variables until we arrived at the final model shown in Table 10.5.[3] This model involved a highly significant improvement over the baseline (null) model. The Nagelkerke pseudo R^2 was very high, namely 0.799, indicating the model's good fit. As the results show, there are two main functions that

Table 10.5 Results of the multinomial logistic regression

	Top management – engineers[a]		Middle management – engineers[a]		Middle management – top management[b]	
	B	Std error	B	Std error	B	Std error
FSPECF	0.92	0.38**	0.46	0.28*	−0.46	0.28
FSPECM	0.85	0.37**	0.58	0.25**	−0.26	0.30
FSPECRD	−0.78	0.30***	−0.50	0.22**	0.28	0.24
DELEG	3.47	0.87***	1.31	0.43***	−2.16	0.80***
RESPRUL	0.77	0.61	−0.49	0.40	−1.26	0.54**
POS	0.24	0.63	−0.30	0.38	−0.54	0.54
COM	2.01	0.60***	0.93	0.34***	−1.08	0.52**
[CASE = g 1]	1.36	1.88	1.15	1.33	−0.22	1.57
[CASE = g 2]	1.69	1.49	1.31	1.15	−0.38	1.18
[CASE = g 3]	1.93	1.69	1.97	1.19*	0.05	1.40
[CASE = s 1]	1.56	1.76	2.47	1.25**	0.91	1.38
[CASE = s 2]	1.85	1.79	0.55	1.32	−1.30	1.67
[CASE = s 3]	0.00	.	0.00	.	0.00	.
Intercept	−26.54	6.18***	−6.87	2.91***	19.66	5.65***

Notes
a. Engineers is the reference group.
b. Top management is the reference group.
* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

reveal the differences between engineers and middle managers and between engineers and top managers. The third set of parameters is derived from the original, which expresses the difference between middle and top managers. We thus cover all the pairwise differences. After controlling for the company and the variables one by one, we get a similar yet clearer picture of the differences between the various levels of employees.

Some of the results, especially when we compare engineers and top managers, are obvious and as expected. Top managers are less involved in research and operational activities; they delegate more decisions to others and prefer more documented communication. Top managers manage and the engineers implement, which is a result that already followed from the ANOVA analysis. What we could not determine precisely from the bivariate ANOVA analysis was the exact role of middle management. However, the multinomial logistic regression shows that middle management is more specialized in finance and marketing and less specialized in R&D compared to the engineers. Functional specialization is therefore also observed from data in the case of middle management which, together with significant variable

communication, supports previous conclusions on the successful transformation of investigated enterprises from entrepreneurial to a professionally managed organization. When comparing middle management with top management, we can see that middle managers delegate fewer decisions to their subordinates, find documented communication less important and are less prepared to respect the rules of the organization. The results indicate that, with respect to following the rules, top managers are more in line with engineers than middle managers. This could be explained by the tendency of middle management to have a more flexible organization while gaining a competitive advantage, as argued by Hitt et al. (1998: 22). But if this were the case, would not the same tendencies also be shown for the top managers and engineers? We thus argue that these results correspond to Nagel et al.'s argument about top management that has the role of establishing an environment which allows new ideas to emerge, and middle management that has to formulate suggestions for top management to approve (Nagel et al., 2006: 230). The middle management, which includes as much as 77 per cent of engineers, more than the group of top managers (63 per cent of engineers) is often the breaking factor to changes in the organization.

Is There a Difference between German and Slovenian Firms?

We tried a similar approach to test for differences between the various levels of employees. There are few significant differences between the two countries (see Table 10.6). Formal communication and additional education and training are viewed as significantly more important in Slovenia than in Germany while, on the other hand, in German firms more importance is given to the formal job description. The reason for this could be that two of the German firms (G1 and G3) are much younger than the rest of the sample and employ a higher proportion of young, educated employees who come straight from university. Consequently, there is less need for additional education training, and a lower desire to follow the formal ways of communication. However, German employees assign more value to formal job descriptions than do Slovenian employees, which is difficult to explain only by the age of employees. A recent study by Jazbec (2005) found that when comparing German and Slovene cultures, based on Hofstede's (1996) cultural dimensions, the only significant difference lies in the fact that German culture ($MAS = 66$) is much more masculine than the Slovenian one ($MAS = 20.3$). This offers an alternative explanation that the more masculine German values keep a strong technical base and consequently less of a market orientation for German engineers. As discussed by Ulijn et al. (2001: 21), German engineers are well educated, more product orientated and directed to doing the tasks described in their job description. This

Table 10.6 Results of the logistic regression for differences between the two countries[a]

	B	Std error
FSPECF	−0.09	0.27
FSPECM	0.20	0.18
FSPECRD	−0.08	0.17
FSPECHRM	−0.09	0.30
FSPECIA	0.28	0.22
FSPECSMC	−0.06	0.18
COM	0.62	0.27**
FORMDEC	−0.18	0.36
JOBDESC	−0.52	0.25**
DELEG	0.35	0.34
RESPRUL	0.15	0.34
TRST	0.17	0.34
POS	−0.11	0.36
ADTR	0.64	0.31**
STGOAL	−0.63	0.40
Constant	−2.24	2.77

Notes:
a. Germany is the reference country.
** Significant at 5%.

is changing over time (also see Ulijn and Fayolle, 2004: 204–32), but it still prevails over the Slovenian experience. With the transition to a market economy, the new high-tech firms in Slovenia are revealing a considerable market orientation.

DISCUSSION

Since this is a case-study analysis, the question is whether these results have any broader meaning. As Yin (2003: 33) argues, it makes sense to compare the results of such an analysis with the results of studies on a wider sample in order to reinforce the robustness of the theory. Therefore, we compared the results for the six companies in our study with those of Lester et al. (2003), who tested a five-stage model applicable to all organizations, and Hanks et al. (1993) which derived a taxonomy of the sequence of growth-stage configurations on a sample of high-technology organizations. Since we present the entire comparisons in Appendix 10A, here we merely discuss the core results. The results indicate that the companies in our

sample can be located somewhere between the survival and success phases in the Lester et al. study. This claim is based on the following: power is spread among several owners/investors; decision making includes some analysis; and the structure is becoming more formal and information processing is sophisticated. In addition, organizations are focusing their operations on broader segments of the market, have a wide assortment of products and/or services which are perceived in the eyes of customers to be different from others and are thus placing less emphasis on production/distribution efficiency items.

Differences among our ICT businesses and businesses from the baseline study are as follows: ICT businesses place less emphasis on efficiency items; have a higher degree of functional specialization; the decision-making process includes more analysis; and power is less distributed among numerous shareholders. In the baseline study, the information-processing dimension was identified as the most critical dimension for indicating the life-cycle stage. We noticed that the companies in our sample have very sophisticated information processing and that they started adopting a more complex information system earlier in their life cycle, like the organizations in the baseline study. This could be attributed to the fact that they are operating in the ICT sector. In comparison to the Hanks et al. study, we found that the ICT companies in our sample are slightly bigger and grew more slowly (both in the number of employees and in the level of annual sales). This could indicate that the companies we studied are in a 'later growth' stage in the life cycle and are no longer experiencing the 'hyper-growth rates' enjoyed by the baseline companies. The faster transition to slower growth rates could, at least to a certain degree, also be attributed to the fact that the burst of the 'internet bubble' in 2000 caused a financial crisis in the ICT business.

The businesses in our study have more complex organizational structures, consequently resulting in less centralization in decision making that could also indicate a later stage in their life cycle compared to the baseline-study participants. However, this could not be supported by the fact that the high-tech companies in our study have slightly less formalized everyday operations. Further, in the context of previous studies the companies in our study seem to have successfully made the transition to professionally managed organizations.

CONCLUSIONS

Our analysis found no major differences between the six companies from Germany and Slovenia and firms from other industries in the transition

from an entrepreneurial to a professionally managed organization. This transition is characterized by the functional specialization of top and middle managers, the increased formalization of decision making and the formalization of communication. Decisions are beginning to be delegated by superiors to subordinates and a culture of trust is being developed, namely trust that the agreed tasks will be performed at all levels. Companies are starting to develop their employees through further education and a formal system of planning and control is being established. All this is needed for firms to survive at the market. Interestingly, there is less stress on both performing tasks according to formal job descriptions and respecting the rules. This is probably a characteristic of high-technology companies that encourage the innovativeness of their employees through team work and a more horizontal organization. Our findings can, thus, also reflect O'Reilly and Tushman's (2004) view on 'ambidextrous' organization – the organizational form that seeks to exploit simultaneously the entrepreneurial with the more institutionalized forms of the firm in order to achieve sustainable innovation over time. Also noticeable is the greater rigidity of German engineers when performing tasks according to their formal job description, which is probably a consequence of the cultural environment. However, having access only to six firms, we are aware of some limitations of our results. Therefore further research with a larger sample from this sector is needed to confirm our findings.

NOTES

1. The multinomial logistic regression is a logistic regression where the response (dependent) variable is a nominal or ordinal variable with more than two values. The model assesses the probability of a unit belonging to a particular group, as defined by the response variable, based on certain properties of the unit.
2. What we model is the probability of belonging to a certain level of employment, as compared to another level. In the interpretation of the results we reverse the causality direction so the coefficients are interpreted as differences between the levels.
3. Some of the variables, namely functional specialization in HRM, implementation and support, training and education, trust and strategy and goals, did not make it into the model. This was due to the fact that, especially after controlling for the firm, the variance of these variables was zero in certain groups (for example, when none of the engineers was specialized in HRM, so all of them answered with 1), which makes it impossible to estimate the model.

REFERENCES

Adizes, Ichak (1999), *Managing Corporate Life Cycles*, Englewood Cliffs, NJ: Prentice-Hall.

Barth, Henrik and Sven Åke Hörte (1999), 'Managerial barriers to growth in Sweden', paper presented at the European Operations Management Association 6th Annual Conference on Managing Operations Networks, Venice, Italy, 7–8 July.

Berry, M.M.J. (1996), 'Technical entrepreneurship, strategic awareness and corporate transformation in small high tech firms', *Technovation*, **16** (9), 478–98.

Churchill, Neil C. and Virginia L. Lewis (1983), 'The five stages of small business growth', *Harvard Business Review*, **61** (3), 30–50.

Deakins, David (1999), *Entrepreneurship and Small Firms*, 2nd edn, London: McGraw-Hill.

Flamholtz, Eric G. and Yvonne Randle (2000), *Growing Pains: How to Make the Transition from an Entrepreneurship to a Professionally Managed Firm*, San Francisco, CA: Jossey-Bass.

Greiner, Larry E. (1998), 'Evolution and revolution as organizations grow', *Harvard Business Review*, May–June, 55–67.

Hanks, Steven H., Collin J. Watson, Eric Janesen and Gaylen N. Chandler (1993), 'Tightening the life-cycle construct: a taxonomic study of growth stage configurations in high-technology organizations', *Entrepreneurship Theory and Practice*, **18** (2), 5–30.

Harper, Stephen H. (1995), *The McGraw-Hill Guide to Managing Growth in Your Emerging Business: Guidelines for Transforming Your Small Business into an Exceptional Enterprise*, New York: McGraw-Hill.

Hitt, Michael, Barbara Keats and Samuel M. DeMarie (1998), 'Navigating in the new competitive landscape: building strategic flexibility and competitive advantage in the 21st century', *The Academy of Management Executive*, **12** (4), 22–42.

Hofstede, Geert (1996), 'Images of Europe: past, present and future', in Malcom Warner and Pat Joynt (eds), *Managing Across Cultures: Issues and Perspectives*, London: Thomson Learning, pp. 89–103.

Jazbec, Marijana (2005), 'Slovenska nacionalna kultura in medkulturno izobraževanje poslovnežev', in Janez Prašnikar and Andreja Cirman (eds), *Globalno gospodarstvo in kulturna različnost*, Ljubljana: Finance, pp. 85–109.

Lester, Donald L., John A. Parnell and Shawn Carraher (2003), 'Organizational life cycle: a five-stage empirical scale', *International Journal of Organizational Analysis*, **11** (4), 339–54.

Nagel, Arie, Wim Vanhaverbeke and Marko Torkeli (2006), 'Towards a more innovative company – creating options for the future', in Janez Prašnikar (ed.), *Competitiveness, Social Responsibility and Economic Growth*, New York: Nova Science Publishers, pp. 223–31.

O'Reilly, C.A. III and M.L. Tushman (2004), 'The ambidextrous organization', *Harvard Business Review*, April, 74–81.

Olson, D. Philip and David E. Terpstraand (1992), 'Organizational structural changes: life-cycle stage influences and managers' and interventionists' challenges', *Journal of Organizational Change Management*, **5** (4), 27–40.

Roberts, Michael J. (1999), 'Managing transitions in the growing enterprise', in Michael J. Roberts, William Andrews Sahlman, Howard H. Stevenson and Amar Bhide (eds), *The Entrepreneurial Venture*, 2nd edn, Boston, MA: Harvard Business Press, pp. 377–91.

Scott, Mel and Richard Bruce (1987), 'Five stages of growth in small business', *Long Range Planning*, **20** (3), 45–52.

Shaw, Vivienne, Christopher T. Shaw and Margit Enke (2003), 'Conflict between engineers and marketers; the experience of German engineers', *Industrial Marketing Management*, **32**, 489–99.
Ulijn, J.M. and A. Fayolle (2004), 'Comparing entrepreneurial and innovation cultures: the European perspective of French, German, and Dutch engineers, some empirical evidence about their technology vs market orientation', in T. Brown and J. Ulijn (eds), *Entrepreneurship, Innovation and Culture*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar, pp. 204–32.
Ulijn, J.M., A.P. Nagel and W.-L. Tan (2001), 'The impact of national, corporate and professional cultures on innovation: German and Dutch firms compared', *Journal of Enterprising Culture*, special issue on Innovation in an International Context (edited by A. Nagel, J. Ulijn and W.-L. Tan), **9** (1), 21–52.
Wilson, Peter and Sue Bates (2003), *The Essential Guide to Managing Small Business Growth*, Chichester: John Wiley.
Winer, B.J., D.R. Brown and K.M. Michels (1991), *Statistical Principles in Experimental Design*, 3rd edn, New York: McGraw-Hill.
Yin, Robert K. (2003), *Case Study Research: Design and Methods*, 3rd edn, Beverly Hills, CA: Sage.

APPENDIX 10A

In our study we used the same dimensions as in the Lester et al. (2003) study and analysed how six participating ICT businesses differ from businesses that took part in the baseline research. The results of the comparison with the baseline survey are presented in Table 10A.1.[1]

Table 10A.1 Comparing the results of our study with the results of Lester et al. (2003)

Item	Summary of statements	Present survey ($n = 6$)		Baseline survey ($n = 242$)		Comparing the difference
		Mean	Std err.[a]	Mean	Std err.	t
FIRSTMOV	Following a first-mover strategy	3.17	(0.62)	3.22	(1.09)	–0.34
SECMOVER	Following a second-mover strategy	2.78	(0.65)	3.41	(0.96)	−3.84**
SEGMENT	Degree of market segmentation (from less to more)	2.60	(0.63)	3.09	(1.06)	−2.74**
BREADTH	Breadth of product or service lines (from less to more)	3.06	(0.64)	3.56	(0.83)	−3.14**
UNIQUE	Perceived uniqueness (from less to more)	3.67	(0.49)	3.47	(0.95)	1.51
EFFICNCY	Efficiency of production/distribution (from less to more)	2.22	(0.43)	3.04	(0.86)	−7.12***
EXIST1	Organization is small	2.83	(0.75)	2.40	(1.4)	1.35
EXIST2	Power rests with the founder	2.67	(0.82)	2.49	(1.48)	0.51
EXIST3	Simple structure	2.67	(1.37)	2.93	(1.35)	−0.47
EXIST4	Simple information processing	2.17	(0.41)	2.52	(1.36)	−1.88*
SURV1	Power spread among several owners/investors	4.00	(0.63)	3.09	(1.3)	3.35**
SURV2	Some specialization	2.50	(0.55)	3.79	(1.03)	−5.53***
SURV3	Information processing consists of monitoring performance	3.33	(0.82)	3.57	(1.22)	−0.69
SURV4	Decision making includes some analysis	4.00	(0.01)	3.23	(1.26)	9.47***

Table 10A.1 (continued)

Item	Summary of statements	Present survey ($n = 6$)		Baseline survey ($n = 242$)		Comparing the difference
		Mean	Std err.[a]	Mean	Std err.	t
SUCCESS1	Larger than most competitors	2.67	(1.21)	3.03	(1.23)	−0.73
SUCCESS2	Power distributed among numerous shareholders	1.50	(0.55)	2.83	(1.14)	−5.65***
SUCCESS3	Information processing is sophisticated	3.00	(0.89)	3.38	(0.94)	−1.03
SUCCESS4	Widely dispersed organization	4.00	(0.63)	3.62	(1.1)	1.92**
RENEWAL1	Centralization structure with few control systems	2.00	(1.67)	3.64	(1.25)	−2.38**
RENEWAL2	Structure is divisional or matrix	3.00	(1.26)	3.47	(1.18)	−0.90
RENEWAL3	Information processing is complex	2.33	(0.52)	3.59	(1.09)	−5.65***
RENEWAL4	Decisions emphasize growth and participation	3.33	(0.52)	3.41	(1.11)	−0.34
DECLINE1	Centralized decision making, not complex	1.00	(0.01)	2.86	(1.46)	−19.84***
DECLINE2	Information processing not sophisticated, but badly needed	1.50	(0.55)	2.81	(1.28)	−5.50***
DECLINE3	Centralized decision making, not complex	2.00	(0.63)	3.21	(1.3)	−4.46**
DECLINE4	Decisions by a few conservative managers	1.00	(0.01)	2.91	(1.41)	−21.01***

Note: * Significant at 10%; ** Significant at 5%; *** Significant at 1%; [a] Standard error.

The taxonomy found in the Hanks et al. (1993) study was formed by clustering firms based upon common patterns of organization age, size, growth rate, formalization, centralization, and a number of specialized functions. Data for the six participating firms in our study were collected using the same method as in Hanks et al. and were analysed using the same methodology (Table 10A.2).

Table 10A.2 Comparing the results of our study with the results of Hanks et al. (1993)

	Present research ($n = 6$)		Baseline research ($n = 126$)		Comparing the difference
	Mean	Std err.[a]	Mean	Std err.	*t*
$Size_{log}$	4.49	(1.2)	3.12	(1.32)	2.74**
Age	11.50	(5.36)	8.91	(6.56)	1.14
Structural form	3.17	(0.75)	1.82	(0.65)	4.31***
Levels	3.33	(0.82)	3.31	(1.24)	0.07
Specialization	6.80	(2.59)	6.29	(4.91)	0.45
Centralization	12.83	(0.75)	16.81	(2.89)	−9.92***
Formalization	38.17	(5.08)	45.21	(10.61)	−3.09**
Employees	161.17	(174.79)	66.07	(166.53)	1.30
Employee growth	0.14	(0.07)	0.41	(0.98)	−2.88**
Sales growth	0.15	(0.16)	1.29	(4.25)	−2.96**

Note: ** Significant at 5%; *** Significant at 1%; [a] Standard error.

NOTE:

1. We thank John A. Parnell, University of North Carolina at Pembroke, for providing us with additional descriptive statistics.

11. Value diversity for innovativeness in the multicultural society of Estonia

Rebekka Vedina, Gerhard Fink and Maaja Vadi*

INTRODUCTION

In this chapter, we shall investigate the potential effects that cultural similarities and differences between the two major cultural groups, ethnic Estonians and people belonging to the Russian-speaking community, might have on the inclination to innovate. We shall study whether the required capabilities, based on instrumental and terminal values, are available in Estonia; and whether these values are equally distributed within and between these groups, or whether more intense cooperation between Estonians and Russian speakers would be required to invest complementary values into new hybrid corporate cultures that have yet to emerge in order to foster innovation. This is an important issue, since the Estonian performance in innovation is rather disappointing at present. Relative private sector innovation expenditure amounts to only 22 per cent of the EU average (Republic of Estonia, 2005: 23). In the year 2000, in Estonia the innovation expenditures of companies as a percentage of turnovers amounted to 1.43 per cent (EU average was 2.15 per cent, ibid.: 31). The rather poor performance in innovation is in obvious contrast with the observation that Estonia is doing pretty well in various rankings on economic freedom and factors that are supposed to determine international competitiveness or usage of new technologies. In this chapter, we shall try to explain this contrast by going beyond the visible and easily grasped features, which form the basis of these kinds of competitiveness rankings, and provide research into the less obvious, but possibly more important cultural factors. These cultural factors are at the core of our analysis.

Belief in market mechanisms and denial of the role of government at the beginning of the 1990s led to the radical implementation of market mechanisms in public policy (Kattel, 2004), which has had surprisingly negative

effects on the development of entrepreneurship. Following economic reform, Estonian enterprises had to adapt themselves to new economic conditions and re-orientate themselves to Western markets (Ratso, 2005). State aid to small and medium-sized enterprises was concentrated on training courses and consulting support only. In order to survive, new entrepreneurs tried to take advantage of the only available short-term competitive edge, namely cheap labour and resources (Kattel, 2004). Consequently, international subcontracting had become a popular means to survive, especially in such sectors as clothing, machinery, metalwork and textiles (Dana, 2005: 288), much more than, for example, among Bulgarian or Polish enterprises (Elenurm, 2004). While the inflow of technological knowledge from abroad is a positive feature, the flipside is potential outflow of a substantial part of the revenues, insufficient domestic technological innovation and only weak development of entrepreneurship. Although Estonia has an innovation potential and some remarkable high-tech innovation can be identified, for example internet voice communication development by Skype, there is still need to deepen the capabilities to induce and implement innovations at corporate levels.

Estonian entrepreneurs lack innovative inputs ('Innovation policy profile: Estonia', 2001; Kurik et al., 2002). For development of entrepreneurship, awareness of the importance of innovation and innovative ideas is urgently needed (see the discussion of the link between entrepreneurship and innovation by Wakkee et al., ch. 9 in this book). Understanding and acceptance of the concepts of innovation and innovativeness are rather poor. Innovation is a notion imported from abroad. The public and many key persons (policy makers, top managers, entrepreneurs, investors and the media) have difficulty associating the same meaning with this term as it has in the West. Because it is difficult to grasp, innovation is considered someone else's responsibility (Kalvet et al., 2005). If at all, innovation is conceptualized as a rather radical, one-time fast success tool, as, for example, new products or research and development (R&D)-derived basic innovations. Incremental innovation in processes and organizational innovations are rather neglected (ibid.).

Interestingly, such public attitudes coexist with the quite optimistic assessments reported by Estonian executives on the openness to foreign ideas in Estonian society (which is similar to that reported in Iceland, Ireland, the Netherlands, Hungary, the Slovak Republic and Portugal; IMD, 2005) and on flexibility and adaptability of people when faced with new challenges. For example, Swedish companies often test ideas first in Estonia, since Estonians tend towards industriousness and are perceived as having a heartier appetite for change than even the forward-thinking Swedes (Levine, 2004). Another potential indicator of the generally positive attitude

towards the novel trends of the modern world is broadband internet access. In 2004, Estonia ranked sixth among the 25 EU member states on broadband internet access among enterprises of more than 10 employees (68 per cent) after Denmark (80 per cent), Sweden (75 per cent), Spain (71 per cent) and Belgium (70 per cent). The average was 52 per cent.

Various rankings indicate that general conditions are relatively favourable for entrepreneurship and innovation. Economic freedom is high. According to the survey conducted by the *Wall Street Journal* and the Heritage Foundation, Estonia holds seventh place in the Index of Economic Freedom 2006, and according to the World Bank Group (2006) it ranks 16th in the ease of doing business among 155 economies. The World Economic Forum (2005) ranks Estonia among the top 20 countries, and in the 'The Lisbon review' survey, Estonia is ranked as the most competitive new EU member state (Ratso, 2005). With EU membership, political stability and ideological legitimacy was established. Why then is entrepreneurship and innovation lagging?

Besides these general trends, certain demographic factors play a particular role in the development processes. Miettinen (2004) considers demographic crisis – negative growth of population together with the shortage of both highly qualified white- and blue-collar workers – as one of the major problems for the development of entrepreneurship (of all those employed, some 90 per cent are employees and 10 per cent entrepreneurs). As he points out, the liberal and open economic policy, together with the neglected or deficient social policy, has created growing inequality among regions, occupations and genders, and it calls for individuals to take the initiative and bear the responsibility for their own future (ibid.). Together with the failure of the state to hedge the entrepreneurial risks, this may result in reluctance to take such risks, that is, lower levels of entrepreneurship and innovation.

Furthermore, since regaining independence in 1991, an important feature of Estonia is the culturally heterogeneous workforce, which is a legacy of the Soviet era. Many big enterprises employed mainly workers from a minority population (that is, Russian speakers) with little or no cultural connection with the majority population (Estonians). Since most of these large corporations were not economically viable and had closed down, integrating the people of these two distinct cultural backgrounds into the new social order is a major challenge for society and policy makers.

Given that persistent split in society, differences in values are an important part of the social system: these differences define and mediate the relations between the population groups and play a role in structuring the interactions between entrepreneurs (see the discussion by Halman et al., Ch. 7 of this volume). Therefore, when approaching the issues of

cooperation and innovation in entrepreneurship, it is important to take into consideration the value diversity prevailing in Estonian society. Are diverse values an obstacle for cooperation? On the contrary! Following Triandis (1995: 11–12) we would argue that differences in values could be an asset for emerging new enterprises. Based on this view we shall pursue the following research questions: what are the specific values salient among the representatives of the two major cultural groups? To what extent are both groups equipped with values that could influence innovativeness?

This chapter is organized as follows: after this introduction, the next section focuses on the concept of values and the potential consequences of value diversity for innovativeness. The third section summarizes insights into cultural diversity in Estonia: the Russian-speaking community and Estonians. An empirical study on values (following Rokeach, 1973) follows in the fourth section, where we highlight similarities and complementarities in the value profiles of Estonians and the Russian-speaking minority. In the final sections, the possible impact of cultural values on innovativeness among the representatives of majority and minority populations in Estonia is discussed and implications are drawn for managers.

VALUES THAT FOSTER INNOVATIVENESS AND COOPERATION

Values are an indispensable implicit part of any culture, be it group, organizational, professional, sector or national culture. Each value relates to a specific basic assumption and in turn has an influence on attitudes, modes of behaviour and norms. In entrepreneurship, specific sets of values are important for providing the ground for innovation, and cultural diversity can be a potential competitive advantage for an enterprise (see Ulijn et al., ch. 1 in this book). In any cooperation, adequately combined values will attain potentially better results.

In their study of seven European countries, Mairesse and Mohnen (2002) have compared the expected and observed innovation intensity (measured by the share of innovative products in total sales). They found that there are differences between the expected innovation ('propensity to innovate' estimated with *ex ante* defined explanatory variables) and observed actual innovation in EU countries. They called this unexplained residual 'innovativeness'. We would expect that cultural factors, which were not included in their model, could explain these variances in the observed innovation intensity.

Indeed, the process of innovation, be it product, process or organizational innovation, requires diverse skills in an organization. Following

Damanpour (1991), Nakata and Sivakumar (1996) and Flynn and Chatman (2001), to name but a few, we consider the innovation process to consist of two phases: (a) initiation, or the generation of new ideas; and (b) implementation, or the actual introduction of the change. From a cultural perspective, there is a clear distinction between initiation and implementation of innovation. Different values play different roles in each phase. Ulijn et al. (2004) proposed that the Dutch might be better equipped to initiate innovations and commercialize them, whereas the Germans are the better implementers and manufacturers. Nakata and Sivakumar (1996) claimed that in the initiation phase, individualistic culture promotes the ability to generate ideas and test the product concept, and collectivistic culture would promote the implementation phase through emphasis on interdependence, cooperation and unified purpose. On the organizational level, it is therefore crucial to combine human resources equipped with different values to promote the innovation process most efficiently. This brings us to the question of value diversity versus value uniformity and their importance for innovation.

Schein (1993) has argued that diverse but connected group cultures are desirable for an innovative organizational culture. Hauser (1998) asserted that diversity in values leads to a more profound problem perception and definition as well as likely acceptance of a chosen solution. In addition to differences in cultural values, diversity of knowledge is an important source and facet of organizational innovation (Souder and Jenssen, 1999). Knowledge-based minority views can stimulate consideration of non-obvious alternatives and interaction with persistent minority viewpoints stimulates creative thought processes (Nemeth, 1986). Hence, value diversity is a crucial asset in the innovation initiation phase.

Realization of the innovative solution, in its turn, is supported by complementary knowledge, together with a common focus (Hauser, 1998). Cohesion is important for the attainment of organizational goals, and harmony is necessary to implement creative ideas (Flynn and Chatman, 2001: 273). Cohesion and harmony should therefore be emphasized during the innovation implementation phase. However, one should not forget that strongly coherent groups tolerate less deviation. If cohesion turns into uniformity, it may result in a decrease in innovation and in reduced willingness or ability to adapt to changing circumstances (Nemeth and Staw, 1989: 175; Nemeth, 1997).

In the psychological literature on team performance, we found yet another example of the importance of similarity and difference:

> Neumann et al. (1999: 28–45) investigated the effectiveness of different strategies for using personality tests (Big Five) to select members for work teams. Their

> research question was whether 'team personality elevation' (= the average level of a given trait within a team) and 'team personality diversity' (= the variability or differences in personality traits found within a team) predict performance of teams. They found that high levels of agreeableness, conscientiousness and openness to experience, but also 'team personality diversity' of extroversion and emotional stability were valid predictors of team performance. Therefore, according to their findings the appropriate team selection strategy would be to select candidates, who are highly agreeable and open to new experience, but differ with respect to extroversion and emotional stability. (Fink et al., 2004: 25)

Hence, the success of innovation projects depends on cooperation between individuals with different values. The innovative productivity of collaboration comes from the 'differentness' of the individuals in a group, not their sameness (Nakata and Sivakumar, 1996; Zien and Buckler, 1997). Diverse subcultures of different departments, often referred to as 'professional cultures' (see Ulijn and Weggeman, 2001), can be complementary and enhance one another's effects on innovativeness. Therefore, complementary values are well suited for stimulating innovation processes (Hauser, 1998).

In the literature, we found a few articles dealing with values of importance for initiation and implementation of innovation. Using the Rokeach (1973) value inventory, Fagenson (1993) found that important instrumental values for initiation are honest, ambitious, capable, independent, courageous, imaginative and logical; and most important values for implementation are the terminal values of true friendship, wisdom, salvation and pleasure (ibid.). Based on Schwartz's (1992) value inventory, similar values were later also found in the work of Voss (2002; Table 11.1).

CULTURAL DIVERSITY: THE RUSSIAN-SPEAKING COMMUNITY AND THE ESTONIANS

Different cultural backgrounds and historical influences are the reasons why diversity emerged in Estonia. For centuries, Estonia has been under Danish, German, Swedish or Russian rule, which has had an important impact on the Estonian national character. After 22 years of independence during 1918–1940, as a consequence of the Hitler–Stalin pact, Estonia was forcibly incorporated into the USSR and was under Soviet control until 1991.

Today, there are two major cultural groups – Estonians and Russian speakers, that is, speakers of Estonian or Russian as a native (first) language, accounting for 68 per cent and 30 per cent, respectively. The Russian-speaking population has its own identity based on linguistic and

Table 11.1 Values of importance for initiation and implementation of innovation

Values	Values for initiation	Values for implementation	Variables	Sources
Terminal	Self-respect Freedom A sense of accomplishment A world at peace An exciting life	True friendship Wisdom Salvation Pleasure	Dependent variable: entrepreneurs vs. administrators Independent variables:	Fagenson (1993)
Instrumental	Honest Ambitious Capable Independent Courageous Imaginative Logical	Loving/compassionate Forgiving Helpful Self-controlled	Rokeach (1973) value inventory	
Terminal	Freedom Social order Social power Respect for tradition	Mature love Pleasure True friendship Sense of belonging Wisdom A varied life Reciprocation of favours Unity with nature	Dependent variable: entrepreneurs vs. administrators Independent variables: Schwartz's (1992) value inventory	Voss (2002)
Instrumental	Ambitious Curious	Daring Influential Protecting the environment		

socio-political grounds (see Vedina et al., 2006). During the Soviet era, many families with different ethnic backgrounds from different parts of Russia and other Soviet republics were relocated to Estonia. The use of Russian as the main language of communication in most public matters and self-perception as belonging to a majority population of the Soviet Union was the common element. After Estonia regained its independence in 1991, some Russian speakers left the country with their families, but most stayed on with the intention of integrating into the new society that was yet to emerge. Their social and economic situation today may vary, but speaking Russian as a mother tongue together with the shift in

self-perception as becoming a minority in the independent republic are still common factors of their identity (ibid.).

These two major cultures are influential in the business environment. We assume that differences in their values have an impact on their behaviour and interactions, and therefore on innovativeness and on the innovation processes.

Jerschina and Górniak (1997), who studied participation in the transformation processes among the minorities and majorities in Estonia, Latvia and Lithuania, distinguished between 'conductors of change', 'passive experts', 'active citizens' and 'silent citizens'. In the period of transition, silent citizens comprised the largest group (49 per cent), 12 per cent were conductors of change, 12 per cent passive experts and 26 per cent active citizens. The differences between national minorities and majorities are remarkable. While there were no differences found between minorities and majorities in Latvia or Lithuania, in Estonia the minorities (mainly Russian speakers) are much more passive. Their behaviour differs strongly from that of the national majority (ibid.).

Passivity is mostly ascribed to the 'communist heritage'. Rightly so, albeit the presumptions are utterly wrong that the observed behaviour had become a sort of 'national cultural value' under socialism. 'Passivity' is not a value that can easily be clarified if reference is made to the literature on values (Kluckhohn and Strodtbeck, 1961; Hofstede, 2001; House et al., 2004; quote from Fink and Lehmann, 2006). Passivity is a typical cultural shock syndrome, which is emerging due to a severe lack of orientation (Fink and Feichtinger, 1998; Fink and Holden, 2002). The significant difference in the passivity between Russian speakers and Estonians can possibly be attributed to a much more severe collective culture shock of the Russian speakers. At the time of the investigation, Russian speakers very likely felt more disorientated than Estonians.

In many companies the legacy of the communist period is still present, for example in the lack of skills, management techniques and competence. Interpersonal relationships enjoy high esteem. Strong inertia in the thinking among the older generation results in a polarization of mindsets between generations (Pärna, 2004; Vadi and Roots, 2006) and makes change difficult.

In earlier research, the following core values of Estonians were identified: patience, Scandinavian individualism, honesty, nationalism, Western orientation, adaptability and flexibility, as well as in manifestations such as silent protest, shyness and moderation, peacefulness, communication as information rather than small talk, and closeness to nature (Nurmi and Üksvärav, 1994). Estonians are considered to be quite individualistic (Hofstede, 2001: 502; Jürgenson, 2005; Vadi and Meri, 2005).

In various domains of social relationships, Russian speakers display more collectivistic attitudes towards family, peers, society and in interpersonal relations within organizations by which they are employed (Vadi et al., 2002). They can therefore be perceived to be more cooperation orientated.

Estonians have mostly been Lutherans, while people of Russian origin are predominantly Orthodox. For example, before the First World War, one million Estonians were Lutherans. The Lutheran Church retained some of its influence on Estonians during the period of Soviet occupation (Stricker, 2001). Thus, it is likely that Estonians, more than Russian speakers, have internalized the principle introduced by the Protestant Reformation that one's calling in life is to work hard in order to fulfil one's earthly duties. The Protestant work ethic was seen as the source of such personal qualities as industry, self-discipline, asceticism and individualism (Weber, 1904 [1930]; Furnham, 1984; Dose, 1997; Ryan, 2000).

However, preferred values may change with the changing standards of living. In a recent study of Schwartz's (1992) value types among Estonian students, Niit (2002) has illustrated that the values 'creativity' and 'varied life', which are related to openness to change, became much less important between 1992 and 1999, which may reflect the improved economic conditions and the greater availability of sources for achieving variety in life. Hence, a preference emerged for the preservation and enhancement of the welfare of those with whom one is in frequent personal contact. Benevolence values are likely to gain in importance.

HYPOTHETICAL IMPACT OF CULTURAL VALUES ON INNOVATIVENESS

In the light of previous research, we shall examine the following research question: can we identify sufficient differentness (diversity) among the dominating Estonian subcultures and also sufficient cohesion, or potential for harmony, which are necessary ingredients for successful innovativeness in a given society?

Following Fagenson (1993) we look at the sources of such differences and similarities by studying individual values as suggested by Rokeach (1973). Accordingly, in a first step we distinguish between 'instrumental' and 'terminal' values. Instrumental values represent modes of behaviour (Meglino and Ravlin, 1998: 352) that people choose as proper (Rokeach, 1973: 8). Terminal values reflect wants and desires that people wish to fulfil during their life (Vadi, 2000), or self-sufficient end-states of existence that people strive to achieve and pursue for their own sake (Meglino and Ravlin, 1998: 351).

The sample consisted of 340 Estonian (age M = 33.6, SD = 9.23) and 664 Russian-speaking employees (age M = 38.7, SD = 9.27) in 16 different organizations operating in various areas such as processing industry, services, and information technology in 1996–2001.

The ranking of instrumental values shows little similarity between Estonians and Russian speakers. Pearson's correlation coefficient ($-1 \leqslant r \leqslant 1$) is 0.48 between the final ranks and 0.57 between the means of the individual rankings (M columns in Table 11.2). R^2 is only 0.33. By contrast, the ranking of terminal values is relatively similar between Estonians and Russian speakers. Pearson's correlation coefficient ($-1 \leqslant r \leqslant 1$) is 0.82 between the final ranks and 0.85 between the means of the individual rankings (M columns in Table 11.3). R^2 is 0.72.

Table 11.2 Ranking of Rokeach instrumental values among Estonians and Russian speakers

Rank	Estonians, $n = 340$			Russian speakers, $n = 649$		
	Instrumental value	M	SD	Instrumental value	M	SD
1	Honest	4.45	3.97	Imaginative	7.36	4.85
2	Responsible	6.13	3.78	Loving	7.61	4.93
3	Intellectual	6.92	4.57	Logical	7.78	5.17
4	Loving	7.50	4.99	Responsible	7.97	5.14
5	Logical	9.01	4.57	Courageous	8.20	5.12
6	Capable	9.16	4.84	Honest	8.85	5.50
7	Helpful	9.33	4.96	Polite	8.94	4.35
8	Broadminded	9.50	5.24	Self-controlled	9.09	4.39
9	Self-controlled	9.53	4.75	Intellectual	9.23	4.56
10	Courageous	9.66	4.61	Forgiving	9.25	5.07
11	Cheerful	9.75	4.65	Cheerful	9.99	5.24
12	Independent	9.83	5.13	Independent	10.00	4.91
13	Clean	10.10	4.61	Obedient	10.56	5.24
14	Polite	10.15	4.30	Broadminded	10.61	4.75
15	Forgiving	10.20	4.96	Helpful	10.86	5.61
16	Imaginative	10.81	4.76	Clean	11.14	4.88
17	Ambitious	11.93	4.61	Capable	11.16	4.66
18	Obedient	16.37	2.90	Ambitious	12.20	5.45

Note: Due to the ranking technique, the smaller the mean, the higher is the importance of a value.

Source: Own research.

Table 11.3 Ranking of Rokeach terminal values among Estonians and Russian speakers

Rank	Estonians, $n = 340$			Russian speakers, $n = 649$		
	Terminal value	M	SD	Terminal value	M	SD
1	Family security	4.72	3.47	Family security	4.60	3.78
2	A sense of accomplishment	4.96	3.57	Wisdom	6.15	4.32
3	Wisdom	6.07	4.08	Self-respect	6.56	3.98
4	Inner harmony	6.11	4.24	A sense of accomplishment	6.92	4.08
5	Self-respect	6.41	3.90	A world at peace	7.68	5.93
6	Happiness	6.82	4.12	Happiness	8.17	4.22
7	Mature love	6.84	3.91	Inner harmony	8.47	4.60
8	True friendship	8.40	3.55	True friendship	9.15	3.94
9	Freedom	8.43	4.02	Freedom	9.18	4.40
10	Social recognition	10.90	4.33	An exciting life	9.37	4.76
11	An exciting life	11.16	4.09	National security	9.51	5.49
12	National security	11.30	4.75	Mature love	9.85	4.48
13	Equality	14.64	3.49	A comfortable life	10.82	5.13
14	A world at peace	11.41	5.39	A world of beauty	11.48	3.86
15	A comfortable life	11.69	4.11	Equality	11.63	4.59
16	A world of beauty	11.72	3.29	Social recognition	12.25	4.10
17	Pleasure	12.96	3.84	Pleasure	13.77	4.27
18	Salvation	16.17	3.37	Salvation	15.15	3.79

Note: Due to the ranking technique, the smaller the mean, the higher is the importance of a value.

Source: Own research.

When we compare the top six instrumental values for Estonians and Russian speakers, we find both similarity and difference. Three values get a high ranking in both groups: 'responsible', 'loving' and 'logical', while 'honest' is more important for Estonians. Two values are different in each group: among Estonians, 'intellectual' and 'capable' get a high ranking, as do 'imaginative' and 'courageous' among the Russian-speakers (Table 11.2).

When we compare the top six terminal values for Estonians and Russian speakers, we find stronger similarity and less difference. Four values get a

similar high ranking in both groups: 'family security', 'wisdom', 'self-respect' and 'happiness'. Two values are different among the top six in each cultural group. 'A sense of accomplishment' seems to be more important to Estonians than to Russian speakers. There is a larger difference for 'a world at peace', which ranks five among Russian speakers, but only 14 among Estonians (Table 11.3).

Thus, in this first step of our brief analysis we can find similarity and difference between Russian speakers and Estonians, which could constitute a basis for efficient teams with connected, but also diverse values, as Schein (1993) has indicated. A necessary condition for successful innovation would be that Estonians and Russian speakers rank highly values that are important for initiation and implementation of innovations. In addition, a sufficient number of those values should be similar and others complementary.

We can show how a combination of Estonians' and Russian-speakers' values would help us to come closer to the ideal situation as indicated by Fagenson (1993). Among the values for initiation of innovation, both groups have a remarkable set of values in common. The instrumental values 'honest' and 'logical', and the terminal values 'self-respect' and 'a sense of accomplishment' get a high ranking in both groups. The instrumental value 'independent', and the terminal values 'freedom' and 'an exciting life' are middle ranking in both groups. Complementarities could help to foster innovativeness. In a team, Russian speakers could bring in high instrumental values, 'courageous' and 'imaginative', and a high terminal value, 'a world at peace'. Estonians could bring in a high instrumental value, 'capable'. Lack of ambition seems to present a problem – the instrumental value 'ambitious' ranks lowest in both groups (Table 11.4).

Among the values for implementation of innovation, again, both groups have a remarkable set of values in common: the instrumental value 'loving/compassionate' and the terminal value 'wisdom' get a very high ranking in both groups. The instrumental value 'self-controlled' and the terminal value 'true friendship' are middle ranking in both groups. Complementarities could help to foster innovativeness. In a team, Russian speakers could bring in a somewhat higher instrumental value, 'forgiving', and Estonians could bring in a higher instrumental value, 'helpful'. The terminal values 'pleasure' and 'salvation' rank lowest in both groups (Table 11.5).

The values of Russian speakers, with their instrumental values 'courageous' and 'imaginative', and the terminal value 'a world at peace' could prove strongly supportive in the initiation phase of the innovation process: referring to the instrumental value 'capable', Estonians could reasonably contribute to the initiation phase, too. For implementation, the instrumental

Table 11.4 Values for initiation of innovation among Estonians and Russian speakers

Values as found by Fagenson (1993)	Estonians Rank of value out of 18	Russian speakers Rank of value out of 18	Comments
Instrumental values			
Honest	1	6	Both high
Ambitious	17	18	Both very low
Capable	6	17	Complementary (Estonians high)
Independent	12	12	Both middle
Courageous	10	5	Complementary (Russian speakers high)
Imaginative	16	1	Complementary (Russian speakers high)
Logical	5	3	Both high
Terminal values			
Self-respect	5	3	Both high
Freedom	9	9	Both middle
A sense of accomplishment	2	4	Both high
A world at peace	14	5	Complementary (Russian speakers high)
An exciting life	11	10	Both middle

Source: Own research.

values 'forgiving' (Russian speakers), and 'helpful' (Estonians) may foster the capabilities of cooperating groups. Thus, we conclude that well-designed cooperation among Russian speakers and Estonians may enhance the innovative capabilities in Estonia. However, there are two major conditions:

- appropriate selection of staff who possess the appropriate values; and
- in the team formation process, staff have to be made aware of their communalities and important differences in their values and attitudes.

DISCUSSION

This chapter draws attention to the need for further study of the relation between values and innovation. We have generated some applicable empirical data from the perspective of Estonian society. However, more needs to be

Table 11.5 Values for implementation of innovation among Estonians and Russian speakers

Values as found by Fagenson (1993)	Estonians Rank of value out of 18	Russian speakers Rank of value out of 18	Comments
Instrumental values			
Loving/compassionate	4	2	Both very high
Forgiving	15	10	Both middle, complementary (Russian speakers higher)
Helpful	7	15	Complementary (Estonians higher)
Self-controlled	9	8	Both middle
Terminal values			
True friendship	8	8	Both middle
Wisdom	3	2	Both very high
Salvation	18	18	Both lowest
Pleasure	17	17	Both very low

Source: Own research.

done to understand how these values influence the emergence of organizations and their culture, and how these organizations become sustainable and innovative.

The study has shown that the impact of national culture on innovativeness is multidimensional. Its possible effects on innovation would stem from the composition of different cultural groups living in Estonia, their common and diverse individual values, and from managerial support. The presence of these complementary group cultures is important to combine advantages in the early stages of innovation with those in the later ones.

The set of the most important terminal values is similar for majority and minority populations; this means that they share the same end goals in life, which should make the cooperation easier. There is more variety in instrumental values, meaning that the desired ways to achieve the end goals are somewhat different among these two populations. Therefore, the joint effects of cooperation among Estonians and Russian speakers will depend on the organizational setting. If those values that are conducive to innovation prevail in an integrative effort, the outcome could be positive. However, there is no guarantee of that. Ulijn et al. (ch. 1 in this book) have found that the more individualistic the person is, the lower his or her

acceptance of partner dissimilarity. Leaving aside issues in communication, which may arise from different languages, the rather individualistic Estonians might favour cooperation with those who have moderately different values. The more collectivistic Russian speakers possibly could be more willing to accept dissimilar partners, also depending, of course, on the perceived size of their in-group. Thus, there is a risk: in a joint effort by Estonians and Russian speakers only those values that are dominant in both groups might prevail. In that case cooperation would not enhance, but rather reduce innovativeness. Therefore, in an integrative effort, the values of both groups need to be carefully managed in order to enhance those values that are conducive to innovation.

Due to the collective cultural shock, Russian speakers have been largely passive in the transformation process, but the value of being courageous enjoys high esteem. It remains unclear whether there is a lasting hidden paradox in the way the minorities behave and feel. As long as passive behaviour prevails, opportunities are lost for organizations. If the focus in the society were to change from competition to cooperation, risk tolerance might increase, which would alleviate the difficult task of new business creation. However, it is of the utmost importance to manage the emerging values of new organizations in order to strengthen those values that foster innovation.

There are several limitations to this study. So far, we have not directly controlled the relations between the cultural values and the innovation process. The perceived relations among national culture, innovativeness and cooperativeness need further study. Could other variables interfere? For instance, could organizational culture overrule the effects of the identified value inventory? Further research is needed to establish and study the links between individual values, individualistic and collectivistic attitudes, and the results of the innovation process, and thus on the development of entrepreneurship.

The similar analysis in other countries with a large minority population and a more collectivistic background would be helpful. For instance, today many European countries (for example, Germany, France) face difficulties with integrating such populations into their societies and organizations. The present research provides some ideas and a foundation for turning the diversity into an advantage.

IMPLICATIONS FOR MANAGERS AND NEW BUSINESS DEVELOPMENT

Previous research has emphasized that integrated pluralistic cultures prove best suited for innovation. In entrepreneurship, the role of individuals in

developing innovations and creating new businesses is crucial. Value diversity is a main asset in entrepreneurship for promoting innovativeness and cooperativeness. The knowledge and awareness of one's own values, and also those of the partner, can be an important asset for establishing partnerships and accessing international markets. However, there is a risk. Value diversity can also express itself in different perceptions of organizational tasks and missions; suppressing different values will reduce rather than enhance the innovation potentials. The differences in values are best seen, and also have the strongest impact, during times of crisis or critical incidents, which may have a strong effect on cooperation (see, for example, the description of tension episodes in Wakkee et al. (ch. 9 in this book), or reference to solving the conflict between academic entrepreneurs who lack necessary business skills and their experienced business partners in Kirwan et al. (ch. 12 of this book).

There is a large innovation potential in Estonian society. The prevailing diversity of values between Russian speakers and Estonians could prove to be an important resource in the process of creating and implementing new ideas. Society, as represented by the government, should acknowledge that improving innovativeness implies a need for cooperation across Estonian subcultures.

Consequently, the management of such a diverse resource requires cultural sensitivity and a clear aim: the creation of corporate cultures conducive to persisting innovation. The synergy of innovation will stem from the purposeful management of diversity. Representatives of both Estonian and Russian-speaking populations could successfully play different roles in the initiation and implementation of innovation. Our value inventory could serve as a guide for selecting the right staff: people who have the appropriate different values, which complement one another.

Organizational culture that stresses teamwork and participation, but also divergent thinking, should be promoted. Managers and staff need to learn how to cooperate without giving up the fruitful components of their diversity. Team mangers should be capable of establishing functioning communication between diverse groups. They should make work-group members aware of the cultural and attitudinal differences, and encourage and reward cooperation across cultures. (see Box 11.1).

These insights, we believe, help us to understand the emergence of foreign-owned state-of-the-art high-tech enterprises in Estonia. Many foreign companies have realized the innovation potential by locating their engineering and R&D departments in Estonia; for example, the large Swedish bank SEB recently moved most of its code-programming operations there, and the major R&D centre of Skype, the world's fastest-growing service for internet voice communication, is also located in Tallinn.

BOX 11.1 MANAGERIAL IMPLICATIONS: TO BROADEN THE VALUE REPERTOIRE FOR INNOVATION

Diverse values among different subgroups in Estonia could significantly contribute to foster innovativeness.

For initiation of innovation among Estonians and Russian speakers, those who show above-average high esteem for being honest, capable, independent, courageous, imaginative and logical should be selected.

For implementation of innovation among Estonians and Russian speakers, those who are loving/compassionate, forgiving, helpful and self-controlled should be selected.

Since several of these values rank differently in both groups, in a team formation process staff need to be made aware that not so much the common values, but rather the different values are a major resource of innovativeness. Suppressing different values would reduce the chance of succeeding on the market.

Referring to the Estonian Action Plan for Growth and Jobs, we find that injecting capital and managerial knowledge will not suffice. Managing cultural commonness and diversity, not by unifying cultures, but by taking different values of different people as a major resource, will help Estonian enterprises to become successful in the global arena.

NOTE

* Rebekka Vedina is the main author, Gerhard Fink and Maaja Vadi contributed equally to this chapter. This chapter has been prepared with the support of the Estonian Science Foundation grant project No. 5527 and of the Andreas and Dr Elmerice Traks Scholarship provided to the main author by the Estonian Relief Committee (USA). The main author also wishes to acknowledge the help of Eindhoven Centre for Innovation Studies of the Eindhoven University of Technology (The Netherlands) during her stay there.

REFERENCES

Damanpour, F. (1991), 'Organizational innovation: a meta-analysis of effects of determinants and moderators', *Academy of Management Journal*, **34** (3): 555–90.

Dana, L.P. (2005), *When Economies Change Hands: A Survey of Entrepreneurship in the Emerging Markets of Europe from the Balkans to the Baltic States*, New York: International Business Press.

Dose, J.J. (1997), 'Work values: an integrative framework and illustrative application to organizational socialization', *Journal of Occupational and Organizational Psychology*, **70**: 219–40.

Elenurm, T. (2004), 'Estonian perspectives of international entrepreneurship', in Léo-Paul Dana (ed.), *Handbook of Research on International Entrepreneurship*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar, pp. 370–82.

Fagenson, E.A. (1993), 'Personal value systems of men and women entrepreneurs versus managers', *Journal of Business Venturing*, **8**: 409–30.

Fink, G. and C. Feichtinger (1998), 'Towards a theory of collective culture shock', *Journal of Contemporary Management Issues*, **3** (2): 53–7.

Fink, G. and N. Holden (2002), 'Collective culture shock: contrastive reactions to radical systemic change', Forschunginstitut für Europafragen Working Paper 45.

Fink, Gerhard and Maren Lehmann (2006), 'People's twist: the cultural standard of "loyalty" and performance in former "Socialist Economies" ', in David Pauleen (ed.), *Cross-Cultural Perspectives on Knowledge Management*, Libraries Unlimited.

Fink, G., A.-K. Neyer, M. Koelling and S. Meierewert (2004), 'An integrative model of multinational team performance', Europainstitut Working Paper, 60: 25.

Flynn, F.J. and J.A. Chatman (2001), 'Strong cultures and innovation: oxymoron or opportunity?', in C.L. Cooper, S. Cartwright and P.C. Earley (eds), *The International Handbook of Organizational Culture and Climate*, Chichester: John Wiley, pp. 263–87.

Furnham, A. (1984), 'Work values and beliefs in Britain', *Journal of Occupational Behaviour*, **5** (4): 281–91.

Hauser, M. (1998), 'Organizational culture and innovativeness of firms – an integrative view', *International Journal of Technology Management*, **16** (1/2/3): 239–55.

Hofstede, G. (2001), *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations across Nations*, 2nd edn, Thousand Oaks, CA: Sage.

House, R., P. Hanges, M. Javidan, P. Dorfman and V. Gupta (eds) (2004), *Culture, Leadership and Organizations: The GLOBE Study of 62 Countries*, Thousand Oaks, CA: Sage.

IMD (2005), *World Competitiveness Yearbook*, 'Index of Economic Freedom 2006', IMD International, Lausanne, Switzerland, www.heritage.org/research/features/index/countries.cfm, 20 January.

'Innovation policy profile: Estonia' (2001), ftp://ftp.cordis.lu/pub/innovation-policy/studies/studies_six_candidate_countries_estonia_2001.pdf, 15 September 2005.

Jerschina, J. and J. Górniak (1997), 'Leftism, achievement orientation, and basic dimensions of the socioeconomic and political attitudes in Baltic countries versus other Central and East European countries', in N. Hood, R. Kilis and J.-E. Vahlane (eds), *Transition in the Baltic States: Micro-Level Studies*, London: Macmillan, pp. 80–107.

Jürgenson, A. (2005), 'Culture's effect on organizational behaviour in Miecys concern in the Baltic states (based on Hofstede's dimensions)', Master's thesis, University of Tartu (in Estonian).
Kalvet, T., R. Kattel, K. Küünarpuu, D. Vaarik, K. Rahu and E. Ojamets (2005), 'Innovation and Estonian opinion leaders. Pre-research for finding out the relevant needs of the state Innovation Awareness Programme target groups', Tallinn: PRAXIS Centre of Policy Studies and Hill and Knowlton Eesti AS (in Estonian).
Kattel, R. (2004), 'Governance of innovation policy: the case of Estonia', *Trames*, **8** (4): 397–418.
Kluckhohn, F.R. and F.L. Strodtbeck (1961), *Variations in Value Orientations*, New York: Elmsford.
Kurik, S., R. Lumiste, E. Terk and A. Heinlo (2002), 'Innovative activities in Estonian enterprises 1998–2000', *Innovation Studies*, **2**, Tallinn: Enterprise Estonia (in Estonian).
Levine, J. (2004), 'Estonia: "If it works, you can break it"', *Forbes Global*, 20 December, www.forbes.com/global/2004/1220/016.html.
Mairesse, J. and P. Mohnen (2002), 'Accounting for innovation and measuring innovativeness: an illustrative framework and an application', *Economics of Technology and Innovation*, **92** (2): 226–30.
Meglino, B.M. and E.C. Ravlin (1998), 'Individual values in organizations: concepts, controversies and research', *Journal of Management*, **24** (3), 351–89.
Miettinen, A. (2004), 'Estonian SMEs in a changing environment: from institutional constraints to emphasis on market factors', *Journal of Enterprising Culture*, **12** (3): 195–210.
Nakata, C. and K. Sivakumar (1996), 'National culture and new product development: an integrative review', *Journal of Marketing*, **60**: 61–72.
Nemeth, C.J. (1986), 'Differential contributions of majority and minority influence', *Psychological Review*, **93**: 23–32.
Nemeth, C.J. (1997), 'Managing innovation: when less is more', *California Management Review*, **40** (1): 59–74.
Nemeth, C.J. and B.M. Staw (1989), 'The tradeoffs of social control and innovation in groups and organizations', in Leonard Berkowitz (ed.), *Advances in Experimental Social Psychology*, Volume 22, New York: Academic Press, pp. 175–210.
Neumann, G.A., S.H. Wagner and N.D. Christiansen (1999), 'The relationship between work-team personality composition and the job performance of teams', *Group and Organization Management*, **24 (**1): 28–45.
Niit, K.-K. (2002), 'The values of Estonian students in the 1990s', in Aune Valk (ed.), *Estonia and Estonians in the Comparative Perspective: Cross-cultural Research from the End of the 20th Century*, Tartu: Tartu University Press, pp. 42–59 (in Estonian).
Nurmi, R. and R. Üksvärav (1994), 'Estonia and Finland: culture and management. A conjectural presentation', Publications of the Turku School of Economics and Business Administration, Series A-9.
Pärna, O. (2004), *Analysis of Business Environment and Identification of Potential Entrepreneurs in Estonia*, Tallinn: Connect Estonia.
Ratso, S. (2005), 'Miracle of Estonia: entrepreneurship and competitiveness policy in Estonia', paper presented at the Forum 'After fifteen years of market reforms in transition economies: new challenges and perspectives for the industrial sector', UNECE Palais des Nations, Geneva, 24–5 May.

Republic of Estonia (2005), 'Action Plan for Growth and Jobs 2005–2007, for implementation of the Lisbon Strategy', Tallinn, http://europa.eu.int/growthandjobs/pdf/nrp_2005_en.pdf, 13 October.

Rokeach, M. (1973), *The Nature of Human Values*, New York: Free Press.

Ryan, John J. (2000), 'Work values and organizational citizenship behaviors: values that work for employees and organizations', *Journal of Business and Psychology*, **17** (1): 123–33.

Schein, E.H. (1993), 'Innovative cultures and organizations', in T.J. Allen and M.S. Scott Morton (eds), *Information Technology and the Corporation of the 1990s: Research Studies*, Oxford: Oxford University Press, pp. 132–9.

Schwartz, S.H. (1992), 'Universals in the content and structure of values: theoretical advances and empirical tests in 20 countries', in M.P. Zanna (ed.), *Advances in Experimental Social Psychology*, Vol. 25, New York: Academic Press, pp. 1–65.

Souder, W.E. and S.A. Jenssen (1999), 'Management practices influencing new product success and failure in the United States and Scandinavia: a cross-cultural comparative study', *Journal of Product Innovation Management*, **16**: 183–203.

Stricker, G. (2001), 'Lutherans in Russia since 1990', *Religion, State and Society*, **29** (2): 101–13.

Triandis, H.C. (1995), 'A theoretical framework for the study of diversity', in Martin M. Chemers, Stuart Oskamp and Mark A. Costanzo (eds), *Diversity in Organizations: New Perspectives for a Changing Workplace*, Thousand Oaks, CA: Sage, pp. 11–36.

Ulijn, J. and M. Weggeman (2001), 'Towards an innovation culture: what are its national, corporate, marketing and engineering aspects, some experimental evidence', in C.L. Cooper, S. Cartwright and P.C. Earley (eds), *The International Handbook of Organizational Culture and Climate*, Chichester: John Wiley, pp. 487–517.

Ulijn, J., F. Wynstra and A. Lincke (2004), 'The effect of Dutch and German cultures on negotiation strategy: an exploratory study to compare operations and innovation contexts', *International Negotiation*, **9** (3): 201–28.

Vadi, M. (2000), 'Organizational culture and values and the relations between them: the example of Estonia', *Dissertationes Rerum Oeconomicarum*, Tartu: Tartu University Press (in Estonian).

Vadi, M., J. Allik and A. Realo (2002), 'Collectivism and its consequences for organizational culture', Faculty of Economics and Business Administration, Working Paper No. 12, University of Tartu.

Vadi, M. and Riin Meri (2005), 'Estonian culture in the framework of the Hofstede dimensions model (the case of the hotel industry)', *Trames*, **9** (3): 268–84.

Vadi, M. and H. Roots (2006), 'The Estonian organizations: the subjects of transformation', in Helena Hannula, Slavo Radosevic and Nick von Tunzelmann (eds), *Estonia, the New EU Economy: Building a Baltic Miracle?*, London: Ashgate, pp. 189–206.

Vedina, R., M. Vadi and E. Tolmats (2006), 'Interactions of cultural elements: Estonian organisations in the pan-Baltic mirror', in Helena Hannula, Slavo Radosevic and Nick von Tunzelmann (eds), *Estonia, the New EU Economy: Building a Baltic Miracle?*, London: Ashgate, pp. 169–88.

Voss, R.S. (2002), 'Generating entrepreneurial and administrative hierarchies of universal human values as a basis for identifying entrepreneurial and administrative

potential across contexts', Dissertation Abstracts International Section A: Humanities and Social Sciences, 62(9-A), p. 3110.
Weber, M. (1904[1930]), *Protestant Ethic and the Spirit of Capitalism*, Winchester, MA: Allen & Unwin.
World Bank Group (2006), Doing Business: Benchmarking Business Regulations, www.doingbusiness.org, 20 January.
World Economic Forum (2005), 'Growth Competitiveness Index rankings: 2005 and 2004 comparisons', www.weforum.org, 20 January 2006.
Zien, K.A. and S.A. Buckler (1997), 'From experience dreams to market: crafting a culture of innovation', *Journal of Product Innovation Management*, **14**: 274–87.

12. Early-stage networking: how entrepreneurs use their social capital to establish and develop high-technology start-ups

Paul Kirwan, Peter van der Sijde and Aard J. Groen

INTRODUCTION

The entrepreneurial efforts of high-technology small firms play an important role with respect to the development of national economies and the sustainable redistribution of wealth (Birch, 1987). Entrepreneurial 'churning' and new business creation are recognized as being among the most important drivers of a country's economic development and growth (Reynolds and White, 1996; During et al., 2001). The importance of high-technology firms is highlighted by Kirchhoff (1994), who found that when compared to non-technology-based firms, high-technology firms contribute disproportionately with respect to both job and wealth creation. Countries whose high-technology firms display an ability to exploit the opportunities created through technological advances (for example, in laser, bio/life sciences, nano/MST (Micro Systems Technology) and information technology) have been found to have increased wealth (Madsen et al., 2004). The importance of high-technology firms to national economies has been reflected in the various support initiatives instigated by local, regional and government agencies to assist these start-up firms in their development and growth (see, for example, Kirwan et al., 2006b) for examples of these support agencies and initiatives in practice).

Entrepreneurs establishing high-technology firms are faced with the traditional problems of starting a venture, gathering scarce resources, acquiring knowledge, establishing a reputation and attracting suppliers, customers and partners (Birley and Cromie, 1988; O'Farrell and Hitchens, 1988; Autio et al., 1997; Brush et al., 2001). High-technology firms are more often operating in international markets; this creates further problems as

the resources which have to be gathered are internationally dispersed. Significant research and development (R&D) investments must be made to create internationally acceptable goods and services. Pursuing international trade requires knowledge of international markets and establishing international networks. The resources involved in these activities is significant (Diamantopoulos and Inglis, 1988) and given that high-technology start-ups are especially resource poor, lacking the required time, capital and capabilities to sufficiently prepare international markets (Doutriaux, 1991), investing in international activities may come at the expense of other activities.

One of the ways that high-technology firms overcome these problems at start-up is through the effective use of networking activities. Many studies have reported that high-technology firms engage in various network activities to gain leverage from external resources (for example, Saarenketo, 2003; Wakkee, 2004) and to help the start-up with support, contact and credibility (Ostgaard and Birley, 1996). This chapter focuses on networking for survival and early growth. Based on the earlier analysis of 22 cases (Kirwan et al., 2005), we describe how entrepreneurs use their networks to establish (pre-foundation) and develop (post-foundation) their firms. The following section outlines the theoretical framework of this study; the entrepreneurship in networks (EiN) model. Subsequently the early-stage networking activity of firms is described using data from the case analysis and further evidence from the Tissue Ventures case example. Further, we examine the regional support supplied to entrepreneurs by actors within their regions also with respect to both the pre- and post-foundation stages of the firm. The chapter concludes with a discussion of the findings, including management implications, some limitations and suggestions for further research.

ENTREPRENEURSHIP IN NETWORKS MODEL

Entrepreneurship is a process (Shane and Venkataraman, 2000; Van der Veen and Wakkee, 2004); a process, driven by the entrepreneur, wherein ideas are recognized, prepared and exploited leading to value creation (Wakkee, 2004; see also Wakkee et al., ch. 9 in this book). Based on the social-systems perspective (Parsons, 1977) and incorporating the entrepreneurship process outlined above, we developed a model (see Figure 12.1) to conceptualize the development of firms from opportunity recognition to its exploitation. In this process the entrepreneur accumulates 'capital' that allows him/her to establish the venture and to start trading; four types of capital are required to do this:

- *economic capital* Every firm needs a certain amount of financial capital or access to financial capital. Traditionally this is viewed as the 'capital' of the venture – in the framework of our conceptualization, there are three more types of capital:
- *strategic capital* A firm needs a strategy and strives (according to a plan) to attain a certain (power) position and authority in the field;
- *cultural capital* In a firm the entrepreneur or the entrepreneurial team provide the basis for the culture. Their knowledge and experience as well as that of the venture's staff, the norms and values and the knowledge and technology together comprise this capital; and
- *social capital* A firm is part of its environment and needs to interact with its customers, suppliers, advisers and so on. The social or network capital relates to actors in the venture's network and the position of the firm in the network. The *content* of the relationship between the firm and its actors is part of the other capitals, because the content can relate to the strategic, the economic and the cultural capital.

The central assumption in the entrepreneurship-in-networks (EiN) model is that on each of the four dimensions, firms will need sufficient 'capital' to be sustainable over time, which also implies that starting firms need to cover these four dimensions in order to establish a viable firm. Groen (2005) hypothesized that entrepreneurs (firms) that do not have each of the four capitals above a certain minimum value generally will not survive. This implies that in each phase of the EiN model the entrepreneur needs to increase the capitals in order to survive and develop the firm.

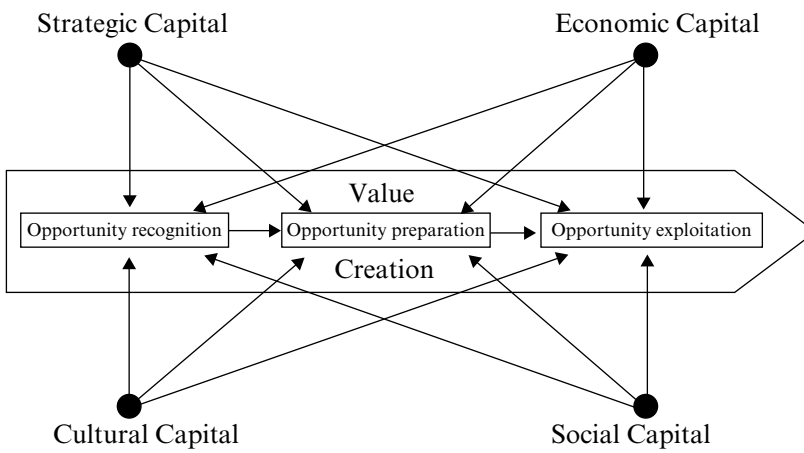


Figure 12.1 Entrepreneurship-in-networks (EiN) model

USING SOCIAL CAPITAL TO ESTABLISH AND DEVELOP HIGH-TECHNOLOGY START-UP FIRMS

Based on the earlier analysis of 22 cases (Kirwan et al., 2005), this section describes the early networking activities of high-technology start-up firms. It focuses on how the entrepreneurs use their networks (social capital) to acquire the necessary capitals to establish (pre-foundation covering the opportunity recognition and opportunity phases) and develop (post-foundation covering the opportunity exploitation phase) the firm. Prior to this description the methodology for case collection is presented.

Methodology

Following a specifically created protocol, a series of case studies was conducted among the consortium members of the European Union project GlobalStart.[1] The case studies explored the specific problems encountered during the development of the firm, from pre-venture to the present day, and the key factors which have helped them to succeed based upon available university and regional support. The method employed was interviews with the founding entrepreneurs, supported by document analysis of secondary sources. The current analysis includes 22 technology firms representing different industry sectors and originating from three European regions (Table 12.1).

The consortium members selected their case studies based on the expert opinion of the directors of their respective technology transfer offices (TTOs). These people are deemed as being best placed to judge the global potential of the firms as they have regular contact with the spin-off firms. All the interviews were reported in English and in a universal manner. The analysis of the case studies was conducted by a central source, which communicated with the individual partners the need to collect further data to ensure the homogeneity and comparability of the case studies.

Capital Accumulation Pre-foundation

In the EiN model the entrepreneur is the main actor driving the process; therefore we first assess the capital contribution of the founding entrepreneur(s). From the case data it was observed that in the majority of cases, the entrepreneurs possess the cultural capital; they developed the idea or technology, on which the firm was based. The entrepreneurs also bring in their personal network (social capital), comprising all those family, friends and acquaintances with whom the entrepreneurs relate to primarily on a social level (Szarka, 1990) and those network contacts the

Table 12.1 Overview of the case firms

Region Consortium Partner	Industry			
	Nano/MST	Biotech	Laser	Telecom Software & IT
Northwest (Anglo-Germanic)	2	1	1	6
University of Twente, Netherlands	2	0	0	2
University of Warwick, England	0	1	1	1
Spin-Out Wales (University of Glamorgan), Wales	0	0	0	3
South (Latin)	2	4	0	1
University of Salamanca, Spain	0	1	0	0
Universidad Miguel Hernández (Elche), Spain	0	0	0	0
Leuven Katholieke Universiteit Belgium	2	3	0	1
New member states (NMS)	0	3	1	1
University of Tartu (Estonia)	0	3	1	1
Brno University of Technology (Czech Republic)	0	0	0	0
Total (22)	4	8	2	8

entrepreneurs have from their previous educational and work experiences. The entrepreneurs also provide economic capital, in the form of personal investment and strategic capital from previous work, life and educational experiences.

From the analysis of the cases (see Table 12.2) it can be seen that none of the cases had sufficient capitals supplied by the entrepreneur to launch the firm. More detailed analysis (Kirwan et al., 2005) reveals that the necessary resources required to launch the venture were supplied in nearly all cases by a single organization, namely the 'key partner'.[2] From the case results in all but two of the cases the relationship with the key partner originated from a prior relationship through the personal network of the entrepreneur. This key partner has many different faces; in the majority of cases it is a university but additionally there was an international venture capital company, parent firms, experienced entrepreneurs, a network organization and a foreign software firm. In two of the cases there was evidence of multiple key partners at the pre-venture phase; with the university being present in both. In one case, an experienced businessman and an entrepreneur came on board prior to foundation and brought with them

Table 12.2 Capital contributions pre-foundation

#*	Capital contribution of the founding entrepreneur	Capital contribution of the key partner	#*	Capital contribution of the founding entrepreneur	Capital contribution of the key partner
1	Cultural, social	Social, economic, strategic	11	Cultural, social	Cultural, economic, social, strategic
2	Cultural, social	Strategic, social, cultural, economic	12	Cultural, social, economic	Cultural, strategic, social
3	Cultural, social, economic	Strategic, economic, social, cultural	13	Cultural, social	Social, strategic, cultural, economic
4	Cultural, social	Cultural, strategic, economic	14	Cultural, social	Cultural, strategic, social, economic
5	Cultural, social	Strategic, social, cultural	15	Cultural, social	Cultural, strategic, social, economic
6	Cultural, social economic	Strategic, social, cultural	16	Cultural, social	Strategic, social, cultural, economic
7	Cultural, social, economic	Social, strategic, cultural, economic	17	Cultural, social, economic	Cultural, economic, strategic, social
8	Cultural, social, economic, strategic	Cultural, social, financial economic	18	Cultural, social, economic	Cultural, social, strategic, economic
9	Cultural, social, economic, strategic	Cultural, social, financial	19	Cultural, social, economic	N/A°
10	Cultural, social, economic	Cultural, strategic	20	Cultural, social	N/A°

Table 12.2 (continued)

#*	Capital contribution of the founding entrepreneur	Capital contribution of the key partner	#*	Capital contribution of the founding entrepreneur	Capital contribution of the key partner
21	Cultural, social economic, strategic	Cultural, social	22	Cultural, social	Cultural, social, economic, strategic

Notes:
* Firms were assigned numbers to protect the confidentiality of the case firms.
° No one key partner involved, highly networked pre-foundation and drew the necessary capitals from many sources.

the necessary contacts and resources to establish the firm and in the second, a networking organization for spin-off firms adopted the firm as a test case and played a similar role in its development.

These key partners in all cases are embedded in international networks and play a vital role in opening up their networks (social capital) allowing the start-up to accumulate the required capitals. They invest in the start-up (economic capital) and provide access to international venture capitalists or networks wherein these contacts can be made. In some cases the key partners provide the technology on which the firm is founded, for example, through licensing agreements. They provide access to facilities, staff, board members, reputation and knowledge (cultural capital). As a result of their accumulated experiences, the key partners also play a role with respect to the strategic direction (strategic capital) of the firm; they provide help with writing professional business plans and initiating strategic relationships (for example, for production and sales). From the case data it could be seen that on each of the four dimensions of the EiN model the capital contribution of the starting entrepreneur(s) and the key partners provide a sufficient core base to attract the necessary capitals to establish the firm.

Accepting this, there is also evidence of other regional partners and private actors providing capitals prior to start-up but their role is less influential at this phase. The following section will outline the capital contribution post-foundation and the increasing importance of other regional actors.

Capital Accumulation Post-foundation

Having reached a sufficient level[3] across the four capitals at foundation, that is, the base at foundation, the firm continues to grow and as it does so new capitals are required. Increased management capabilities are needed to develop and implement new strategies. The firms develop their own management capabilities through training, coaching and networking activities (Kirwan et al., 2006b). Further expansion of the capitals are generated through everyday business activities, for example, the development of a new technology (increase in cultural capital) leads to new product development; this necessitates strategic (strategic capital) decisions with regard to potential markets, distributors and clients (social capital), and the realization of these activities in terms of product sales will result in the generation of revenue (economic capital).

However, the case firms do not produce enough capitals to be self-sufficient and all cases reveal evidence of the influence of other partners post-foundation. The required capitals are accumulated through the continuing relationship with the key partner and are supplemented in all cases by relationships with other partners, for example, regional development agencies, venture capital companies, government trade associations and private enterprises (see Table 12.3).

The four capitals are outlined as follows:

1. *Economic capital* Similar to all other firms, high-technology start-ups require financial development in all stages of the firm's development. Given the research-intensive nature of these firms, they are more likely to look to outside sources for this revenue during the preparation to exploitation phases as in these early stages they are still busy with product development and in numerous cases have not yet developed marketable products. As evidenced in the case studies there are many regional actors both public and private which provide economic capital post-foundation, for example, international, regional and local venture capitalists; government-backed funds; university funds; national enterprise organizations; private equity; grants and loans. Many firms supplement their income at this stage of development by having one cash-generating product or service. In most of the cases this is through service activities such as consultancy. However, given the time and other resource constraints this can be to the detriment of product development.
2. *Strategic capital* The majority of the case firms are university spin-offs, which are often started by technically skilled and motivated researchers, who are generally young and lack business and management experience (Luostarinen and Gabrielsson, 2002). Employing the

Table 12.3 Capital contributions post-foundation

#*	Capital contributions of other partners	Examples of other partners	#*	Capital contributions of other partners	Examples of other partners
1°	Economic	Regional development agency	12	Economic, strategic, social	Venture capital firms; international partner; private & industrial investors; national institute for science & technology; network organization
2	Social, economic, strategic	Network organization; university challenge fund; international manufacturer	13	Social, strategic, cultural, economic	Entrepreneurship network; European industrial network; international assemblers; spin-off venture fund, bank & other investors
3	Economic	Venture capital funds; private investors	14	Economic, strategic social, cultural	Venture capital funds; entrepreneurship network; international research partners; government export organization
4	Economic	Venture capital funds; private endowed charity	15	Economic, strategic, social	Spin-off venture fund; national institute for science & technology
5	Strategic, cultural, social, economic	Private management consultancy co., governmental development agency	16	Economic, strategic cultural	Spin-off venture fund; international marketing partner
6	Economic	Governmental development agency	17	Cultural, economic, strategic	Spin-off venture fund; international marketing partner
7	Cultural, economic	Suppliers, wholesalers, science park, governmental enterprise institution	18	Economic, strategic, cultural	Spin-off venture fund; national institute for science & technology; national & international investors;

Table 12.3 (continued)

#*	Capital contributions of other partners	Examples of other partners	#*	Capital contributions of other partners	Examples of other partners
					university hospital; national & international R&D partners
8	Strategic, cultural, economic	Foreign resellers; domestic partners; national venture capital funds	19	Strategic, economic, social, cultural	Regional development agency; MNC; university spin-off programme; technology network; 2 universities
9	Cultural, strategic, economic	National biocentre; domestic partnerships; national and international venture capital funds	20	Strategic, economic, social, cultural	University spin-off programme; private investors; shareholders; domestic strategic partners & clients; international manufacturing & clients
10	Economic, strategic, cultural	National innovation fund; foreign universities & clinics; domestic partners; governmental enterprise institution	21	Economic, strategic, cultural	Regional & governmental support agencies; domestic & international R&D partners
11	Strategic, economic	National innovation fund; strategic investors; national biocentre: foreign clients/ R&D partners/sales agents; foreign shareholders	22	Strategic, cultural, economic	Domestic & international R&D partners/customers; international distributors

Notes:
* Firms were assigned numbers to protect the confidentiality of the case firms.
° Numbers correspond in both Tables 12.2 and 12.3.

relevant skills to overcome these deficiencies requires increasing both the strategic capital as well as the cultural capital (see (3) below) of the start-up firms. Entrepreneurs can increase their strategic capital by engaging in courses and through mentoring. Entrepreneurs will actively search for courses using network contacts to evaluate the best one available to meet their needs. The appointment of coaches/mentors can follow a similar pattern but it was mostly evidenced that these were provided through the network of the key partner.

The firms in the cases had strategic issues regarding marketing and sales, production and operation, and R&D; to gain assistance in making these decisions they relied on a wide variety of bodies, including networking organizations, relationships with established industrial partners, and government agencies. Further, there is ample evidence of increasing strategic capabilities through the hiring of staff, (increasing cultural capital). These actions are initiated by both the company themselves recognizing a problem, but also on behalf of the key partner who often recognizes that a shift in orientation is necessary and will use the company networks to seek out new board members and even CEOs to rectify the situation.

3. *Cultural capital* Growth in cultural capital is achieved in two main ways. First, as mentioned above the findings of the case studies reveal that its growth is largely achieved through the recruitment of new staff. At many different stages of development post-foundation there is evidence of firms recruiting staff across all organizational functions, from CEOs to technical staff, to improve the know-how within the company. The second main type of growth in cultural capital is evidenced in the continued technical development of the firms. As previously mentioned these firms are largely in their development phase with no marketable products as yet and continue to engage in R&D activities and technological advancement. The older firms with established products were also heavily involved in reinvesting in R&D, developing new products and technologies. This is especially important for high-technology firms as it reduces the risks associated with relying on one application or offering, which resulted in the death of so many firms when the internet bubble burst.
4. *Social capital* Social capital increases as the company grows as relationships are established with suppliers, customers and other organizations. Network development is organic; the network evolves through everyday business dealings. Further, there is evidence from the cases of firms joining networking organizations and taking part in European projects to gain access to potential customers and knowledge which they do not possess themselves. All of the case firms are embedded in

networks and their key partners provide access to the capitals or contact with organizations which can provide the necessary capitals.

Thus it can be seen that post-foundation the firm has to utilize social capital primarily from the region to source the necessary capitals to grow the firm. The following section highlights a specific case, elaborating on how a high-technology venture uses its early stage networking activities to establish and develop the venture.

CASE STUDY: TISSUE VENTURES[4]

Networking Activity Pre-foundation

Founded in 2000, Tissue Ventures is a biomedical firm operating at the cutting-edge of regenerative medicine. The company was founded as a spin-off of two universities in conjunction with the technology transfer office of one of the universities. The idea (cultural capital) originated from one of the founding professors; however, the company needed to procure two patents (cultural capital), which the technology transfer office held, to begin the enterprise. The founding professors had significant academic and industry experience (cultural capital), respectively, and they also brought their professional and personal networks (social capital) to the firm, including their respective university departments and ancillary contacts. The technology transfer office assisted them in writing their business plan (strategic capital), setting out, short-, medium- and long-term goals. Finance (economic capital) was provided by the founders, a seed capital fund in which the technology transfer office was a partner, both universities, a university hospital, members of the scientific board and through a government-funded technology grant. The company outsourced its research (cultural capital) to one of the universities. For an overview of the starting capital contributions of the entrepreneur and the key partner, see Table 12.4.

The early-stage networking activities of high-technology firms can thus be seen to be a dynamic process. The entrepreneur utilizes his personal network in the search for the capitals necessary to begin the venture; the university professor is aware that the technology transfer office (key partner) possesses the patents necessary for him to pursue his entrepreneurial opportunity. He then enters into cooperation with the key partner, which provides direct access to these capitals, that is, licensing the technology from the technology transfer office and also, indirect access to the capitals through the key partner's network, namely, the technology transfer office is part of a network providing seed capital to start-up firms. Through

Table 12.4 Starting capitals of Tissue Ventures

	Entrepreneur	Key partner – university TTO (origin of contact)
Cultural capital	Idea Previous academic and industrial experience	Patents (TTO held patents ⇒ entrepreneurs' networks) Staff (TTO organized contract research through the university ⇒ TTOs' network) Scientific advisory board (entrepreneurs' networks)
Strategic capital	Idea for the business and strategic intent from previous experiences	Assistance in writing the business plan Scientific board
Economic capital	Entrepreneurs	Seed capital fund (TTOs' network) 2 universities (entrepreneurs' networks) University hospital (entrepreneurs' networks) Members of the scientific board (entrepreneurs' networks) Government-funded technology grant (entrepreneurs' networks/ TTOs' network)
Network capital	Professional and academic networks of the entrepreneurs including the TTO, universities and scientific board members	Provided contacts with respect to financing the seed capital fund

this relationship between the entrepreneur and the key partner the firm can acquire the required capitals to form the company. While the role of regional actors is also evidenced, for example, through the government-funded technology grant.

Networking Activity Post-foundation

In the time following foundation, Tissue Ventures entered into an international collaboration (social capital) for clinical trials (cultural capital) for one of its products. It also opened a GMP (good manufacturing practices)

Table 12.5 Overview of the capital development of Tissue Ventures (three years after foundation)

	Internal developments	External actors
Cultural capital	Continuous technological development (resulting in 8 patent applications) Hiring of staff in various functional areas (to meet development needs)	
Strategic capital	Started clinical trial Opening cell expansion facility (GMP)	Venture capital funds are strategic as well as investment partners
Economic capital		€12 million investment from leading European venture capital firms
Network capital	Developing external networks with among others, potential investors (realized through the €12 million secured funding)	Collaboration with international centres for clinical trials Industrial partnerships for commercialization of products

facility in early 2002 (strategic capital). In addition, it hired new staff in the areas of clinical research, marketing and sales, and business development (cultural capital). It further increased its technical capabilities (cultural capital) to the point where it had eight patent applications and a small-scale market introduction (strategic capital) of one of its products, thus highlighting the continued investment into technological development and not relying solely on one application for survival. Tissue Ventures raised a further €12 million (economic capital) through leading European venture capital funds. It took on extra staff so that the business team combines all the relevant skills necessary for further development (cultural capital), while also engaging in industrial partnerships for the commercialization of products (social and strategic capitals). See Table 12.5 for an overview of the capital development post-foundation.

As the firm grows, the networks of the entrepreneur and the key partners merge (see Figure 12.2), and the new venture forms direct relationships with other actors in the network of the key partner. The key partner continues to play a role but it is hard to distinguish this role as the new venture is firmly embedded in the network. For example, in this case, through the technology transfer office's membership of the seed capital fund, the

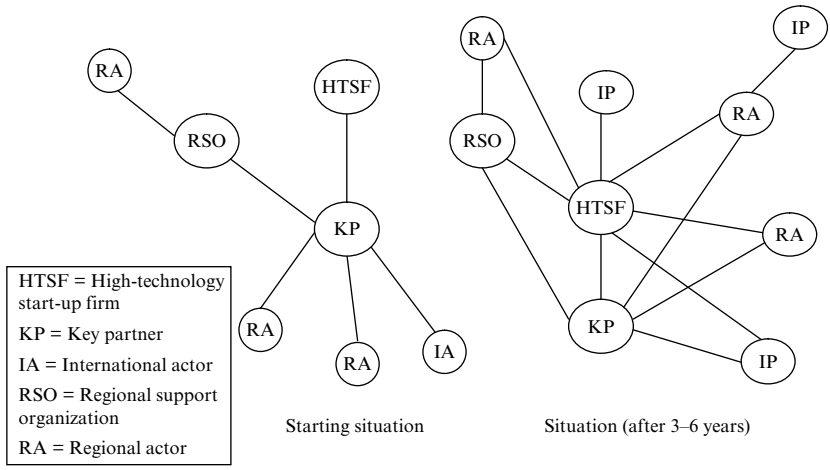


Figure 12.2 The development of the high-tech start-up network over time

university is a shareholder in the firm. One of the other members of the seed fund is a financial institution, which initiated the round of financing yielding €12 million. At this stage of the company's development the financial institution as a shareholder is very much a part of the high-technology venture and their networks are firmly intertwined.

Other firm relationships develop organically as the business grows; the firm initiates relationships with potential customers, suppliers, research collaborators and so on. The firm utilizes these developing relationships as sources of information and for access to the required capitals. Thus, it can be seen that as firms develop they adapt and align their networks to gain the resources they need to ensure successful emergence, thus paving the way for future growth.

DIFFERENCES IN REGIONAL SUPPORT

Although high-technology firms more often operate on international markets, support in the early stages primarily comes from the direct environment. As previously described, firms first acquire a sufficient store of capitals to launch the venture relying chiefly on the networks of the entrepreneur and the key partner, and later development involves a wider variety of regional actors. However, countries and regions differ from one another in the (hard and soft) support infrastructures and also with respect to the range of actors providing support to these firms.

Our case studies allowed us to compare three regions in Europe: the Northwest (Anglo-Germanic: Wales and Warwick, both UK; Twente in the Netherlands), South (Latin: Leuven, Belgium and Salamanca, Spain), and new EU member states (Brno, Czech Republic and Tartu, Estonia). In each region, technology transfer officers of at least two universities from different countries were asked to rate on a 5-point scale the adequacy of the regional support for high-technology firms that operate on international markets at early stages of their development. Table 12.6 gives an overview of the perceptions of the respondents on a regional basis. The table is quite revealing in the sense that the regional support structures seem to be inadequate for supporting these types of venture. Nevertheless, our cases show that despite these inadequacies the ventures, with the support of their key partners and the international networks of their key partners and in combination with regional actors, are able to develop into starting companies.

Across all capital domains there is, on average, more support available post-foundation. This is unsurprising in that many regional support agencies are unwilling to take a risk on high-tech firms and this is especially true in the pre-venture phase. Those agencies providing support for these firms prefer to tailor their support for those stages following the establishment of the venture.

Support structures for economic capital are the most advanced both pre- and post-foundation, which reflects the demand for financing; economic capital is listed by these firms as their most-needed capital (Kirwan et al., 2006a). Given this lack of early-stage financing, high-technology firms have to compete for this (very) scarce resource and present a business plan and a watertight business model to attract support. Across all our regions there is evidence of support agencies experimenting with (new) systems for early-stage financing via either public funding and/or public–private partnerships.

Given the importance of strategic capital, that is, having a good business plan and strategic direction, it is not unsurprising to see that regional support for strategic capital has the second-highest reported support structures in place. While inadequate, these support structures, are especially necessary as high-tech start-ups traditionally lack management experiences and capabilities (Luostarinen and Gabrielsson, 2002). Support is primarily provided for helping to develop the business plan (pre-foundation) and developing specific strategic goals, for example, related to sales, marketing, production and operation (post-foundation).

Support structures for social capital are perceived as being the least adequate in both the pre- and post-foundation stages. While there is increasing recognition of the importance of social networking, access to and support in this area is not sufficiently developed within the regions. The lack of this support in the pre-venture phase is further evidence of support agencies'

Table 12.6 Regional differences in pre- and post-foundation support

Region	Level of regional support pre-foundation				Level of regional support post-foundation			
	Cultural	Economic	Social	Strategic	Cultural	Economic	Social	Strategic
Northwest	1.9	2.6	1.6	2.4	2.5	3.4	1.9	2.8
South	2.1	2.9	2.5	2.3	2.6	3.2	2.8	2.9
New member states	1.7	2.2	1.3	1.6	1.9	2.2	1.8	2.0
Average	1.9	2.6	1.8	2.1	2.3	2.9	2.2	2.6

reluctance to deal with potentially risky high-tech ventures. In fact, one could argue that this scarcity of support structures coupled with the reluctance of some agencies to engage in pre-venture support prerequisites the relationship between a high-technology start-up and its key partner.

At both the pre- and post-foundation stages the level of support for developing cultural capital is perceived as being inadequate in all three regions. For high-technology firms this is not a great problem as the majority of these firms develop and undertake their own technological development and R&D. Cultural capital refers to both human capital and knowledge; and it is with respect to knowledge that we distinguish regional differences.

Knowledge is predominantly supported by institutions such as universities. However, many universities do not view commercialization as their main task; in fact, many do not even recognize it as a task that should be fulfilled by a university – although the climate is changing in this respect. From the GlobalStart project we can see that there is a positive relationship between active commercialization of knowledge and the degree of adequacy of support structures in the region. Where the regions and the universities are active in commercialization, making knowledge and the knowledge infrastructure available for firms, even for spin-offs, a more advanced support structure is required. In the new member states in our study, commercialization of knowledge has only recently become important in Tartu and still remains a relatively unimportant area in Brno. Given that these activities are relatively new, the need for structures supporting them is also only recent. This helps explain why on average the adequacy of support structures in the new member states lags behind those of the Northwest and the South, as the last two regions have more experience in this field.

CONCLUSIONS

This chapter set out to examine the role of early-stage networking of high-technology firms, specifically how entrepreneurs use their networks in both the pre- and post-foundation phases to establish and develop their firms. In our study, taking the entrepreneur as the starting-point for the venture we found that he had the idea for the venture (cultural capital) and that his personal network (social capital) was the foundation for the firm, that is, it was through his personal network that he established the contacts with the key partner enabling him to start the firm. The entrepreneur also provides economic capital, in the form of personal investment, and further cultural capital from previous work, life and educational experiences. This reflects Burt's (2000) description of the 'network entrepreneur'.

These findings are also consistent with those of Brush et al. (2001) who put forward that the first resources of a firm (for example, education, experience, reputation, knowledge of the industry, network contacts) exist in the entrepreneur and that the entrepreneur leverages these resources to develop the firm. Further, Rippollés et al. (2002) found that the personal relationships, which the entrepreneur had at the beginning of a venture, provide the company with the necessary resources. These findings would lead us to agree with Aldrich et al. (1987) who argued that the most valuable asset that entrepreneurs bring to the company is their personal network in that it provides the resources (or from our study provides access to the resources) for successful emergence.

The importance of a key partner was first mentioned in the doctoral dissertation of Wakkee (2004), who concluded that global start-up companies usually have a relationship with at least one 'strong' partner, for example, a university research group or a venture capitalist. From this research we can see that this is also true for the high-technology firms in our study.

The value of both domestic and international partners has been widely documented in the literature on high-technology small firms/international new firms (McDougall et al., 1994; Reuber and Fischer, 1997; Preece et al., 1998; Arenius and Autio, 2002; Saarenketo, 2003). This study specifically illustrates the importance of network contacts, especially the relationship with the key partner; in the early development phases of high-technology firms (see Figure 12.3). In the absence of adequate regional support the emergence and survival of these companies is dependent on such relationships.

Post-foundation it was seen that the networks of the entrepreneur and the firm merged over time. This is not uncommon in the small business context as entrepreneurs strongly identify with their firms, thus causing a significant overlap between the entrepreneur's and the organization's networks (Szarka, 1990). This simultaneity of the entrepreneur's and the emerging firm's network (Hite and Hesterly, 2001) is most evident during the opportunity exploration phase. During this phase, entrepreneurs fulfil the role of resource coordinators and agents for a firm (Bhide, 1999). During emergence the social network of the entrepreneur is virtually synonymous with the firm's network, as network ties initially exist on the interpersonal level (ibid.). This process continues post-foundation, as was evidenced in the case of Tissue Ventures, but in relation to the networks of the new firm and its key partner (see also Figure 12.2).

This study highlights the suitability of the EiN model for investigationg entrepreneurial firms. It captures the development process of the firm from the idea stage right through to the present day, giving it a longitudinal perspective. In most of the international new venture literature the network

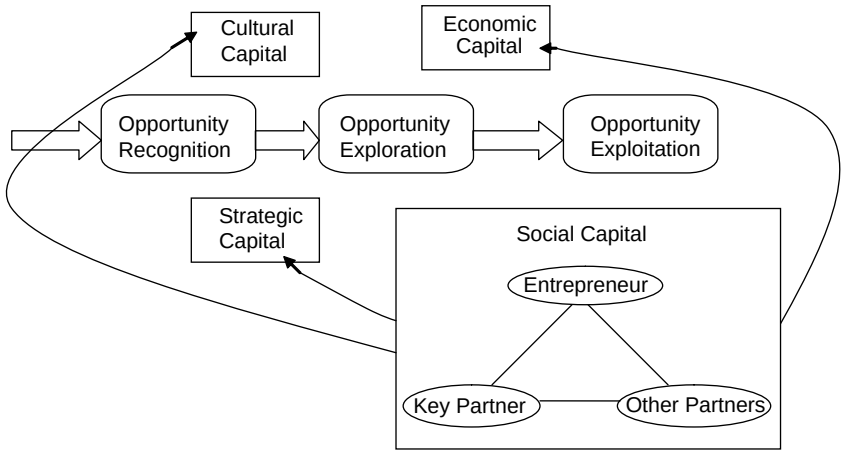


Figure 12.3 The role of social capital in the development of the firm

dimension is only ever investigated from a static perspective, that is, at one particular point in time; this model allows us to capture the dynamic network evolution of the firm. In the context of this chapter the model also shows how the entrepreneur utilizes *his* network activities in the beginning, and later the network of *the firm*, incorporating the various (regional) actors, to acquire the necessary capitals to establish and develop the firm.

On a regional level many differences exist, most of which go beyond the scope of this contribution. Regional support structures are considered as being important for regional economic growth and are adequate for the majority of start-up firms. Our focus on high-technology firms, which are increasingly operating in international markets, because of their technology or product offering, revealed that regional support structures are less adequate to support these firms accumulating their capitals. This may be one of the reasons why a key partner is necessary for the establishment and development of high-technology firms. However, given the importance of such firms to regional economic development, adequate support structures should be in place to allow for the development of a greater number of such firms, which should translate into greater returns to the region.

MANAGEMENT IMPLICATIONS

The findings of this chapter suggest that entrepreneurs should pay special attention to the role and make-up of their networks when developing high-technology firms. Networking as an activity is perceived to be organic

in nature and effective network management is not widely reported in entrepreneurship literature. However, it is an area where the entrepreneur can take proactive steps by strategically targeting network contacts which can be of benefit to the company's initial emergence and future development.

Further, our study shows that from the technology transfer officers' perspective, present support structures are inadequate in meeting the needs of high-technology firms at both the pre- and post-foundation stages. However, the existence of the firms in our study all largely supported by regional support post-foundation suggests that this is not necessarily true at the post-foundation stage. It can also be argued that a more developed regional support structure would allow for the successful support of more firms. What is obvious from the results is that more support could be tailored to firms for pre-venture support and regions could develop structures to enable high-technology firms to accumulate the necessary capitals, but this entails the regional support agencies undertaking an element of risk and this is not always feasible or in line with the operational models of these bodies.

A limitation of this study is that it includes just a subset of high-technology start-up firms, that is, university spin-offs and two corporate spin-offs, the parent firms having originated from a university environment. To extend this, research is needed on a wider sample of both high-technology and other firms exploring the impact of the dependency relationship between the venture and its key partner. Future studies should focus on issues such as exchange dependence, embeddedness of the relationship, importance of the relationship to the key partner and independence as a goal of the young firm. This would provide a better understanding of the relationship and its importance to both parties involved.

NOTES

1. The authors would like to acknowledge the participation of the GlobalStart consortium members in conducting the case studies. The GlobalStart consortium consists of: Brno University of Technology (Czech Republic), Leuven Katholieke Universiteit (Belgium), Universidad Miguel Hernández of Elche (Spain), the University of Salamanca (Spain), the University of Tartu (Estonia), the University of Twente (the Netherlands), Wales Spinout Programme (Wales, United Kingdom) and the University of Warwick (England, United Kingdom). For further information on the GlobalStart project see www.globalstartups.org.
2. Wakkee (2004) proposes that the presence of a domestic or international partner with international contacts is a critical success factor for global start-up firms. In this chapter we refer to that partner as the 'key partner', that is, the partner who contributes most to the development of the firm. Yli-Renko et al. (2001) studied the effects of key customer relationships examining the effect of the largest customer, that is, the one that accounts for the highest proportion of sales revenue, on knowledge acquisition and knowledge

exploitation. In this chapter the key partner relationship is viewed in similar terms, however, its relevance is focused on the acquisition of further 'capitals'.

3. What this level is we cannot measure at the present time but it is an area worthy of further research.
4. To protect the anonymity of the venture an alias is used.

REFERENCES

Aldrich, H., B. Rosen and W. Woodward (1987), 'The impact of social networks on business founding and profit', in N. Homaday, O.J. Krasner and K. Vesper (eds), *Frontiers of Entrepreneurship Research*, Wellesley, MA: Babson College Center for Entrepreneurial Studies, pp. 154–68.

Arenius, Pia and Erkko Autio (2002), 'International social capital and its effects on resource acquisition in born global firms', paper presented at the EURAM (European Academy of Management) Annual Conference, Stockholm, May.

Autio, E., H. Yli-Renko and A. Salonen (1997), 'International growth of young technology-based firms: a resource-based network model', *Journal of Enterprising Culture*, **5** (1): 57–73.

Bhide, A. (1999), *The Origin and Evolution of New Business*, Oxford: Oxford University Press.

Birch, D. (1987), *Job Creation in America*, New York: Free Press.

Birley, S. and S. Cromie (1988), 'Social networks and entrepreneurship in Northern Ireland', paper presented at the Enterprise in Action Conference, Belfast, September.

Brush, C.G., P.G. Greene and M.M. Hart (2001), 'From initial idea to unique advantage: the entrepreneurial challenge of constructing a resource base', *Academy of Management Executive*, **15** (1), 64–80.

Burt, R.S. (2000), 'The network entrepreneur', in R. Swedberg (ed.), *Entrepreneurship: The Social Science View*, Oxford: Oxford University Press, pp. 281–307.

Diamantopoulos, A. and K. Inglis (1988), 'Identifying differences between high- and low-involvement exporters', *International Marketing Review*, **5**, 52–60.

Doutriaux, J. (1991), 'High-tech start-ups, better off with government contracts than with subsidies: new evidence in Canada', *IEEE Transactions on Engineering Management*, **38**, 127–35.

During, W., R. Oakey and S. Kauser (2001), 'The development of high-technology small firms: is it a matter of growth management and networking?', in W. During, R. Oakey and S. Kauser (eds), *New Technology-Based Firms in the New Millennium*, Volume 1, Oxford: Pergamon, pp. 1–3.

Groen, A. (2005), 'Knowledge intensive entrepreneurship in networks: towards a multi-level/multi dimensional approach', *Journal of Enterprising Culture*, **13**, 1.

Hite, J.M. and W.S. Hesterly (2001), 'The evolution of firm networks: from emergence to early growth of the firm', *Strategic Management Journal*, **22**, 275–86.

Kirchhoff, Bruce A. (1994), *Entrepreneurship and Dynamic Capitalism*, Westport, CT: Praeger.

Kirwan, P., P. van der Sijde and A. Groen (2005), 'Network development of global startup companies: a Pan-European investigation', paper presented at the

Babson Kauffman Entrepreneurship Research Conference, Boston, MA, 9–11 June.
Kirwan, P., P. van der Sijde and A. Groen (2006a), 'Assessing the needs of new technology based firms (NTRFs): An investigation among spin-off companies from six European Universities', in *International Entrepreneurship and Management Journal*, Special Issue on New Technology Based Firms, **2** (2), 173–87.
Kirwan, P., P. van der Sijde and M. Klofsten (2006b), 'Supporting high-tech companies using the business platform as a practical instrument', paper under review, contact the lead author for a copy.
Luostarinen, R. and M. Gabrielsson (2002), 'Globalization and global marketing strategies of born globals in SMOPECs', a paper proposal included in the 28th Annual Conference of the European International Business Academy (EIBA), Athens, Greece, 8–10 December.
Madsen, H., H. Neergaard, S. Fisker and J.P. Ulhøi (2004), 'Entrepreneurship in the knowledge-intensive sector: influential factors at the start-up and early growth phase', paper presented at the 13th Nordic Conference on Small Business Research, Tromsø, Norway, 10–12 June.
McDougall, P., J.G. Covin, R. Robinson and L. Herron (1994), 'The effects of industry growth and strategic breadth on new venture performance and strategy content', *Strategic Management Journal*, **15** (7), 537–54.
O'Farrell, P.N. and D.M.W.N. Hitchens (1988), 'Alternative theories of small-firm growth: a critical review', *Environment and Planning*, **20** (2), 1365–83.
Ostgaard, T.A. and S. Birley (1996), 'New venture growth and personal networks', *Journal of Business Research*, **36**, 37–50.
Parsons, T. (1977), *Social Systems and the Evolution of Action Theory*, New York: Free Press.
Preece, S.B., G. Miles and M.C. Beatz (1998), 'Explaining the international intensity and global diversity of early-stage technology-based firms', *Journal of Business Venturing*, **14** (3), 259–81.
Reuber, A. and E. Fischer (1997), 'The influence of the management team's international experience on the internationalization behaviors of SMEs', *Journal of International Business Studies*, **28** (4), 807–25.
Reynolds, P.D. and S.B. White (1996), *The Entrepreneurial Process*, Westport, CT and London: Quorum Books.
Ripollés, M., M. Menguzzato and M. Iborra (2002), 'The internationalisation of new ventures: the Spanish case', *International Journal of Entrepreneurship and Innovation*, **3** (3), 191–200.
Saarenketo, S. (2003), 'Born global approach to internationalisation of high technology small firms – antecedents and management challenges', in Wim During and Ray Oakey (eds), *New Technology Based Firms in the New Millennium*, Vol. III, Oxford: Pergamon, pp. 277–94.
Shane, S. and S. Venkataraman (2000), 'The promise of entrepreneurship as a field of research', *Academy of Management Review*, **25** (1), 217–26.
Szarka, J. (1990), 'Networking and small firms', *International Small Business Journal*, **8** (2), July–September, 10–22.
Van der Veen, Marijke and Ingrid Wakkee (2004), 'Understanding the entrepreneurial process', in David Watkins (ed.), *ARPENT, Annual Review of Progress in Entrepreneurship Research*, Vol. 2, pp. 114–52, 2002–2003, Brussels, Belgium: European Foundation for Management Development.

Wakkee, I. (2004), 'Starting global. An entrepreneurship-in-networks approach', PhD dissertation, Febodruk B.V., Enschede.
Yli-Renko, H., E. Autio and H. Sapienza (2001), 'Social capital, knowledge acquisition, and knowledge exploitation in young technology-based firms', *Strategic Management Journal*, **22**, 587–613.

Index