



LUND UNIVERSITY

Institutions and the Geography of Innovation: A Regional Perspective

Zukauskaitė, Elena

2013

[Link to publication](#)

Citation for published version (APA):

Zukauskaitė, E. (2013). *Institutions and the Geography of Innovation: A Regional Perspective*. [Doctoral Thesis (compilation), CIRCLE].

Total number of authors:

1

General rights

Unless other specific re-use rights are stated the following general rights apply:

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Read more about Creative commons licenses: <https://creativecommons.org/licenses/>

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

LUND UNIVERSITY

PO Box 117
221 00 Lund
+46 46-222 00 00

Institutions and the Geography of Innovation: A Regional Perspective

av

Elena Zukauskaite



LUNDS UNIVERSITET

AKADEMISK AVHANDLING
som för avläggande av filosofie doktorsexamen vid
samhällsvetenskapliga fakulteten, Lunds universitet,
kommer att offentligt försvaras i sal. 111 (Världen), Geocentrum I, Sölvegatan 10, Lund,
fredagen den 4 oktober 2013, kl. 13.15

Opponent: Professor Meric Gertler, University of Toronto

Organization LUND UNIVERSITY		Document name DOCTORAL DISSERTATION
Department of Human Geography Sölvegatan 10 SE-223 62 Lund		Date of issue September 2013
Author(s) Elena Zukauskaitė		Sponsoring organization
Title and subtitle Institutions and the Geography of Innovation: A Regional Perspective		
Abstract This thesis takes the regional innovation system approach as a point of departure and aims to advance knowledge about the role of institutions (i.e. hinderers vs enablers) in innovation processes within regional innovation systems. It especially focuses on the interaction of different types of institutions at different geographical levels, on how institutional influence changes as an innovation process develops, and on the role of regional authorities in changing institutional conditions for the actors. The theoretical framework relates the insights of regional innovation systems studies to theories of new institutionalism in organizational studies, new and old institutional economics and historical institutionalism. Relating regional innovation systems studies to institutional theories enables conceptualization of institutional diversity within the system. The reference is to different types (e.g. regulative, normative, cognitive) and different geographical levels (e.g. regional, national, global) of institutions which form a complex framework for innovation activities. Organizational diversity is considered by using the knowledge base (i.e. analytical, synthetic, symbolic) approach, which can be applied at industry, firm, and activity levels. The empirical focus of this thesis is on Scania, which is a region in Southern Sweden. The findings of this thesis reveal that institutional diversity with boundedly rational diverse actors leads to multiple paths of development within a region. Since institutions have different incentives and functions, they can complement, reinforce or contradict each other while influencing innovation processes. Organizational (i.e. critical knowledge base) and individual (i.e. position in the organization, personal qualities) characteristics lead to different responses of actors to institutional incentives. Furthermore, some institutions are more relevant at different stages of innovation processes than others. Policy makers should take institutional and organizational diversity into account when designing regional support programs. Knowledge base characteristics can serve as guidelines for the design of the programs at sectoral level and facilitate fine-tuned implementation at firm level. Awareness of institutional diversity enables the identification of supporting and contradicting institutions, and is necessary to achieve the goals of the programs.		
Key words: Economic Geography, Innovation, Innovation System, Institutions, Knowledge base, Region, Scania, Sweden		
Classification system and/or index terms (if any):		
Supplementary bibliographical information:		Language English
ISSN and key title:		ISBN 978-91-7473-633-5
Recipient's notes	Number of pages 198	Price
	Security classification	

Distribution by (name and address) Elena Zukauskaitė, Lund University, CIRCLE, P.O. Box 117, 22100 I, the undersigned being the copyright owner of the abstract of the above-mentioned dissertation, hereby grant to all reference sources permission to publish and disseminate the abstract of the above-mentioned dissertation.

Signature 

Date 2013-08-22

MEDDELANDEN FRÅN INSTITUTIONEN FÖR
KULTURGEOGRAFI OCH EKONOMISK GEOGRAFI
AVHANDLINGAR VIII

Institutions and the Geography of Innovation: A Regional Perspective

Elena Zukauskaitė



LUND
UNIVERSITY

This study was made possible by generous financial support from:
The Swedish Governmental Agency for Innovation Systems (VINNOVA)
The Swedish Research Council (VR)
European Science Foundation (ESF)
Riksbankens Jubileumsfond (RJ)
Joint Committee for the Nordic Research Councils for the Humanities and Social Sciences (NO-HS)

Copyright © Elena Zukauskaitė

Cover artwork © iStockphoto

Faculty of Social Sciences, Department of
Human Geography

ISBN 978-91-7473-633-5 (print)

ISBN 978-91-7473-634-2 (Pdf)

Printed in Sweden by Media-Tryck, Lund
University
Lund 2013



Table of Contents

Table of Contents	7
Acknowledgement	9
Abstract	11
List of Publications	13
Chapter 1: Introduction to the Thesis	15
1.1 Contribution, Aim and Research Question	16
1.2 Overview of the Papers	20
Chapter 2: Research Setting	23
2.1 Innovation	23
2.2 Scania Region	24
Chapter 3: Methodology	27
3.1 Epistemological and Ontological Perspective	27
3.2 Research Design	29
3.3 Methods	32
Chapter 4: Theoretical Framework	39
4.1 Innovation Systems, Learning and Knowledge	39
4.1.1 Regional Innovation Systems	41
4.1.2 Institutions in Regional Innovation Systems	44
4.2 Institutions – beyond Regional Innovation Systems	47
4.2.1 Institutions or Organizations?	48
4.2.2 Evolving Institutions or Routines?	51
4.3 Re-defining Institutions in Regional Innovation Systems	54
4.4 Innovation Policies and Institutions	57
4.5 Summary of the Conceptual Framework	60
Chapter 5: Findings, Conclusions, and Outlook	61
5.1 Summary of the Findings	61
5.2 Conclusions, Policy Implications and Outlook	71
References	77

Acknowledgement

It is impossible to name everyone who has supported me on my journey from being a PhD student to becoming a researcher. I have met many inspiring scholars from all over the world at conferences, seminars and workshops; they have contributed to the development of this thesis in various ways. However, I want to mention a few to whom I am extremely grateful – without them this journey would not have been possible.

First of all my supervisors, Jerker Moodysson and Björn Asheim, have been irreplaceable. Jerker has been an excellent first supervisor, co-author and reviewer who has read numerous versions of this thesis and provided thoughtful and challenging comments. He has always been generous with his time, whether it be discussing, explaining or listening to my questions and research ideas. His encouragement and confidence have been crucial for the successful development and accomplishment of this thesis. Björn, my second supervisor, has complemented Jerker perfectly. He has introduced me to his networks, trusted my abilities and revealed the big picture of the research world. His constructive critique and sharp observations have certainly helped to define the contribution of this thesis to the field of economic geography.

Lars Coenen, a discussant in the first and half-way PhD seminars, spent much of his scarce time on long discussions whenever needed along the way. The structure of the theoretical framework of the thesis is a direct outcome of those discussions. Markku Sotarauta did a good job as a discussant during the final seminar. His comments were crucial for finalizing the thesis. Michaela Trippl kindly agreed to read earlier drafts of Article 4 and the introductory part. This thesis has benefited a lot from her precise and insightful comments. I have spent long hours discussing the concept of institutions with Jon Mikel Zabala. Figure 1 in the introductory part has been influenced by those discussions. I also want to thank all my other wonderful colleagues at CIRCLE for making my work place vibrant and stimulating. It has been an honor and a pleasure working with them.

Josephine Rekers and Emelie Stenborg have been true friends who always find time to talk about research and life, and to inspire, raise questions, and calm me down during stressful periods. They have contributed a lot to making these three years a fun experience. Thank you!

This thesis could not have been written if interviewees had not given their time to tell me about innovation processes in their organizations. I am grateful for that.

On a more personal note I want to thank my parents and my sister for teaching me to be determined while seeking my goals. I am also in debt to my three fabulous kids Matas, Juozas and Alma for their patience, and for summer holidays spent in

Lund (and not complaining). Last but not least I thank my husband Arash for his unconditional support. This thesis has gained a lot from his creative mind, sharp intellect and deep understanding of research practice.

Abstract

Economic geographers have long been intrigued by the role of institutions in innovation processes. It has been argued that differences in institutions are among the factors explaining the uneven innovative capacity across and within countries. The regional innovation system approach highlights the interrelationships of firms, universities, governmental authorities and other organizations, as well as how those relations are influenced by the institutional setting in a region. There is a general perception in this stream of literature that institutions do matter. They constitute a legal framework for actions, define communication patterns and influence learning possibilities. However, these studies have been criticized for their lack of discussion of the interaction between institutions at different geographical levels, the relation between individuals and institutions and the impact of changes in the institutional framework on innovation activities.

This thesis takes the regional innovation system approach as a point of departure and aims to advance knowledge about the role of institutions (i.e. hinderers vs enablers) in innovation processes within regional innovation systems. It especially focuses on the interaction of different types of institutions at different geographical levels, on how institutional influence changes as an innovation process develops, and on the role of regional authorities in changing institutional conditions for the actors. The theoretical framework relates the insights of regional innovation systems studies to theories of new institutionalism in organizational studies, new and old institutional economics and historical institutionalism. Relating regional innovation systems studies to institutional theories enables conceptualization of institutional diversity within the system. The reference is to different types (e.g. regulative, normative, cognitive) and different geographical levels (e.g. regional, national, global) of institutions which form a complex framework for innovation activities. Organizational diversity is considered by using the knowledge base (i.e. analytical, synthetic, symbolic) approach, which can be applied at industry, firm, and activity levels.

The empirical focus of this thesis is on Scania, which is a region in Southern Sweden. Previous studies have analyzed various sub-sets of Scania's innovation system and highlighted on-going innovation activities in the region. The region is also characterized by organizational diversity including various actors when it comes to a critical knowledge base for innovation activities. Therefore, Scania is a suitable case for the analysis.

The findings of this thesis reveal that institutional diversity with boundedly rational diverse actors leads to multiple paths of development within a region. Since institutions have different incentives and functions, they can complement, reinforce or contradict each other while influencing innovation processes.

Organizational (i.e. critical knowledge base) and individual (i.e. position in the organization, personal qualities) characteristics lead to different responses of actors to institutional incentives. For example, increasing consumer interest in health issues (changing norm) creates an incentive for firms in the food sector to develop healthy products. When the combination of analytic and synthetic knowledge bases is critical to the innovation activities of firms, they respond to this incentive by developing value added products with health benefits, while firms dominated by the synthetic knowledge base from one field of expertise introduce products which are ‘healthy in a natural way’ – i.e. sugar-free (or reduced sugar) alternatives of juice, cereals, or ketchup. Furthermore, some institutions are more relevant at different stages of innovation processes than others. For example, during the initiation and establishment phases of organizational innovation (i.e. novel organizational form of a research unit) the institutions that hinder a change process are most prominent, since all the decisions related to the formalities of the unit then have to be made. The institutions that are related to benefiting from the results of a change process start playing an important role in a later phase.

Policy makers should take institutional and organizational diversity into account when designing regional support programs. Knowledge base characteristics can serve as guidelines for the design of the programs at sectoral level and facilitate fine-tuned implementation at firm level. Awareness of institutional diversity enables the identification of supporting and contradicting institutions, and is necessary to achieve the goals of the programs.

This thesis consists of four articles that have been published or submitted to peer-review journals, and an introductory part which presents a theoretical overview and discusses the methodological approach and main conclusions.

Keywords: Economic Geography, Innovation, Innovation System, Institutions, Knowledge base, Region, Scania, Sweden

List of Publications

Four peer review journal articles are included in this thesis:

1. Moodysson, J. & Zukauskaitė E. (2012) Institutional Conditions and Innovation Systems: On the Impact of Regional Policy on Firms in Different Sectors, *Regional Studies* DOI:10.1080/00343404.2011.649004
2. Martin, R., Moodysson, J. & Zukauskaitė E. (2011) Regional Innovation Policy Beyond 'Best Practice': Lessons from Sweden, *Journal of Knowledge Economy* 2: 550-568
3. Zukauskaitė E. (2013) Organizational Change within Medical research in Sweden: On the Role of the Individuals and Institutions, revise and resubmit at *Environment and Planning C*
4. Zukauskaitė E. & Moodysson, J. (2013) Multiple Paths of Development: Knowledge Bases and Institutional Characteristics of the Swedish Food Sector, submitted to *Environment and Planning A*

Chapter 1: Introduction to the Thesis

A United Nations Industrial Development Organization report (UNIDO, 2002/2003) has defined two alternative ways in which nations, regions and firms compete in a globalizing economy. One of them is a 'low road' competition based on reduced wages, depreciated exchange rates, and indifference to labor standards and environmental regulations. A 'high road' competition, on the other hand, is a matter of competing through innovation and learning. According to the report, only the latter can be sustainable in the long term for both developing and developed countries. 'High road' competition should not be exclusively linked to 'high-tech' industries. Innovation and learning can be found in all types of industries and are key characteristics of the contemporary economy (Cooke and Leydesdorff, 2006, Asheim et al., 2011c). However, the ways in which these activities are organized and carried out vary, depending on territorial characteristics and critical knowledge base (Asheim and Coenen, 2005, Storper, 1997, Asheim et al., 2011a). More concretely, both innovation and learning are interactive and socially embedded processes which cannot be fully understood without taking into account their institutional contexts (Lundvall, 2010a, Martin, 2000).

Institutions are embedded in space (Martin, 2000, Boschma and Frenken, 2006). They consist of regional, national and global regulations, local culture and habits, sectoral norms and traditions, and organizational routines. Economic behavior is guided and influenced by those rules (Boschma and Frenken, 2006). Institutional differences between spaces can partly explain uneven distribution of economic activities (Gertler, 2004, Saxenian, 1994). Many studies on the relations between institutions and economic behavior focus on the macro-institutional framework and analyze nation-specific institutions or differences between various countries (Wood, 2001, Hage, 2006, Zysman, 1994, Schneiberg, 2007, Whitley, 2002). On the other hand, regional specific assets such as conventions, informal rules and habits that coordinate economic actors under conditions of uncertainty are central forms of scarcity in contemporary capitalism and therefore create competitive advantage (Storper, 1997). The economic success of cities and regions is highly dependent on the local and sectoral institutional setting and on the framework of governance in which regional and urban economies are embedded (Swyngedouw, 2000). The emergence of the concept of the 'knowledge economy' led to the focus on innovation and learning in economic performance, and in that way contributed to the awareness of the importance of the region (OECD, 1996). As learning, knowledge exchange and innovation are facilitated by geographical proximity, a regional level with unique institutional setting becomes an important level of analysis (Rutten and Boekema, 2007).

The regional innovation system approach highlights the interrelationships of regional institutions, firms, regional authorities and other organizations, such as universities, in knowledge production. Innovation systems can be defined in narrow and broad ways. In the narrow definition the main focus is on R&D units, research councils, universities – those organizations and institutions which deliberately promote the acquisition and dissemination of knowledge (Freeman, 2002). In a broad way, innovation systems can be defined as all “the elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge ”(Lundvall, 2010a:2). In other words, regional innovation systems are composed of regional firms, knowledge production and other organizations that are embedded in laws, routines, norms and rules – an institutional infrastructure supporting innovation within the region (Asheim and Coenen, 2005). Learning is a key characteristic of successful regional development; it takes place not only through formal education at universities or colleges, but also in connection with routine activities in production, distribution and consumption. It is also related to learning-by-interacting, involving users and producers in an interaction resulting in innovations (Lundvall, 2010a). The regions with an institutional framework that facilitates learning and knowledge exchange as well as provides a common framework for a variety of interactions become more successful in global competition (Asheim, 2000, Storper, 1997). In addition, collocation of firms in the same region facilitates informal relations, which in turn contribute to the institutional framework supporting trust, commitment and mutual understanding that are beneficial for innovation performance (Lundvall and Maskell, 2000, Storper, 1997). To sum up, there is a general perception that institutions do matter. They constitute a legal framework for actions, define communication patterns and learning possibilities. However, the studies on regional innovation systems usually lack more elaborated discussion of the interaction of different types of institutions at various geographical levels, the relation between individuals and institutions and the impact of changes in the institutional framework on innovation activities (Gertler, 2010).

1.1 Contribution, Aim and Research Question

Interrelatedness between different types of institutions is a very important aspect of institutional analysis. Other social science disciplines such as institutional economics (North, 1990) and organizational studies (Scott, 2008) have highlighted the fact that different types of institutions – formal and informal, normative, cognitive and regulative – are perceived and experienced in a combined manner. Similarly, institutions at different territorial levels, such as regional, national, and global, should also be interrelated and, thus, experienced in a combined manner. Regions are the places where different kinds of institutions – national, regional,

global and organizational – interact (Hayter, 2004, Martin, 1994). Therefore, in order to analyze the role of institutions in the innovation activities of actors within the region, it is important to take this interrelatedness into account (Gertler, 2010).

The aim of this thesis is to advance knowledge about the role of institutions (i.e. hinderers vs enablers) in innovation processes within regional innovation systems, taking into account institutional variety in terms of types (i.e. regulations, norms, procedures) and geographical levels (i.e. regional, national, global).

Although regional innovation systems are considered to be open – that is embedded in national and global levels as well as influenced by organizational routines (Asheim et al., 2011b), the studies that analyze how different types of institutions at various geographical levels influence the innovation activities of regional actors are few. Iammarino et al. (2008) analyze factors associated with advanced technological capabilities as the interactions between micro (organizational) and meso (regional) levels. Their study is limited to the analysis of structures for human capital development (at micro and meso levels) and the importance of an active public sector (at the meso level). Other types of institutions are beyond the scope of the article. Gertler (2004) and Lehrer (2001) relate macro observations on different types of market economies (i.e. liberal vs coordinated) to micro institutional frameworks at a firm level. In these studies the macro level is considered to be superior, influencing the responses (e.g. employment and learning strategies) at the organizational level. In addition, some authors (i.e. Martin, 2010, Strambach, 2010, Gertler, 2010) emphasize that institutions at different levels – national, regional, sectoral, organizational – create certain institutional frameworks that evolves over time. However, these studies do not address the question of how the constellation and importance of different levels of institutions change as sectors or organizations develop. Especially when it comes to innovation processes, there is a general belief that an institutional environment where trust and learning are promoted and where financial support is available is beneficial for innovation performance, while more detailed analysis – what kinds of institutions at different stages of innovation matter – is lacking.

Several studies within the social sciences have made contributions to the analysis of institutional change and its impact on economic behavior. The varieties of capitalism approach analyzes how certain historical processes in different countries have led to the establishment of liberal or coordinated market economies (Hall and Soskice, 2001, Hage, 2006). Differences between the two are based on the characteristics of the labor market, financial, educational, and social welfare institutions (Thelen, 2001, Wood, 2001, Hage, 2006, Whitley, 2002). In other words, the focus of analysis is on the availability, competence, and regulation of labor, tax policies and funding possibilities as well as existing historical traditions of education in certain countries. The main criticism of this branch of literature is

that it does not take into account the differences between countries with the same type of capitalism and neglects the variety within a single country (Strambach, 2010, Zysman, 1994, Whitley, 2002). In addition, it mainly focuses on macro institutional structures at the national level. Yet, certain collaboration patterns between the organizations, implementation of regional innovation policies, and organizational practices of research activities are also part of the institutional framework of a certain geographical area. Nonetheless, they are usually outside the scope of VoC analysis. The special issue of *Economy and Society* (2009) can be mentioned as one of the exceptions. In different articles of the issue, regional and sectoral dynamics are referred to as being among the key drivers behind the internal diversity within national economies (see e.g. Crouch et al., 2009, Lane and Wood, 2009, Trigilia and Burroni, 2009). This idea is also supported by Strambach (2010) and Schneiberg (2007), who argue that organizational or regional differences might lead to alternative paths of development within the same type of market economy.

The process of institutionalization is a part of institutional analysis. New rules emerge, develop and finally, if successful, become institutionalized or in other words change the pattern of behavior. The requirement of having a driving license in order to drive a car could serve as an example illustrating how radically new regulative institutions emerge and develop. In the beginning of the automobile era, a driving license was not required. However, increased concern with the growing number of cars and accidents led to a demand for 'better auto laws'¹. It was in 1908 that the state of Rhode Island started examining drivers' skills and issuing driving licenses. It was followed by New York in 1913 and slowly diffused throughout the country and the world. Now the requirement of a driving license in order to drive a car is fully institutionalized in most societies. Still, it changes incrementally when new requirements (such as minimum age) or new kinds of tests (e.g. driving on the slippery road) are added. Norms and conventions go through similar processes. However, due to its informal nature, it is hard to assess the exact milestones in the development. One example could be the role of gender in social relations. The norm of gender equality (as opposed to male domination) emerged in western society with the second wave of feminism around the 1960s. However, it is hard to say if this norm is fully institutionalized.

Regional innovation policy is an example of regional governmental authorities' (sometimes in cooperation with other actors in the region) attempts to influence the development of normative institutions within the region (such as attitudes

¹ See e.g. 'Better Auto Laws Are Now Needed', in *New York Times*, August 18, 1907.

towards innovation, knowledge exchange and networking). There have been several attempts to discuss the institutionalization processes of regional policies. Storper et al. (2007) argue that only a successful regional policy will have long-term effects on institutions and lead to different patterns of collective action. It follows that any regional policy initiative does not automatically feed into the institutional framework of the region. Cooke et al. (2000), in defining patterns for the success of regional innovation policy, include taking the needs of the firms within the region into account, while at the same time not avoiding difficult choices, as well as providing financial support for innovation. It is not clear, though, what is meant by difficult choices. More generally, the arguable weakness of the studies is that they are not systemic accounts of the regional policies' institutionalization processes, and relations between policies and institutions are not discussed explicitly.

The underlying research question of this thesis is:

How do institutions (routines, norms, regulations) of various types and levels influence the innovation activities of the actors within the region (firms and research organizations)?

Specifying the main research question further, sub-questions are raised:

How does the role of institutions (i.e. hinderers vs enablers) change during different stages of innovation processes?

What is the role of regional authorities in changing institutional conditions for the actors?

By addressing these questions, the thesis seeks to contribute to filling the following research gaps in the existing studies in economic geography:

- 1) It conceptualizes and empirically analyzes the relation between institutional framework and regional innovation policies and their (in)abilities to influence the innovation activities of firms within the region;
- 2) It provides a detailed dynamic analysis of the role of institutions at different geographical levels in the process of organizational change of a novel research unit in the region, and analyzes the role of the personal and professional characteristics of innovating individuals;
- 3) It investigates conceptually and empirically the relation between institutional incentives and sectoral development within the region.

This thesis adds to the studies on the role of institutions in innovation processes within economic geography by further conceptualization and analysis of institutions. It takes a territorial (regional) perspective as a point of departure.

However, instead of treating institutions in a chosen region as ‘pre-given and fixed’ (Boschma and Martin, 2010), it treats the region as an open system where institutions of different types and territorial levels interact and change. The theoretical framework of the thesis and the separate articles, inspired by Gertler (2010) and Gertler and Wolfe (2002), relates insights from institutional studies in economic geography to theories of historical institutionalism and organizational studies (e.g. Hall, 2010, Hall and Thelen, 2009, Meyer, 1994, Scott, 2008). It enables a geographically situated analysis of institutions and actors behind innovation processes, and responds to the discussions within economic geography urging the development of a theoretical framework relating institutional dynamics at the level of cities, regions and nations to individual agency and organizational routines (Malmberg and Maskell, 2010, Schamp, 2010). It is important to highlight that changes and dynamics in the institutional framework are not conceptualized as a historical analysis (emergence, application and diffusion of certain institutions). The reference is to changes in institutional conditions for innovation at a certain point in time – i.e. entry into the EU, new funding possibilities for innovation, and new regional support programs. Those new aspects of institutions are interconnected with historically established institutional patterns forming the framework for innovation activities. Furthermore, at different stages of the innovation process some institutions might be more influential than others (see Articles 3 and 4 for more elaborations).

The author of this thesis is aware that the relation between institutions and innovation processes is interdependent (Farole et al., 2013). On the one hand, institutions might constrain or enable innovativeness of different actors. On the other hand, the actors can engage in collective action and modify their institutional environment (Hollingsworth, 2000). However, it is beyond the scope of this thesis to take the duality of this relation into account. The primary focus is on constraining and/or enabling role of institutions in innovation processes rather than on how innovation activities lead to changes in the institutional environment. The latter requires longitudinal data capturing long-term dynamics of institutional change, which is most often slow and incremental (Mahoney and Thelen, 2010). The data collected for this thesis does not allow for such analysis, but it would be an interesting topic for future research.

1.2 Overview of the Papers

To conclude the introductory chapter, here is a short outline of the contents of the individual papers and their relationships to the central question of the thesis. The first paper “Institutional conditions and innovation systems: On the impact of regional policy on firms in different sectors” deals with institutional conditions in

regional innovation systems; how institutions affect the organization of innovation activities among firms, and in what ways regional policy initiatives can be supportive. The analysis draws on data on innovation networks and activities in the life science, media, and food industries. The analysis reveals that different industries have different innovation practices, but regional policies seem to be very generic and therefore have limited influence on the firms. The paper points to the need for further research which will define the tools to evaluate companies' needs and demands and improve the conceptual discussion about the position of regional policies in the institutional framework of the region.

The second paper "Regional innovation policy beyond 'Best Practice': Lessons from Sweden" develops a theoretical framework relating institutional theories, regional innovation systems, and industry-specific knowledge base literature, thus corresponding to the issues raised in the first paper. Following Hall (2010), Campbell (2006), and Storper et al. (2007), the main argument is that, for regional innovation policies to become a part of the institutional framework, needs and demands of the target population have to be addressed. The paper presents an in-depth analysis of policy support programs for innovation performance targeting three industries – life science, media, and food – located in the Scania region, mainly focusing on the needs and demands of the actors and abilities of policies to meet those, or in other words to be institutionalized.

Jointly, the first two papers correspond to the first gap in the literature and conceptualize and empirically analyse the relations between the institutional framework and regional innovation policies, as well as evaluate their effect on the innovation activities of firms within the region.

In the third paper "Organizational change within medical research in Sweden: On the role of the individuals and institutions" the role of individual actors and institutions in the change processes is analyzed. The analysis draws on a case study of the novel cancer research center of translational medicine at Lund University (in Scania/Southern Sweden). The selection of the case is based on the assumption that organizational change within such institutionalized fields as university research and clinical practices requires capable individuals who overcome institutional barriers and identify opportunities within institutional frameworks. The focus of this paper is on how organizational change within medical research evolves and is influenced by different types of institutions at different geographical levels, as well as what characteristics of the key individuals are important in enacting institutional opportunities and overcoming hindrances. The findings of the paper reveal that although innovating individuals are influenced jointly by different types and territorial levels of institutions including norms at the global level, regional culture and national regulations, some institutions are more prominent than others in different phases of the process.

Furthermore, the relations between institutions influencing a change process can be contradicting, reinforcing or complementary. Actors can take advantage of institutional opportunities and introduce innovations due to their position in organizations, personal characteristics and access to different networks.

The third paper adds to the fulfillment of the goal of the thesis by analyzing, from an institutional perspective, the process of the emergence of a novel research environment within the region. It highlights the interrelatedness of different territorial level institutions and how their role is changing over time, as well as the characteristics of individual actors important for overcoming institutional barriers and recognizing opportunities.

As opposed to many studies which focus on input (e.g. investments in R&D) or output factors (e.g. types of products or processes) and mainly dealing with how much resources firms invest and how much they get out of their investments, the fourth paper “Multiple paths of development: Knowledge bases and institutional characteristics of the Swedish food sector” instead aims at capturing how firms actually go about innovating, and why their modes of innovation differ. The aim of this paper is to explain the complex development of the food sector in southern Sweden in the past decades, focusing on the relation between institutions and innovation practices, and taking into account the diversity of actors composing the sector and institutional variety. The paper develops a theoretical framework combining concepts of path dependency and knowledge bases, and applies it empirically. The three paths identified in the paper resemble path development via radical change, incremental change and diversification. Firms belong to one of the paths partly as a result of their knowledge base guiding innovation activities.

The fourth paper adds to the fulfillment of the goal of the thesis by analyzing sectoral development from an institutional perspective highlighting the role of different types and levels of institutions in innovation processes.

Chapter 2: Research Setting

2.1 Innovation

Drawing on the different characteristics of innovation in the literature, innovation can be defined as a matter of combining the processes of knowledge generation and exploitation in order to develop new commercial applications of economic value (Edquist, 2005, Cooke, 2004, Chesbrough, 2003). More concretely it might be defined as new products, new methods of production, new sources of supply, the exploitation of new markets and new ways to organize business (Schumpeter, 1961). In addition, the distinction is made between invention and innovation. Invention is the first occurrence of an idea for a new product, process or organizational form, while innovation is an idea put into practice (Fagerberg, 2005) and having ‘economic significance’ (Edquist, 1997:1).

Due to the high importance of the commercialization aspect in the conceptualization of innovations, firms are usually perceived as the main innovating actors (Johnson, 1997). However, firms seldom innovate in isolation, but together with other organizations such as other firms, customers and universities (Edquist, 1997, Edquist, 2005, Lundvall, 2010a). As mentioned in the introduction, from the innovation systems perspective, innovation is an outcome of systemic interaction of the actors (firms, research organizations and local governmental authorities) embedded in a certain institutional setting (institutional setting of regional innovation system in the case of this thesis). For the exchange of ideas and interaction to be successful in the ideal case, all actors within the system should be able to renew themselves. Therefore, the articles of this thesis focus not only on innovation within firms (Article 4 and partly parts of 1-2), but also on regional innovation support programs (Articles 1 and 2) and research organizations (Article 3).

The innovation activities of the firms interviewed for this thesis (Articles 1-2) include the development of new products, processes, strategies, accessing new markets and introducing new organizational structures. Therefore, regional innovation policy support programs are analyzed with the focus on their abilities to identify the needs and meet the demands of the wide range of innovation activities of the firms rather than one particular kind. In the case of the food sector (Article 4), the question of significant innovations leading to development of the sector is kept open to allow respondents to identify major innovation events which are later classified under certain types – mainly product and process innovations.

In Article 3 the focus is on organizational change – the emergence and development of a novel organizational form within medical research. Following Lam (2005), the creation of a new organizational form can be defined as an organizational innovation. Although organizational innovation is one of the innovation types introduced by Schumpeter (1961), the most common object of analysis in innovation studies is product/technology innovation. However, as pointed out by Lam (2005:124) “organizations with different structural forms vary in their patterns of learning and knowledge creation, giving rise to different types of innovative capabilities”. Therefore, organizational innovation might be a crucial precondition for technological innovation to emerge, and is an important object of analysis in its own right. Relating to Fagerberg’s (2005) conceptualization of innovation, the object of analysis in Article 3 can be defined as a new organizational form which is put into practice. The economic significance of this innovation cannot be evaluated in terms of profit or turn-over. However, it does have the potential of social significance in changing research and patient treatment practices in the medical community.

Being an outcome of interaction and knowledge exchange, innovation has a clear institutional dimension. Behavioral norms and traditions are among the factors governing distribution and utilization of new findings (Foray, 1997). Old habits of thought, routines and patterns of cooperation sometimes have to be changed before technological change (product and process innovations) can take place (Johnson, 2010). On the other hand, new technologies can trigger institutional change such as establishment of new regulations (laws regulating research with stem cells) or adding to the development of new norms communication and interaction (with the emergence of new ICT technologies) (Freeman, 2010, Edquist and Johnson, 1997).

Due to the importance of the institutional dimension in innovation activities, the success of innovation policies is highly influenced by the awareness of policy makers of the cognitive and normative frameworks of their target organizations. The emergence of novel organizational forms in such a highly institutionalized field as medical research requires enabling institutions at different geographical and organizational levels. These arguments are further developed in the conceptual framework of the thesis and respective articles.

2.2 Scania Region

All the actors whose innovation activities are analyzed in this thesis are located in the region of Scania in southern Sweden. The region has 1.2 million inhabitants, the majority of whom live in the third largest city in Sweden – Malmö. Together with the Greater Copenhagen area in Denmark, it constitutes a cross-national

Öresund region. Scania hosts several universities and colleges: Lund University (one of the oldest, largest and most prestigious universities in the country), Malmö University College, Kristianstad University College and the Swedish University of Agricultural Sciences.

LU has played a major role in the development of the region (Benneworth et al., 2009). It has a strong position in sciences, technology, and medicine. The Faculty of Medicine comprises 2,500 full-time students, 900 graduate students and 1,200 employees, and is one of the most research-intensive university environments in Europe. Its research spans a wide range, from experimental basic research to applied research with a focus on clinical, healthcare science, and public health issues. It is one of the founders (together with Region Skåne, Ideon Science Park, Skåne University Hospital and LU Bioincubator) of a large biomedical centre, BMC, which unites research and development and health-care activities. The Faculty of Engineering (LTH) is one of the few complete engineering faculties in Sweden. Besides the traditional engineering programmes, it offers architecture and industrial design. Research areas include nano-technology, combusting engineering, mobile communications, water resources, automatic control, laser physics and biotechnology. There is an ongoing interaction between the medical and technical sciences at LU. One of the cooperation forms is analyzed in this thesis (Article 3).

Malmö University College, established in 1998, has played a major role in the transformation of Malmö from industrial manufacturing hub to modern city of learning and knowledge. Its main strength lies in design, media and culture studies. Most of the companies within the moving media industry analyzed in this thesis are established close to the college area. Some of them have joint collaboration projects.

The key sectors of Scania reflect its strengths in research and education: food, life science, ICT, moving media and cleantech (Henning et al., 2010). Three of these industries (food, life science and moving media) have been chosen for a closer analysis in the thesis (Articles 1, 2 and 4).

Science parks and business incubators add to entrepreneurial and innovation activities in the region. Ideon Science Park is the oldest (started in 1983) and the largest (approx. 330 companies, 2500 employees and 120 000 square meters office space) science park in the Nordic countries. Its development is closely related to LU (especially the Faculty of Technology) and the presence of Ericsson (the first multinational company located in the science park). Small companies (1-10 employees) working mainly in the areas of ICT, life science and cleantech dominate the park. Krinova Science Park (Kristianstad) concentrates on food, environment and ICT, while Medeon (in Malmö) specializes in life science. The largest incubator in Sweden, Minc, is owned by Malmö City and provides support

for new media companies in the region. Most of the companies interviewed in the data collection process of this thesis are located in or collaborate with one or more science parks.

Scania was one of the regions where responsibilities for regional development and planning were transferred to the County Council as opposed to central government in 1997. (Most of the regions in Sweden obtained those responsibilities in 2009). County Councils were given the responsibility to develop a strategy for long-term regional development, to determine the distribution of state subsidies for regional cultural organizations, and decide how the means provided by central government for the development of regional policies should be used (1996:1414). Scania has one of the strongest regional governments in the country and the vision is to make the region the most innovative in Europe by 2020. According to the rankings of the Global Innovation Index 2013, this region is already one of the innovation leaders in Europe (Hollanders, 2013).

All the types of actors (firms, local government and research organizations) identified as necessary within the analytical framework of regional innovation systems are present in the region of Scania. However, it would not be meaningful to try to map the innovation system of Scania by means of exact definitions of which actors or institutions are to be included or excluded in the analysis. It is much more interesting to study the system's functionality, preferably separated into its constituent parts (Henning et al., 2010). Various studies have analyzed different subsets of Scania's innovation system. The subsets include the role of the university (Benneworth et al., 2009, Coenen, 2007), the development of different sectors within the system (Henning et al., 2010, Martin and Moodysson, 2011), the analysis of the science parks (Johannisson and Dahlstrand, 2009), and of the system's functions and capabilities (Hallencreutz et al., 2008). All of them point out the ongoing innovation activities of the different actors, supporting the view that Scania is an interesting case for analysis of the role of institutions in innovation activities within the region.

Chapter 3: Methodology

3.1 Epistemological and Ontological Perspective

This thesis is informed by the methodology of critical realism. It accepts the world as existing independently of the researcher's knowledge of it (physical processes and social phenomena would exist without our awareness of it; i.e. as objectively existing reality). However, that world becomes available and known to us due to the analysis of it. In other words, critical realism differentiates between ontology and epistemology in science. It accepts the idea that science is socially influenced, but the phenomenon and the mechanism it explains exist prior to and independently from scientific thought (Alvesson and Sköldbberg, 2009). Science has two dimensions – intransitive (object of analysis) and transitive (theories and discourses about object of analysis) (Sayer, 2000).

Such an age-old question as the creation of our universe (intransitive dimension) can be addressed from different transitive dimensions – Einstein theory of special relativity, hot big bang theory or different religious perspectives. These theories and points of view might complement or compete with each other. However, the emergence of our universe does not change because we change our perception about it.

In contrast to the natural objects which are stable over time, social phenomena are outcomes of social interactions and, therefore, possible objects of transformations and only relatively enduring. The identification of a social object is space and time dependent. Furthermore, theories (transitive dimension) are socially defined objects themselves and might transform over time (Bhaskar, 1998). Innovation is a social object emerging through the interrelations of actors. The way firms, regions and nations innovate has changed over time – the focus has moved from large in-house R&D units and major investments to basic science to an interactive process involving different groups in the firm and society. As a social phenomenon transforms, so does the theory around it. Innovation processes have been analyzed using linear, chain or systemic models, applying value chain or managerial frameworks. However, it does not mean that the way firms innovate changes due to the theoretical concept used by a researcher. In other words, a social phenomenon transforms because of the change in the context around it and in the relations between social actors that produce the phenomenon (i.e. the context of the USA before and after the cold war influences the interactions of society at large, scientists and large firms), rather than because of the theory that provides an abstraction of the process. This is not to deny that there is some interplay between

lay and academic spheres in social life, but ‘this does not mean that, in thoroughly undialectical fashion, subject-object relations and distinctions just collapse’ (Sayer, 2000:35). In addition, there will always be a time lag between empirical observation, further redefinition of the theory and possible (if ever) impact on the lay sphere of social life.

Critical realism makes an important distinction between the real, the actual, and the empirical. Real refers to the objects of the world which have their structures and mechanisms. Actual refers to what happens if and when those powers are activated. Empirical is defined as the domain of experience (accessible to the researcher) through observability or causal analysis. To identify and explain the real – the causal mechanisms behind certain phenomena, and the impact on behavior – is the primary goal of critical realism (Alvesson and Sköldbberg, 2009). It is a posteriori methodology, using constant reflections and immanent critique and seeking to reconstruct causal powers of the objects, when they were activated and under what conditions. That is, causation is contingent, not pre-determined, and refers to potentiality rather than actuality (Sayer, 2000, Yeung, 1997).

The causal relations are disclosed through iteration between the abstract and the concrete. It starts with an empirical problem and then proceeds to abstract the necessary relation between the concrete phenomenon and deeper causal structures. It moves from the description of a phenomenon to something that causes or produces it (Yeung, 1997). This iteration between the abstract and the concrete can also be perceived as the relation between empirical observation and theory, which can be referred to as a process of retroduction. An empirical phenomenon is approached with a certain theoretical framework in mind. However, that framework does not predetermine the analysis, but is rather further developed and changed by the insights from the empirical world. One can approach the creation of the phenomenon of the universe with the big bang theory in mind. However, by adding causal mechanisms from new empirical findings, one can further develop and adjust theoretical implications. In other words, critical realists’ studies are theoretically informed and informative (Sayer, 2000). According to Clark (1998), theoretical implications provide initial categorizations and ideas, while an empirical phenomenon adds to their revision and reconceptualization (or total rejection in some cases).

This thesis as a whole has been developed through the process of retroduction. Each article represents a new step of retroduction, where the role of institutions in the innovation process within regional innovation systems is further redefined. Therefore, the conceptualization of institutions as well as relations between institutions and innovation policies slightly differ in different papers and the introductory part. Articles 1 and 2 follow the strict division between institutions and organizations. Although this distinction is applicable due to the research question (as explained in the section 4.2.1), it is also due to the fact that a more nuanced view regarding institutions and organizations is developed only in Article

3 and later in the introductory part when the insights from organizational studies are used in the abstraction process. In Article 1 innovation policies are analyzed as if they are part of the institutional framework of regional innovation systems. However, in the conclusion it is stated that innovation policies are not necessarily institutions, and that the relation between institutions and policies should be further developed. Applying and further redefining additional theoretical insights, the conditions under which innovation policies become institutions are specified in Article 2. Similarly, the difference between companies' needs and demands is first discussed in Article 2 using the conceptualization by Edquist (2009), since the differentiation is necessary to answer the research question. Still, since the difference is not realized while writing Article 1, incoherence in terms appears. What are referred to as needs in Article 1 are demands in Article 2.

The analysis of the concrete from a critical realism perspective is closely related to the concept of space, which is a given point of departure for geographical studies. According to Sayer (2000), any concrete empirical observation has a spatial dimension because events or phenomena are situated in space and time. On the other hand, space exists through the relations and characteristics of objects that occupy it. In order to reveal the importance of space, we have to identify particular kinds of objects, relations and processes constituting it. In the social sciences, space is an important object of analysis not in its own right, but due to the social phenomena that take place in it (Asheim, 2006). It is important to note here that the flexibility of objects within space (that is ability to adapt to different environments) does not undermine its importance. If space did not matter, flexibility would not be needed. Space provides causal contexts in which observation of the empirical takes place.

A detailed description of how abstract and concrete as well as relation to space have been combined in the articles of this thesis follows in the next section of this chapter.

3.2 Research Design

This thesis follows the idea of bounded rationality, meaning that both individuals and organizations have limited knowledge about the preconditions and possible outcomes of their decisions, and are highly influenced by their environment (Simon, 1959, Nelson, 2008). Therefore, the object of analysis (intransitive dimension) is the relation between the environment (understood as institutions) and innovation activities in the region. The theoretical framework consisting of different institutional theories in economics and the social sciences as well as

theories on innovation represents a transitive dimension which informs and is informed by empirical analysis.

The main question asked in this thesis is a conceptual one – defining and further elaborating the relation between innovation activities and the institutional framework. According to Siggelkow (2007), a case study approach is useful when conceptual questions are asked, as it both illustrates and adds to further development of theoretical concepts. In addition, a case study approach is considered to be appropriate in economic geography when the diversity and complexity of reality (intransitive dimension) need to be revealed and studied (Clark, 1998). Therefore, a theoretically informed case study approach is a methodological choice in this thesis.

The initial empirical point of departure is the region of Scania. However, as discussed in the previous section, space (in this case Scania region) exists only through the characteristics and relations of the objects that occupy it. Informed by the regional innovation systems approach, the objects of interest for the analysis are firms, research organizations and public governmental authorities (the main actors within the framework of innovation systems). Therefore, case studies vary depending on the research focus in each paper. Innovation activities can be addressed in the form of innovation support programs, new products and processes in food-sector firms and a novel research organization. In the case study research, an empirical phenomenon is analyzed in its context (Yin, 2009). In this thesis the context is of several layers. On the one hand, case(s) in each of the papers are embedded in their immediate context (institutional conditions relevant for a certain industry or research organization in the region). However, all of them are overarched by the same regional context in order to keep some parts of the analysis constant.

The research design of the thesis starts with an empirical observation (concrete) of several innovation support programs aimed at different sectors within the region. Articles 1-2 discuss the effect of innovation policies on innovation activities of the firms. Both articles use a multiple case study approach – three innovation support programs addressing different sectors and their impact as perceived by the firms in those sectors. The comparison of all three policy support programs support the idea that innovation policies are indeed generic, as similar support is offered regardless of the sector. The comparison of the firms within three industries (each representing a particular knowledge base) enables reconceptualization of the institutionalization process of regional innovation policies, since a knowledge base is a helpful tool in the identification of industry needs. In this way, contrasted and compared findings make the results more reliable and the reconceptualization of theory richer (Yin, 2009).

However, the relation between concrete and abstract differs in the papers. Article 1 is mainly informed by previous research and theoretical consideration of regional

innovation policies. The analysis identifies the limited impact of all three innovation support programs due to the lack of attention to the target populations' needs and demands. Relating back to abstraction, Article 1 raises further questions for theory development rather than provides answers. Therefore, Article 2 is a continuation of Article 1. A broader theoretical approach (combining innovation policies, institutional change and knowledge base frameworks) provides categorization patterns and, through a comparative analysis of the cases, conceptualization of the relation between policies and institutions.

These articles are mainly focused on the (in)ability of innovation policies to influence firms' activities where institutional mismatch is one of the reasons. In order to understand the causal relation (the mechanisms) between innovation activities in the firms and their institutional environment, there is a need for more in-depth study of the sector. The food sector is chosen for such an analysis for several reasons. Consisting of many different organizations, it is one of the oldest sectors within the region. It includes firms performing radical innovations (e.g. functional food), diversification via process technologies, firms characterized by minor product development, and a variety of other organizations such as network platforms (e.g. Innovative drinks platform) and research centers (e.g. Functional Food Center). This suggests that there is a large variety of norms, beliefs and procedures guiding and/or hindering innovation activities. In addition, in the first two articles, institutional mismatch between policy makers and firms within the food sector seems to be most prominent, raising scientific curiosity to make a more detailed analysis of institutional factors guiding the behavior of the firms in this sector. Addressing these different groups of firms, Article 4 reveals the mechanisms behind firms' choices of whether and how to innovate or not, and how these choices are influenced by the incentives created by the institutional framework and knowledge base underlying innovation processes.

The level of abstraction regarding knowledge bases differs in Articles 1-2 and Article 4. In Articles 1-2 one critical knowledge base is assigned for the whole industry, depending on the dominant mode of innovation. However, in order to take a variety of actors within the sector into account, differences between the firms have to be considered. Therefore, three types of combinations of knowledge bases are defined (see Article 4 for further elaboration).

In Article 3, the focus shifts from firms and policies to a different aspect of regional innovation system – research organization. It is triggered by an empirical observation that in order to address new problems emerging in the society, research activities need to be organized in a different way. The object of analysis (single case study) is a novel research center at LU, representing an organizational change within research. Informed by innovation and organizational studies, the

article reveals the mechanisms behind the creation processes of novel research organizations.

In relation to methods, critical realism differentiates between intensive and extensive research. Intensive research starts from individual cases in their causal contexts, and is focused on the characteristics of certain processes and the reasons behind them. Extensive research, on the other hand, aims to reveal regularities and the breadth of a phenomenon. It is usually of a descriptive rather than explanatory nature (Sayer, 2000). Theoretical advances are developed in a dialogue between theoretical work and intensive research practices (Clark, 1998).

The real in this thesis refers to the social phenomenon of institutions (influencing innovation). Their power and structure come into being through the perceptions and actions of individuals and organizations. In order to obtain information about actions, and especially perceptions, intensive and extensive methods are used in the thesis. The main data in all four articles has been collected through different types of interviews (structured and open-ended semi-structured). Background information about the cases is derived from websites, policy documents and organizations' internal publications. In addition, abstract research – formulation of different conceptual categories, which are later redefined using empirical observations – is crucial during different stages of the thesis. The advantages and limitations of different methods are further discussed in the next section. However, the combination of different methods allows to reveal different features of the same layered reality (Downward and Mearman, 2007).

3.3 Methods

As explained in the previous section, the combination of abstraction, extensive and intensive research methods are used in order to study the relation between the institutional framework and innovation activities in the region.

Abstraction is an inseparable aspect of the research process from a critical realism perspective. It provides the initial conceptualization and perspective for empirical research done in later stages. One important source for abstraction is previous research and theoretical frameworks developed within institutions and innovation studies (reviewed in the chapter below). Intensive reading of the literature (making notes, sorting, classifying, marking overlapping and contradicting aspects – as suggested by Silverman (2011)) help to derive structure and concretize the focus with which empirical observations are approached. At the same time, broad reading enables familiarization with a variety of theoretical aspects preventing deductive reasoning and leaving space for the iteration between the abstract theory and phenomenon observed.

In order to redefine and make an abstraction better informed, there is a need to relate it to empirical observations. Three different data sets are used in this thesis; each of them aiming at a separate aspect of the regional innovation system.

The same empirical data set is used in the first two articles². Reuse of the data while broadening the theoretical discussion enables a theoretical abstraction defining the relation between policy initiatives and institutions. The empirical material for this data set has been collected mainly using different types of interview methods. To find out the rationale behind the existing policy programs and what they claim to provide in terms of support for firms' innovation activities, 15 in-depth interviews with key individuals representing the regional policy programs were conducted. These interviews have allowed deeper assessment of the actual activities carried out in the policy programs, as the documents describing those are fairly vague when it comes to specifying concrete activities. Additional input for assessing the policy programs has been received through participation in focus group meetings involving representatives of the regional council, one of the main stakeholders responsible for the design and implementation of the programs. These meetings have enabled a discussion of the stakeholders' views on the workings of their activities, as well as the main challenges and achievements in the course of the programs. Eight such meetings were held during the period February 2009 to March 2010. I did not participate in this data collection process as it was done by the co-author of the paper before my admission to the PhD program. However, as all the interviews and meetings were recorded, I could get access to the records and make my own interpretations. Possible misinterpretations could be clarified as a supervisor and co-author of the papers designed and was present during the interviews. This part of the data collection and analysis process is of an explanatory and intensive nature; it helps to understand why and how certain policy practices have emerged and developed.

In addition to the intensive open-ended interviews, publicly available documents (websites, strategies, evaluations) have been analysed to provide background information and to prepare for an interview interpretation process. Some of that

² Although the same dataset is used, there are some differences in the way the data is analyzed. When discussing the benefits from a policy program, in Article 1 the difference is made between sharing knowledge (i.e. participating in knowledge networks) with customers, suppliers, and competitors. This is merged into a category 'networking' in Article 2 in order to have a better comparison of three industries. In addition, some of the benefits are omitted since they apply to only one particular industry and, therefore, is not relevant in the comparison (i.e. sharing of laboratories).

information is directly used in the articles (e.g. an observation that none of the innovation support programs explicitly define what it is meant by innovation in their framework).

The policy initiatives are also evaluated from the firms' perspectives. Therefore, a total of 95 structured interviews were conducted with firms' representatives, mainly CEOs or general managers; 30 for the life science industry, 28 for the food industry, and 37 for the moving media industry. This corresponds to a response rate of 72% for the life science cluster, 80% for the food cluster, and 50% for the moving media in the region³. During face-to-face surveys like interviews, interviewees were asked about the support programs they were aware of, used in their activities, benefits they think they got and finally what support they thought was needed for their activities. Interviewees could choose from provided answers. However, the face-to-face nature of the interview allowed for more in-depth elaboration on the matter, thus enriching the interpretation process.

The nature of this data collection and analysis processes is in between extensive and intensive research. On the one hand, the data analysis has aimed to define the extent to which firms within the region targeted by the policy makers were aware of policy initiatives and could benefit from them, as well as what the dominant demands were. It is closer to the extensive type of research as it does not aim to reveal causal relations, but rather identifies regularities of the behaviour. It is a suitable methodological choice, as the extent to which policies are known and perceived as useful identify their relation to the institutional framework within the region (see Article 2 for more detailed discussion). In addition, the structured nature of the interview enables a comparison of three sets of firms. Differences in their needs and demands provide the basis for more fine-tuned policy recommendations. However, the discussion on the interrelation of demands, benefits and support that is provided by the policy support programs is also informed by intensive research practices. Survey data is analyzed by relating it to additional information about interviewed firms, in-depth interview material and respondents' elaborations on the subject beyond a survey questionnaire.

Open-ended semi-structured interviews are the main method for data collection in Article 3 and Article 4. In addition, different textual material related to the development of the field was reviewed before the interviews took place. Still, it mainly served as a preparatory step for the interviews (as suggested by methodological literature (see e.g. Rapley, 2004, Schoenberger, 1991)). Some of the factual information from those texts is also referred to in the articles (e.g.

³ A desktop-based non-response analysis reveals no systematic differences in terms of size, age and type of activities between responding and non-responding firms.

requirements for strategic research centers). In Article 3, 15 interviews were conducted with representatives of the center and funding organizations that provided financial support for its establishment. The thematic structuring of the interviews with center representatives was based on the main events of center development: preconditions for the establishment, application process for funding bodies, establishment, organization and development and commercialization of technologies. The main themes for SSF representatives were based on the phases of the funding process: preconditions for call for the strategic research centers, the definition of the requirements and assessment process.

In Article 4, 14 semi-structured interviews were conducted with firms' representatives (CEO's, production managers or marketing directors), representatives of regional policy support programs, and other individuals with experience from and insights into the development of the food sector. The main thematic focus of the interviews was development of the food industry in general and in the region. Respondents were asked to describe how the sector developed over the last decades, how new products and processes were developed and how that changed over time, what the main triggers and hindrances were for innovation, and what the role of the region was in those processes.

The semi-structured nature of the interviews provided controlled flexibility enabling coverage of the topic of interest, while providing the space for the exploration of unexpected facts and attitudes (Silverman, 2011, Jarratt, 1996). Data collection and analysis are based on intensive research. The data collection processes start from empirical observations at a certain point in time and space (existence of a particular research center at LU/uneven innovation processes of the firms within food sector in Scania) and are developed further by tracing the establishment/development process back in time. In other words, the main motivating question is what the reality had to be like for the center/food sector to become what it is, and what causal mechanisms have led to these research structure/innovation processes.

The interview method has advantages and disadvantages. Rapley (2004) suggests that interviewing enables the interviewer to hear the opinions of usually hidden voices. I would also add hidden or unnoticed facts and events. That is, not being able to talk to the actors involved in the processes implies that lots of information would stay hidden from the researcher. Interviews are useful tools of data collection when change or development processes of organizations are in focus, as they provide access to often conflicting and shifting logic and historical contingencies that underlie strategic decision making. Finally, and most importantly for this thesis, interviews enable the analysis of organizations embedded in their institutional contexts (Schoenberger, 1991). On the other hand, interview data is what Silverman (2007) characterized as manufactured; that is, it

is influenced by both the interviewees' and interviewers' perceptions. In this way, instead of analyzing certain phenomena in society such as knowledge exchange, innovation researchers rather analyze the discourse around it. It is related to what Schoenberger (1991) identified as the issues of interpretation, language and meaning. Language is always in between the researcher and the phenomenon under study. However, as suggested by McDowell (1992), from a critical realism perspective, the world is only understandable if the deep structures that generate events and discourses are identified. Therefore, these structures are neither coincident with nor reducible to the patterns of empirically observable events. Furthermore, theory abstraction in this thesis suggests that the power of institutional mechanisms is activated when they are enacted by individuals or other agents. Therefore, the hindering or enabling aspects of institutions depend to a considerable degree on how they are perceived and interpreted by their target population.

The question that remains concerns the validity and reliability of the results. There is no agreed position among social scientists on how these terms should be treated in qualitative research. Reliability refers to the possibility of repeating the whole research process and coming up with the same results and interpretation (Schoenberger, 1991, Silverman, 2011). It also refers to the degree of consistency – the independence of the findings from accidental circumstances of their production. In other words, that they are assigned to the same category by different observers or by the same observer on different occasions (Silverman, 2011). The reliability criterion (consistency) in this thesis is satisfied by careful pretesting of the interview schedules. In the case of the co-authored articles, several researchers have interpreted the same results, while in the single-authored article researchers familiar with the data-set have been encouraged to provide additional interpretations or point out questionable ideas in the first drafts. In addition, most of the interviews are transcribed (notes written down if not transcribed) and available upon request. The transparency in the applied methodological and theoretical approaches reveals the process of data collection and interpretation, and therefore supports the consistency of the findings (Moisander and Valtonen, 2006).

There are several definitions of validity. Schoenberger (1991:184) defines validity as the characteristic of 'how closely the results conform to "true" reality'. McDowell (1992) criticized this approach to the positivistic relation to reality and suggested that the validity of any interpretation was contingent upon the agreement of others. However, even if the revelation of 'truth', from a critical realism perspective, is a process rather than a result, and the world can be known only under particular analysis, that does not mean that any interpretation of empirical data or analysis of the world is equally good (Sayer, 2000). The researchers are encouraged to use data triangulation and corroboration tests to assure validity (Sayer, 2000, Yeung, 1997). In all four articles (in cases of semi-

structured open-ended interviews) data is triangulated with respect to the person (Denzin, 1970). Different respondents were interviewed about the same phenomenon (policy initiative, organizational innovation, innovation within the food sector). A corroboration test was partly applied by collecting information from different sources – publications about the phenomenon under study as a preparation for interviews. Any contradiction between the officially announced data and the data obtained during the interview was sorted out, either during the main interview or through follow-up interviews (mainly by phone). In the case of the survey data, all the questions were asked, in a courtroom manner, about the awareness and usefulness of innovation policy programs. The face-to-face nature of the interviews reduced possible misinterpretations of the questions and answers. In addition, in the presentation of this research project for the firms, we highlighted the fact that our research might have an impact on future innovation policies because of the interaction with policy makers. This, together with promised anonymity, encouraged openness among the respondents and reduced the chance of purposeful story-telling.

Chapter 4: Theoretical Framework

The aim of the thesis is to advance knowledge about the role of institutions (i.e. hinderers vs enablers) in innovation processes within regional innovation systems, taking into account institutional variety in terms of types (i.e. regulations, norms, procedures) and geographical levels (i.e. regional, national, global). It focuses on how institutional influence changes as the innovation process develops, as well as on the role of regional authorities in changing institutional conditions for the actors (firms and research organizations). In order to achieve the goal, the theoretical framework is developed to relate the literature on innovation systems with institutional theories. First, the innovation systems literature is reviewed with the main focus on regional innovation systems and, more concretely, institutions within regional innovation systems. Further, a discussion on institutions in economic geography beyond the innovation systems approach is critically reviewed, and insights from several institutional theories (old and new institutional economics, organizational studies and historical institutionalism – the ones that are mainly referred to in the works by economic geographers) are presented. This enables a fine-tuned conceptualization of the institutions in regional innovation systems, which is further applied in this thesis. Finally, since innovation support programs are objects of analysis in two of the papers, the relation between innovation policies and institutions is elaborated.

4.1 Innovation Systems, Learning and Knowledge

There have been several attempts to define the way innovation processes take place. One of the earliest models of innovation is called the ‘linear model’, which is inspired by Vannevar’s Bush (1945) report to the US President on a program for postwar scientific research. This report highlights the importance of basic scientific research for the creation of new products, industries and jobs. According to this model, basic research leads to development, development to production and production to marketing (Kline and Rosenberg, 1986). This model is criticized for distorting the process of innovation by neglecting the importance of feedback, and placing science in the center at the cost of other factors influencing the innovation process (Asheim and Isaksen, 1997, Kline and Rosenberg, 1986). However, in the context of this thesis, an interesting observation is that, already in 1945, Bush pointed out that ‘science, by itself, provides no panacea for individual, social, and economic ills. It can be effective in the national welfare only as a member of a team’ (p.11). It follows that almost 70 years ago the importance of the relation between research and the broader social context was highlighted, although further elaborations in the report are missing.

Kline and Rosenberg (1986) developed a chain-linked model of innovation in which innovation emerges when potential in the market has been identified and developed through constant feedback between design, test and market units which are embedded in the research and knowledge environment.

The innovation systems approach is moving away from innovation processes as necessarily related to research activities. Innovation is being viewed as a cumulative process emerging through a systemic interaction of the actors in the system (Lundvall, 2010a, Edquist, 2005). From this perspective, the social environment of the innovation process becomes of crucial importance. Innovation systems can be defined in terms of geographical (national or regional) or sectoral/technological dimensions (Edquist, 1997). Sectoral innovation system refers to ‘a set of new and established products for specific uses and the set of agents carrying out market and non-market interactions for the creation, production and sale of those products’(Malerba, 2002:250). In other words, the boundaries of the system are defined by the technologies and products that it unites. National or regional in front of innovation system defines geographical boundaries applied in the analysis of the phenomenon. Both of them, following the typology by Lundvall (2010a), can be understood in ‘broad’ or ‘narrow’ terms. The narrow approach concentrates on those organizations and institutions which deliberately promote the acquisition and dissemination of knowledge and are the main sources of innovation. The focus is on the networks of R&D departments, industrial R&D practices, technological institutes, universities, and research councils (Lundvall, 2010a, Freeman, 2002). The ‘broad’ approach recognizes that these ‘narrow’ organizations and institutions are embedded in a much wider socio-economic system in which political and cultural influences as well as economic policies help to determine the scale, direction and relative success of all innovative activities (Freeman, 2002:194). A broad definition of regional innovation systems is applied in this thesis due to its inclusion of different kinds of organizations and institutions in the analysis. The concept is discussed in more details in the following section of the chapter.

The alternative classification of innovation processes is based on the mode of learning involved. It goes back to the 18th century – the observations made by Adam Smith (1776). In the contemporary interpretation by Lundvall (2010b) they are defined as DUI mode, where learning takes place through doing, using, and interacting, and the STI mode where learning takes place through science and engineering based research processes – science, technology and innovation. The DUI mode relies on informal processes of learning and experience-based know-how often leading to incremental innovations. The STI mode based on codified scientific knowledge is able to produce radical innovations.

As mentioned before, the innovation system approach provides the overarching framework for the conceptualization of innovation in this thesis. In addition, the analysis of innovation processes is also informed by the differentiated knowledge

base approach distinguishing analytical, synthetic, and symbolic knowledge bases (Articles 2 and 4). This approach is used to characterize the basic (critical) knowledge input which knowledge creation and innovation processes cannot do without (Asheim et al., 2007). Knowledge inputs and outputs in an analytical knowledge base have the highest degree of codification. Since innovations are mainly science driven, the relations with universities play an important role. Innovations in synthetic knowledge base firms/industries are user and market driven, usually emerging through the combination and improvement of existing knowledge. Relations to universities are limited to applied R&D collaborations. However, the networking with other firms as well as users and suppliers is of great importance. A symbolic knowledge base is related to the creation of meaning and desire as well as aesthetics attributes of products. The innovation process requires specialized abilities in symbol interpretation and creativity; this type of knowledge is highly tacit, embedded in cultural experiences and specific social communities. Furthermore, depending on the critical knowledge base, industries differ in their sensitivity to distance in knowledge exchange processes. Knowledge exchange takes place at the local/regional level mainly among the firms dominated by symbolic and synthetic knowledge bases. In industries where an analytical knowledge base is critical, a global scale is the most important for knowledge exchange (Martin and Moodysson, 2012)⁴. This approach is chosen because it provides insights into how different firms and sector organize their activities and what aspects of innovation process are important. It allows taking into account the diversity, with respect to innovation practices, of the firms in the region.

Relating knowledge bases to institutions, the argument can be made that the dominating knowledge base has an impact on norms and routines within the sector and firm (i.e. collaboration with a university is more valued by an analytical knowledge base dominated sector/firm than a symbolic one). Furthermore, the knowledge base also influences the responses to the incentives created by the institutional framework within the region. This in turn leads to differences in innovation processes (see Articles 2 and 4 for further discussion).

4.1.1 Regional Innovation Systems

The literature on regional innovation systems provides several definitions of the concept. Initial definitions mainly highlight the importance of interaction among

⁴For a detailed discussion on knowledge bases see Asheim and Gertler, 2005, Asheim et al., 2007, Martin and Moodysson, 2012, Martin and Moodysson, 2011.

different actors within the system. Cooke et al. (1997) defines regional innovation systems as different sectors or even clusters interacting with regional governance and innovation support infrastructure as well as with the national and global levels. Asheim and Isaksen (1997) point out that the regional innovation system denotes regional clusters surrounded by supporting organizations which interact with each other and are embedded in an institutional framework. In more recent definitions, commercialization of knowledge and institutional aspects of the system are put forward. Cooke (2004:3) specifies and enlarges the definition of regional innovation systems as 'interacting knowledge generation and exploitation sub-systems linked to global, national and other regional systems for commercializing knowledge'. Asheim and Gertler (2005) made the institutional aspect most prominent by defining a regional innovation system as an institutional infrastructure supporting innovation within the region. These various aspects of the definitions are reflected in the thesis in different ways. As innovation processes are addressed from the institutional perspective in this thesis, the Asheim and Gertler (2005) definition is most influential because it clearly points out the interrelated nature of innovation processes and institutions. However, it does not contradict the perception of innovation as an outcome of systemic interaction. On the contrary, the institutional framework becomes relevant as it might hinder or facilitate interactions between the actors (Gertler, 2004, Storper, 1997). In addition, from an institutional perspective, it is important to keep the regional innovation system open – interrelated with global and national levels – as institutions are perceived, experienced and changed in an interdependent manner (Scott, 2008, Asheim et al., 2011b).

Regions to which the concept of regional innovation systems can be applied are different. First, there is no single definition of what is meant by the region. It can be defined in terms of administrative region or functional region that does not necessarily correspond to any single jurisdiction (Doloreux and Parto, 2005). Secondly, administrative or functional regions differ in terms of autonomy, governance, presence of research organizations, firms' density and many other aspects. This variety has resulted in an ongoing discussion in the literature on regional innovation systems regarding whether every region has an innovation system or in what way a specific region can be assessed as an innovation system (Doloreux and Parto, 2005). Some of the authors argue that only a few regions in the world can be described as having a regional innovation system and should be seen as on their way to becoming regional innovation system (see e.g. Cooke et al., 1997, Iammarino, 2005), while others think that each region has some kind of innovation system (see e.g. Doloreux and Parto, 2005, Tödtling and Trippel, 2005). (The latter approach is followed in this thesis.) In line with these arguments, different typologies of regional innovation systems are developed to grasp this variety of regional characteristic.

The Scania region is sometimes characterized in the literature as being close to a networked-interactive regional innovation system (Asheim and Coenen, 2005). A networked-interactive system is distinguished by a balance between large and small firms as well as private and public research laboratories. Actors in the region have access to both local and global knowledge sources and research competences ranging from basic to applied research responding to the demands of a variety of different types of firms. The system has a large number of stakeholders and is of a more planned character involving public-private cooperation (see Cooke, 2004, Asheim and Coenen, 2005). Alternatively, using the other typology by Cooke (2004), the Scania region can be also defined as an institutional regional innovation system (IRIS). This system is characterized by strong user-producer interactions, supporting regulatory and institutional frameworks such as public investment in research via laboratories and universities, and a dependence on bank borrowing (patient capital) leading more often to incremental rather than radical innovations. The opposite to an institutional regional innovation system is an entrepreneurial regional innovation system (ERIS), which lacks these strong systemic elements and instead gets its dynamism from local venture capital, entrepreneurs, and market demand, and therefore is characterized by both incremental and disruptive innovation. Since the dynamism comes from venture capitalists, the driving force is a more short-term profit boosting of shareholders rather than the more long-term perspectives of a broader group of stakeholders in an IRIS context (see also Asheim and Coenen, 2006, Cooke, 2001). These two types of RIS, thus, reflect the varieties of the capitalism dichotomy of coordinated (IRIS) and liberal (ERIS) market economies (Asheim and Coenen, 2006, Asheim, 2007a).

Without going into more details, from an institutional perspective it is interesting to note that the main characteristics of a networked-interactive regional innovation systems (as well as other types in that typology) are defined in terms of actors involved (i.e. small vs large firms), type of research performed (i.e. in public or private facilities) and collaboration patterns (i.e. within or outside the region), leaving the concept of institutions implicit to the framework. Different types of networks could possibly point to varying institutions, but it is not explicitly addressed in the literature. Institutions are mentioned in the discussion regarding IRIS and ERIS, but limited to a short note on possibly different norms governing the actors (shareholders' profit making vs. long term interests of shareholders) and the importance of public investment in research in IRIS. Regulative institutions that govern ERIS, such as low taxes and weak labor unions, which are

characteristic of liberal market economies, are not mentioned at all⁵. Furthermore, a conceptual discussion characterizing different types of institutions in different systems is missing. As summarized by Hassink and Lagendijk (2001), studies on institutions within the regional innovation system literature are mainly limited to the impact of the institutional set-up supporting innovation – or more concrete institutional infrastructure supporting cooperation.

Regardless, some authors argue for the importance of going beyond direct support for cooperation. Among those are Amin and Thrift (1995), who argue that economic development is influenced by the broader civic institutions within the regions. This idea is also supported by Scott (1998), who claims that important aspects of democracy are implemented and experienced at the regional level. Increased civic institutions and communal spirit within the region could lead to knowledge exchange and collaboration among different actors, which in turn benefit economic development. Rodriguez-Pose and Storper's (2006) modeling experiment, intertwined with empirical examples, points out that the optimal institutional conditions for any economic development is when social norms, conventions and traditions are balanced with coordinated formal regulations. The next section further specifies the conceptualization of institutions in regional innovation systems.

4.1.2 Institutions in Regional Innovation Systems

The concept 'institutions' is not clearly elaborated in the regional innovation system framework. On the one hand, the concept seems to be central for the framework. The regional innovation system framework has its origins not only in general innovation system literature, but also in regional studies literature and its explanations of the socio-institutional environment from which innovation emerges (Doloreux and Parto, 2005). The basic idea behind this literature is that, in a more and more globalized world, economic reflexivity increases when various actors reflect on economic environment and shape the course of economic evolution, which in turn leads to more uncertainty of economic processes than ever before. Therefore, competitive advantage can be preserved by some unique assets that cannot be easily copied (e.g. traditions, values, communication aspects) and by creating patterns of behavior that facilitate and enable fast responses to a changing environment (see e.g. Storper, 1997, Storper and Scott, 1995, Bathelt et al., 2004, Porter, 1998). However, on the other hand, the elaboration of the term

⁵ The observation regarding the lack of discussions on regulative institutions in ERIS in the works by Cooke (2001, 2004) is inspired by Björn Asheim.

'institutions' is limited in the literature (Doloreux and Parto, 2005). It is usually analyzed either as institutional infrastructure in the form of the presence of different research and funding organizations and technology transfer agencies, or historically formed conditions having something to do with regional traditions or path-dependency (Asheim and Isaksen, 1997, Cooke, 2004, Iammarino, 2005, Iammarino et al., 2008).

Cooke et al. (1997) define three institutional forms that are crucial for the capacity of regional innovation systems: the financing, learning and 'productive' cultures. In order for the regional innovation system to develop its capabilities, it needs good infrastructure and incentives for learning, cooperation (productive culture) and financial sources for innovation (direct support for firms' innovation activities and financing of infrastructures through which different players within the region can exchange knowledge, find collaboration partners, and get access to venture capital). In a later study (Cooke, 2001), the institutional dimension is redefined as co-operative culture, interactive learning and associative consensus, while financing is discussed as a separate (infrastructural) characteristic of the innovation system. However, neither of the papers suggests methodological guidelines or further specification on how to measure institutions. Furthermore, learning, cooperation and consensus making are activities, not institutions per se. Financial structures seem to follow the basic definition of institutions as enablers and constraints for activities mainly referring to the guidelines, regulations and incentives related to financial support for innovation. The definition of learning, productive/co-operative culture and consensus-making as institutions suggests that regions should develop norms, habits and incentives that facilitate learning and cooperation in order to be innovative and competitive.

The Cooke et al. (1997) description of institutions implies that the authors suggest defining and measuring institutions by their outcomes. If actors within a region have a well-developed cooperation network – work in joint projects, have workshops for knowledge exchange, joint databases (just to mention a few possible ways), they will have institutions supporting cooperation. However, beyond these activities there should be certain specific institutions. Some possible examples could be formal, such as financial support rewarding cooperation in the form of research grants for collaborative projects, or informal, such as beliefs that cooperation or learning adds value to welfare. We may imagine a region as a room full of lazy and skeptical or interested and engaged kids. In the latter group existing values can be used and directed towards a variety of learning activities, while the former group has to change its attitude before learning can take place.

As noted by Maskell and Malmberg (2007), measuring institutions by their outcomes may lead to circular reasoning: the cities, regions or nations that do well are those that are equipped with the appropriate institutional structure, while

appropriate institutional structure is found in the territories that perform well. It seems logical that territories that perform well have a well-functioning institutional framework that supports needed activities. However, a lack of activities does not necessarily mean lack of institutions. A lack of activities might be caused by a lack of resources rather than a lack of institutions. Interested and engaged kids might have positive attitudes towards learning, but without appropriate human and financial resources these values alone cannot lead to learning activities.

Asheim and Gertler (2005) support the Cooke et al. (1997) basic argument that knowledge exchange is crucial for a well-functioning regional innovation system. They highlight the interactive and systemic aspects of innovations where innovation is an outcome of cooperation between firms or between firms and research organizations rather than a product or the efforts of one single human genius. Those interactions (or lack of them) are influenced and shaped by the regional institutional framework. The creation of such an infrastructure at regional level (as opposed to national or global) is facilitated by geographical proximity, which is also a proxy for cultural proximity (Gertler, 2004), implying the existence of trust as the basic precondition for the emergence of any collaboration. This idea is also supported by Boschma (2005) who claims that social proximity (defined as trust and commitment-based social relations due to friendship, kinship or experience) is stimulated by geographical proximity, because short geographical distance favors social interaction and trust building. In addition, social proximity is closely related to informal aspects of institutional proximity, such as shared values and habits which are geographically localized, while formal aspects of institutional proximity (laws and regulations) operate at the level of the nation-state or beyond. A certain level of institutional and social proximity of the actors is crucial for knowledge exchange and learning to take place (Boschma, 2005).

To sum up, the discussion on institutions in the regional innovation systems literature suggests that the institutional framework for innovation activities consists of national, global, regional and industry-specific institutions that have a joint impact on the activities of the actors. In addition, it emphasizes the importance of informal institutions such as trust, democratic values and traditions for network creation, knowledge exchange and learning, which in turn influence innovation. However, it lacks a critical discussion on institutions and the conceptualization of institutional carriers.

4.2 Institutions – beyond Regional Innovation Systems

Institutional studies in economic geography have been highly influenced by the conceptualization of institutions in old and new institutional economics (Martin, 2000, Boschma and Frenken, 2006). Old institutional economics rejected the idea of the rational economic man, and regarded habit as crucial for the emergence and sustaining of institutions (Hodgson, 1998). ‘Men’s habits of thought’ (i.e. institutions) provided guidance for action (Veblen, 1898:380). On the other hand, it is in the human action and agency that ‘the motor forces of economic development must be studied if they are to be studied in action at all’ (Veblen, 1898:388). Furthermore, human action could be influenced by changes in the ‘material world’ – e.g. emergence of new technology. In the view of old institutional economics, institutions evolved slowly from individual habits into routines and customs of different communities and groups (Veblen, 1898). Therefore, the focus was on what is now perceived as the informal nature of institutions – habits, routines, customs, traditions – and how they constrain and enable activities by individuals (MacKinnon et al., 2009).

New institutional economics adapts to neoclassical economic theory rather than rejects it (Nee, 2005). It focuses on the emergence of institutions out of the interactions of given (limitedly rational) individuals (Hodgson, 1998, Nee, 2005). Institutions are defined as ‘an arrangement between economic units that defines and specifies the ways by which these units can co-operate or compete’ (North and Thomas, 1970:5), or more broadly as rules of the game (North, 1990). The existence of informal institutions is acknowledged, but usually omitted from models and analyses:

(...) many of these informal institutions have mainly spontaneous origins – which is to say that deliberative choice of a calculative kind is minimally implicated (Williamson, 2000:597).

The main focus is on formal institutions – constitutions, laws (especially property rights), governance structure and resource allocation – and the constraints they impose on organizations and individuals (Williamson, 2000, North, 1990, Nee, 2005). Due to the formal aspect of institutions, the state has a major role in introducing, changing and enforcing institutions (North and Thomas, 1970, Williamson, 2000).

To sum up, both streams of thought perceive institutions as general regularities in social behavior (Hodgson, 1998), but differ in their perception of individuals, degree of formality and relation to neoclassical economic theory⁶.

4.2.1 Institutions or Organizations?

There is no unanimous view in institutional economics on the relation between institutions and organizations. Old institutional economics is mainly interested in the relation between individuals and institutions, leaving organization in a ‘grey’ area of the debate. New institutional economics includes a diverse group of theorists with different views on the subject. North (1990) defines institutions as rules of the game such as laws, norms, habits etc – strictly separating them from organizations and/or individuals (players) who follow (or disobey) the rules. Williamson (2000), on the other hand, inspired by organizational theorists (as suggested by Nee (2005)) include governance structures – markets, firms and other type of organizations – in the definition of institutions.

This duality of definitions is reflected in the economic geography literature. Some of the studies claim that they follow the strict distinction by North (1990). One of the (paradoxical) examples is innovation system literature where institutions are defined as habits, norms, regulations, laws which influence systematic relations between the actors – universities, firms and governmental bodies (Lundvall, 2010a, Edquist and Johnson, 1997, Freeman, 2010, Asheim and Gertler, 2005). However, as indicated by Farole et al. (2013), the analysis of institutions in innovation systems research has mostly focused on institutions as organizations (research organizations, governments, venture capital etc.) rather than more broadly on the institutional environment (the legal system, norms etc.). In other words, the focus is on the institutional infrastructure in the form of the presence of research and funding organizations (as pointed out in the section 4.1.2).

Many other authors include ‘organization’ in the definition of institutions. Amin and Thrift (1995, 1994) developed a term ‘institutional thickness’ that arguably is beneficial for regional development. On the one hand, they perceive institutions as certain interactive patterns among the actors in the region, as well as civil society norms, shared rules and conventions that, through increasing democratization, have a positive impact on the economic development of the regions. On the other hand, institutional thickness also includes the sufficient number (i.e. large enough number to carry out institutions) of firms, training centers, governmental agencies,

⁶ For further discussions on similarities, differences and possible convergence of the two branches see Hodgson (1998) and Nee (2005).

universities etc. This latter characteristic corresponds to the term of ‘organizational thinness’ (Tödtling and Trippel, 2005), referring to the lack of critical mass of organizations in peripheral regions. The same conception of institutions – including both organizational and institutions as defined by North – is later followed by other authors like Henry and Pinch (2001).

The main problem lies not in the definition of an institution as both rule and organization, but in the fact that authors do not usually question the term ‘institutions’ (apart from occasionally mentioning that there is confusion in its use). In some cases organizations (or societies, communities) are presented as both actors or agents (acting in the environment) and institutions (part of the environment), which makes it quite complicated to understand their characteristics and roles. Furthermore, if institutions are rules, habits, routines and organizations, how are all these distinct features related in one phenomenon? The reinforcing relations between formal rules and informal norms and habits have been discussed in economic geography (see e.g. Rodriguez-Pose and Storper, 2006, Amin and Thrift, 1995). However, a discussion on how this relates to organizations as parts of institutions is largely missing. Gronning (2008) provides a literature review discussing the roles of institutions in innovation systems at large, but does not include any references to regional innovation systems literature. Furthermore, when it comes to the relation between institutions and organizations, the review is limited to the summary of existing definitions rather than critical discussion. A broad body of literature around the topic is developing in other social sciences, especially organizational studies (see e.g. Meyer and Rowan, 1977, DiMaggio and Powell, 1983, Scott, 2008).

In early institutional studies in sociology, Sumner (1906) suggests that an institution consists of a concept (idea, notion, doctrine, interest) and a structure. The concept defines the purpose or functions of institutions, whereas the structure provides the tools to put an idea into action. From this perspective, organizational form (e.g. research center uniting researchers from different faculties) puts the idea (value) of cross-disciplinary research into practice. Therefore, maintaining certain types of organizations indicates the preservation of particular values in a society or a community (Selznik, 1984). It is also a way to codify practices and values to make them less dependent on the personal characteristics of individuals (Zucker, 1970).

In an ideal case, each organizational structure should be fine-tuned for the best performance of the activities. Nonetheless, if this can be the case in the initial stages of new organizational forms with increasing diffusion, following certain structures becomes more of a requirement and less of a choice (Scott, 2008, DiMaggio and Powell, 1983). That is, formal structures become manifestations of powerful institutional rules which are binding on particular organizations. The

adoption of a certain form becomes a requirement to achieve legitimacy for activities (Meyer and Rowan, 1977).

Different theoretical schools highlight the importance of enforcement of institutions – the need for a certain degree of compliance and enactment for the institutions to survive and persist (Mahoney and Thelen, 2010, Hall, 2010, Knight, 1992, Berger and Luckman, 1967). Therefore, organizations and institutions can develop in an overlapping manner. On the one hand, organizational forms are the outcomes of regulative frameworks and cultural expectations (DiMaggio, 1988). On the other hand, they are themselves the indicators, revealing enacted existence of regulations and norms (Meyer and Rowan, 1977, Scott, 2008).

Following organizational theorists, Hollingsworth (2000:619) suggests that ‘institutional rules, norms and conventions unfold in tandem with organizational structures’ and therefore organizational studies’ perception of institutions could be useful for institutional analysis of innovation. This idea is also followed by Gertler and Wolfe (2002), who perceive organizations as part of (nested in) institutions in the form of rules, habits and routines in their discussion on innovation and learning processes. The main question is not which definitions and typologies to follow, but how the analysis differs depending on the choices made. One of the important methodological differences lies in the indicators which may be used to measure institutions or carriers of institutions (Scott, 2008). If institutions are rules of the game as defined by North (1990), possible carriers could be different kind of laws, regulations and the existence of certain norms and values in society, such as traditions stemming from religious beliefs, attitudes towards family relations, immigrants etc (examples of measurements can be found in e.g. World Value Survey). However, from the perspective of organizational theorists, next to regulations and norms/values, jobs, organizational forms, roles, and standard operating procedures may be used as carriers revealing constraints and enablers of individuals’ and other actors’ actions and activities (see section 4.3 for the discussion on institutional carriers).

This does not imply that one theoretical approach or a certain definition is better than any other. In simplified terms, both theoretical schools agree that institutions represent fundamental structures in society and define the behavior of individuals and other actors. If organizations (or some of the organizations) are a part of those fundamental structures depends on the research question asked. A practical example of such a choice could be the perception of the Parliament. If the question is what role it plays in defining the functioning of a certain society, it should be treated as an institution. If the research focus of the paper is on the Parliament as an actor making decisions and interacting with other actors, the distinction between institutions and organizations would be methodologically applicable.

The same rationale regarding organizational form is followed in this thesis. Articles 1 and 2 follow North’s (1990) strict distinction between institutions and

organizations, as the primary interest lies in the abilities of regional innovation policies to influence the attitudes and behavioral patterns of the firms within the region. Scott's (2008) insights are applied to the extent that they follow the initial distinction. A similar distinction is followed in Article 4 since organizational form has not turned out to be relevant for sectoral development. Article 3 focuses on novel research organizations within the field of health-care. In this case, organization is nested in an institutional framework (Gertler and Wolfe, 2002). New organizational forms have to break through and develop in relation to the normative environment of medical research practices. Therefore, the insights made by organizational studies about the interrelated character of institutions and organizations are applicable to the analysis.

4.2.2 Evolving Institutions or Routines?

Initially, efforts were made in institutional studies in economic geography to identify two sub-fields – institutional and evolutionary. Boschma and Frenken (2006) summarize the differences and similarities between the two. According to them, in contrast to an evolutionary approach, institutional geography has a primary interest in static analysis; that is, how institutions in certain geographical areas (regions or nations) influence the economic performance of the actors at a given time. Institutional differences between territories lead to differences in economic activities. An evolutionary approach, on the other hand, takes a firm, not a territory, as a point of departure and analyzes how firm specific institutions evolve over time in a path dependent manner.

The article has raised debates in the scientific community. Some authors criticize evolutionary economic geography for high dependence on evolutionary economics, especially the work by Nelson and Winter (1982) (which in turn was highly influenced by evolutionary theories in the natural sciences) and their limited approach to institutions as organizational routines (see MacKinnon et al., 2009). They do not question the arguments stated in the article, but rather doubt the very idea of developing the subfield in economic geography – a separate evolutionary economic geography. MacKinnon et al. (2009) suggest an open approach to institutional theories benefiting from different disciplines e.g. political economy. This corresponds to Hollingsworth's (2000) appeal for a common institutional theory for the whole area of social sciences.

As a response to these debates, Boschma and Frenken (2009, 2011) propose the integration of evolutionary and institutional economic geographies. However, in the proposal for the integration they diminish the concept of institutions to routines (which is in line with some of the arguments of old institutional economics). They claim that a single firm has its distinct routines that may be applied in any

territorial context, and that each territory is characterized by a variety of routines (Boschma and Frenken, 2009). In other words, territorial institutions are nothing more than the sum of organizational routines within a certain geographical space. Therefore, the integration of institutional and evolutionary economic geography would mean the analysis of ‘such routines among firms within and across regions, and determine under what conditions such a diffusion process leads to the institutionalization of these routines at various spatial scales’ (Boschma and Frenken, 2011:302). From the ‘original’ definitions of institutions as rules, laws, norms and habits, they borrow only what they call ‘basic institutions’ (Boschma and Frenken, 2009:155). That is, territorial institutions are limited to property rights, markets, and a judicial system (and some more that are not mentioned), which are the core concepts in new institutional economics. It follows that economic activities are influenced by mainly organizational routines and some very basic formal laws, while the impact of informal social institutions at different geographical level and active participation in the creation of new institutions by e.g. regional authorities are rejected.

This approach seems to have several limitations. Firstly, according to Boschma and Frenken (2009), the emergence of new institutions is mainly possible in relation to new industries which do not have routines yet. However, according to Johnson (2010), sometimes the institutional framework has to be changed before new technologies (and industries as a result) are developed. So how do new institutions emerge?

Secondly, new organizational practices emerge as a response not only to new technologies, but also to other external challenges such as new regulations, social changes (e.g. aging population), changed customer preferences etc. Therefore, those new organizational routines have to find their way through a highly institutionalized environment (Meyer and Rowan, 1977). As pointed out by Hollingsworth (2000), institutions are temporally superior to organizations, as each organization emerges and is shaped by an institutional context which exists prior to its establishment. Still, through establishment and development processes, organizations might change the institutional framework in which they are embedded. Research reveals that the development of new organizational practices of such highly institutionalized fields as health-care would not be possible without state intervention (Bosch, 2010). Therefore, supportive institutions at national and regional levels (e.g. financial support, guidelines for the development, in some cases even regulations) are crucial preconditions for new practices to emerge rather than the other way around, as suggested by Boschma and Frenken (2009). In other words, windows of locational opportunities, in which, according to Boschma and Frenken (2009) new industries emerge, cannot exist as pre-given entities waiting to be filled in by some new industry or new type of organization (and then later supported by State intervention or collective actions). They must be actively created in a conscious manner.

The role of regional political practices, which is at the heart of the Amin and Thrift (1995) argument, is not clearly defined if institutions are conceptualized as routines. Moreover, if institutions are limited to organizational routines, does it mean that governmental authorities do not have the power to change institutional lock-in or institutional thinness? Boschma and Frenken (2009) mention that supportive institutions come into being through state intervention after the emergence of a new industry. Institutions can also develop through collective action by firms, governmental officials and customers. Therefore, there is some scope for public sector actions. Still, in such a case it is not clear how this relates to the definition of institutions as organizational routines.

Finally, when relating the above to a critical realism description of space, the exact re-creation of the same routines seems unlikely. In social science, space is an interesting object of analysis because of the relations and characteristics of objects that occupy it. Whether causal powers are activated and with what effects depends on the objects with which they are in contact (Sayer, 2000). It is very unlikely that, in two different spatial settings, there will be the same configuration of objects with the same characteristics and relations between them. Therefore, an organizational unit situated in a new spatial form will have to use its flexibility and adapt its routines to new conditions. Thus, routines of a single firm can hardly be applied to any territorial context without making adjustments.

Without stating it explicitly, Boschma and Frenken (2009, 2011) try to integrate the concepts of institutions of the old institutional economics (routines) and the new institutional economics (formal regulations and markets). However, the emergence of new routines as a response to new technological artifacts is only one part of habitual evolution. Habits of thoughts also define customs, traditions, and beliefs, which in turn influence economic action (Veblen, 1898). By reducing institutions to organizational routines emerging from new technologies and basic regulations, the authors do not leave space for the impact of traditions and customs. However, according to Scott (1998), the traditions of joint decision making in various communities' issues and other preconditions for local democratic actions are of high importance for regional economic development. The development of such traditions can hardly be explained by organizational routines or basic regulations.

A recent contribution by Gertler (2010) can be interpreted as adding to these debates on the conceptualization of institutions in economic geography. The author points out several aspects which future studies on institutions should take into account. First, there is a need for more dynamic studies in the field; that is, how institutions emerge, develop and interplay with other institutions in different geographical spaces. Second, the role of agency – individual and corporate – should be better elaborated. More concretely, the author calls for more studies

analyzing the possibilities of different stakeholders to influence institutions at regional level. Third, there is a need to explain the processes by which institutions are produced and reproduced at a number of spatial scales and how these influence economic action. Finally, variance in methodological approaches – by which he primarily means the inclusion of comparative studies in the analysis – would be beneficial for a better understanding of institutions.

Some of the points raised by Gertler (2010) correspond to the Boschma and Frenken (2006) criticism of institutional economic geography: static analysis and undermining the role of agency. However, Gertler (2010) suggests a different possible solution; that is, opening up the field for the wider influences of social sciences⁷. He refers to the work by Streeck and Thelen (2005), relating VoC approaches with historical institutionalism tradition, as a notable example in the field. Similar trends can be identified in the author's earlier works such as Gertler (2004) and Gertler and Wolfe (2002). In the former the author defines institutions using the insights by institutional economists, mainly North and Hodgson and historical institutionalists, mainly Hollingsworth. The approach is even broader in the latter where ideas by economists, social psychologists and organizational theorists are included in one theoretical discussion.

4.3 Re-defining Institutions in Regional Innovation Systems

Following Gertler's idea of combining insights from different disciplines within economics and the social sciences, the conceptualization of institutions within regional innovation systems is suggested in this thesis. On a very broad level institutions can be considered as rules, norms, beliefs and procedures that structure (enable and constrain) the behavior of organizations and individuals (Mahoney and Thelen, 2010, Scott, 2008, North, 1990). Following new institutional economics, rules are conceptualized as formal regulations, standards (usually enforced by law), and financing guidelines regulating support for (innovation) activities (North, 1990, Williamson, 2000). Norms are defined as attitudes, values, and legitimate ways of organizing activities, which meet the conventional conception of fairness, i.e. are morally governed (Scott, 2008, Carroll and Hannan, 1989, Hall, 2010). Beliefs represent the cognitive aspect of institutions and

⁷ It can be related to the ideas by MacKinnon et al. (2009), who argue for the inclusion of political economy. However, Gertler (2010) suggests a broader conceptualization of institutions, outside the field of economics.

patterns of behavior that are taken for granted, in most cases without conscious reflection (Scott, 2008, Mahoney and Thelen, 2010). Finally, procedures relate to organizational routines, habitual actions within organizations and communities (Boschma and Frenken, 2009, Veblen, 1898). Gertler (2004) suggests excluding routines and habits from the definition of institutions, as they are the outcomes of norms and regulations rather than institutional conditions. However, they can play a role as enabling or constraining factors of innovation activities, thereby following the tradition of old institutional economics they are included in the definition.

Institutions should be separated from activities and resources (Scott, 2008). Activities such as learning or networking are influenced by the existence (or lack) of previous institutions (i.e. positive/negative attitudes to knowledge exchange). The availability (or lack) of resources by itself does not enable (or constrain) the actions of organizations or individuals. The effective use of resources can only take place when institutions determining the distribution of these resources are in place.

Institutions need different kinds of mediums to be diffused, transmitted and enacted. Scott (2008) refers to such mediums as carriers. Table 1 below summarizes the main carriers for each type of institution discussed above.

Table 1.- Types of institutions and carriers

Types of institutions	Carriers
Regulations	Laws and standards
Norms and beliefs	Traditions/values/attitudes embodied in individuals and their relations, types and forms of organizations
Procedures	Organizational structure, jobs/roles, patterns of interaction, protocols, codified/written rules

Source: own elaboration based on Dimaggio and Powell (1983), Hollingsworth (2000), Meyer and Rowan (1977) and Scott (2008).

Regulations refer to formal institutions. They are usually codified in the form of laws and standards, regulating such things as intellectual property rights, taxation and labour relations (Williamson, 2000). Methodologically, the identification of regulations is relatively unproblematic, since they are codified in written documents and can be analyzed using the methods of text/discourse analysis.

According to Hollingsworth (2000), values and attitudes exist at the level of individuals. Therefore, some of the norms and beliefs that are important for innovation, such as trust, willingness to learn and cooperate, are embodied in individuals and their attitudes. Methodologically the identification of such carriers is more complicated and can mainly be addressed via observation or via interviews where proxies for certain values can be established. As discussed in the

methodology section, the interview method has been chosen for this thesis. In addition, organizations and different types of organizational forms may be considered carriers of norms and beliefs. The kinds of organizations that actors create reflect the norms and regulations of the institutional environment they are embedded in (Hollingsworth, 2000). The establishment of universities would suggest the value of education and research in the society. Evidence of the increasing value of interdisciplinary research can be seen in a new type of organizational structure at universities, uniting researchers from different faculties (see Article 3). Technology transfer offices, agencies for cluster support, research and funding organizations are often included in analysis of the institutional infrastructure of a regional innovation system (Asheim and Isaksen, 1997, Cooke et al., 1997). They are used (without stating it explicitly) as institutional measures for knowledge exchange, willingness to learn and innovate. Still, one should be careful when making a direct link between organizations and certain norms. First, organizations might be isolated from the rest of the actors within a region/sector and their activities might have very limited impact. Therefore, they might be the outcomes of regionalization policies at EU level or the norms of small groups of individuals rather than the mainstream development in the region/sector. The first limitation can be partly addressed by assessing the impact of those organizations on the region/sector, and the willingness of other actors in the region/sector to participate in their activities (see Articles 1 and 2). Second, the lack of organizations for networking and knowledge exchange might be more indicative of a lack of resources rather than negative attitudes to innovation and learning. To address that, it is useful to combine different carriers (i.e. values embodied in individuals and organizational forms) when analyzing norms and beliefs.

Procedures are routinized activities within the organization. The structure of organizations, jobs/roles of its members and protocols for certain activities represent formal routines and practices (Scott, 2008). Since formal institutions are always subjects of interpretations and individual applications (Mahoney and Thelen, 2010), they are underpinned with informal patterns of communication and interaction within and outside the organization.

Procedures are applicable mainly for the organizational level. However, norms and regulations (rules) can range from supranational/national to regional, local and organizational levels. This conceptualization of institutions relates to the idea of an open regional innovation system where institutions at different geographical levels are interrelated. These ideas are further elaborated in the concluding section of the thesis.

4.4 Innovation Policies and Institutions

The perception of the role of policy in innovation processes differs in the literature. Some of the authors argue that market mechanisms are very effective discovery processes, the results of which cannot be improved by policy makers. In addition, due to bounded rationality, we cannot have certain knowledge about the future. Therefore, the effectiveness of long-term policy aiming at restructuring and innovation is questionable (for the discussion see Dalum et al., 2010). However, uneven regional development, the need for conscious actions to bridge science-based and user-inspired activities, and the increase of knowledge stock at the expense of social cohesion point to (the possibility of) market failure and the need for policy intervention (Edquist, 2001, Oughton et al., 2002).

It is interesting that modern theoretical developments regarding innovations are highly influenced by policy documents related to the support for innovation activities – Vannevar Bush report mentioned earlier. Bush (1945) saw the role of the public sector (government) primarily as an investor in basic research and education. This perception influenced the development of innovation policies for a long time; the primary focus was on R&D investment and technological development, or in other words the supply side of innovations (Morgan, 1997, Asheim et al., 2011a). However, this approach is highly criticized as investment in science and technology alone, neglecting the role of absorptive capacity and learning, cannot provide desirable results, especially in lagging or less developed regions (Morgan, 1997, Henry and Pinch, 2001, Oughton et al., 2002, Asheim et al., 2011a). Regional innovation systems and constructed regional advantage (CRA) provide not only an alternative way to understand metamorphosis in economic growth, but also a strategic policy perspective of practical use to firms, academics and policy makers (Uyarra, 2010, Cooke and Leydesdorff, 2006). The idea of CRA implies that it is not sufficient to expect that competitive advantage of the region will be automatically created through the collocation of relevant actors. Instead, it should be pro-actively constructed, taking into account sectoral and regional specificities. It also argues that public sectors (including universities) should take more active roles in cooperation with the private sector (Asheim et al., 2007, Asheim, 2007b, Asheim et al., 2011c). This perspective naturally implies an important role for regional innovation policies, which should reduce the interaction deficits of the actors in the system and enlarge absorptive capacity. The basic rationale is to strengthen innovation capabilities within the region by promoting knowledge exchange and diffusion (Cooke and Leydesdorff, 2006, Uyarra, 2010). However, the ways in which such promotion could take place and be effective vary.

Most of the empirical analysis of regional development is based on the success stories of so-called 'holy trinity' regions – Silicon Valley, the Third Italy, and Baden-Württemberg, which came to be regarded during the late 1980s and early 1990s as archetypal or 'paradigmatic' in various respects (Malmberg and Maskell, 2002). This led to 'one-size-fits-all' regional policies and numerous failed attempts to recreate Silicon Valley ignoring the initial conditions of the region (Amin, 1999). Recent studies advocate more customized policy approaches. Schwerin and Werker (2003) and Iammarino (2005) highlight the importance of historical contingency in the policy making process. A better understanding of historical processes strengthens the knowledge base upon which policy is built, and facilitates the empowerment of future decisions. This idea is also supported by Boschma (2004), who argues that the impact of regional policy increases if it is embedded in the surrounding institutional environment. Tödting and Trippel (2005) suggest that barriers to innovate depend on the type of region: peripheral, old industrial or metropolitan. Therefore, regional innovation policies should be constructed taking this diversity into account.

Despite the demand for a more customized approach, regional policy guidelines are quite generic. The main message sent by academic work is that regional innovation policy should support network creation within the region (e. g. Schwerin and Werker, 2003, Boschma, 2004, Cooke et al., 1997, Lambooy and Boschma, 2001) and at a global level (Asheim and Gertler, 2005, Cooke et al., 2000). More often than not the importance of university-industry links is highlighted in the creation of well-functioning RIS (Cooke et al., 2000). However, the argument that various industries tend to network differently in geographical and organizational terms, and that regions differ according to their networking experience, remains implicit in the texts.

One of the attempts to include this diversity is the knowledge base approach. As already mentioned, industries and/or firms can be characterized by critical knowledge which the knowledge creation and innovation processes cannot do without; i.e., a specific knowledge base that is analytical, synthetic and symbolic (Asheim et al., 2007). The differences are defined based on the importance of the relations with universities, the degree of codification and the networking characteristics among the actors. The challenge for policy makers is to define what types of industries and/or firms are present in the region, and to fine-tune innovation policies based on their networking and knowledge organization characteristics. For instance, the facilitation of knowledge exchange with universities is relevant for industries where an analytical knowledge base is critical, but of little importance where a symbolic one dominates (Martin and Moodysson, 2012). However, knowledge base approach should be combined with the institutional specificities of a region as a whole when innovation policies are designed (Asheim et al., 2011a, Tödting et al., 2011). For example, organizationally thin peripheral regions should design the policy that mainly

focuses on one knowledge base, while locked-in old industrial regions need a policy that promotes diversification of knowledge bases. Finally, fragmented metropolitan regions would benefit from innovation policies that strengthen the connectivity between analytical, synthetic and symbolic knowledge base activities (Martin and Trippl, 2013).

Taking the diversity into account might lead to fragmentation of regional innovation policy. There is a risk that, instead of responding to the needs and demands of a variety of firms and industries, innovation policies will become another name for industrial/sectoral policies dividing rather than uniting regional actors (Uyarra, 2010). Asheim et al. (2011c) aim at solving this dilemma by suggesting the concept of platform policies. These kinds of policies would be primarily focused on bringing together different but related activities based on resources and needs available in the region. This could be done by establishing networking places for representatives of related sectors, supporting labor mobility as well as encouraging related labor inflows from other places.

When analyzing regional innovation systems from the institutional perspective, it is important to discuss the relation between policies and institutions. Hollingsworth (2000) defines policies as one of the outputs of the institutional components of society, and therefore still part of institutional structures which are most open and susceptible to change. Different regional innovation policy initiatives are indeed discussed from an institutional perspective (Iammarino, 2005, Boschma, 2004, Schwerin and Werker, 2003), but this does not necessarily mean that policies are institutions. The basic rationale of institutions followed in this thesis is that they enable or constrain the behavior of organizations and individuals. When policies have an impact on the patterns of behavior, they become institutions or, in other words, are institutionalized.

One could think about several reasons for the emergence of regional innovation policies. EU policies and directives for regionalization (also urging regional innovation policies), and developments in social scientific research highlighting the importance of innovation and knowledge in achieving competitiveness in the actual 'real world' are just two of several structural changes in the environment in which regional innovation policies (at least in the European context) emerge. However, if the actions related to these policies do not achieve the goals stated, innovation policy becomes only a piece of paper or a website stating the need and encouragement of learning and cooperation. Using Scott's (2008) vocabulary, policies are dead (meaningless) if they are only represented in verbal designations. They have to be brought to life by human conduct or they lose their meaning as enablers and constraints of innovation activities. In other words, policies acquire meaning only through application to its target population, or, using the terminology of Amin and Thrift (1994), through institutionalization. Put in simple

terms, unless firms and other actors in the region are aware of existing policy programs, engage in their activities and actually start collaborations and knowledge exchange activities, regional innovation policy is nothing more than a failed incentive. This separation between regional innovation policies and institutions is important not only for purely conceptual matters, but has practical implications as well. Further specifications of the conditions under which the target population (actors in the region) internalizes regional innovation policies would add to the effectiveness and better implementation of policy programs. (These aspects are further elaborated in Articles 1 and 2 in the thesis⁸.)

4.5 Summary of the Conceptual Framework

The aim of the thesis is to advance knowledge about the role of institutions in innovation processes within regional innovation systems, taking into account institutional variety in terms of types (i.e. regulations, norms, procedures) and geographical levels (i.e. regional, national, global). In order to compose a conceptual framework consistent with the goal, a variety of theoretical approaches developed within innovation studies, organizational studies, economics and economic geography is used. All of them are connected by a ‘red thread’ of the institutional perspective and overarched by the regional innovation system approach. More concretely, the innovation system approach is combined with in-depth characteristics of an institutional variety. In this way innovating actors – firms, research organizations and public authorities – as well as the institutional environment are included into one stylized conceptual framework. According to this framework, innovating actors are regional, but the institutions they are influenced by consist of rules, norms, beliefs and procedures at different geographical levels. The openness of the regional innovation system is conceptualized as interrelated institutions at regional, national, global, sectoral and organizational levels. Furthermore, organizational diversity is accounted for by using the knowledge base (i.e. analytical, synthetic, symbolic) approach. Such conceptual framework enables a better informed analysis of the complex role of institutions in various innovation processes within the system.

⁸ The conditions under which policies become institutions are elaborated and empirically applied in Article 2 in the thesis. The clear distinction between policies and institutions is missing in Article 1. The doctoral thesis is a learning process and this argument was not developed at the time Article 1 was written. The realization that there is a need to define the conceptual relation between institutions and policies is one of the outcomes of the analysis in Article 1.

Chapter 5: Findings, Conclusions, and Outlook

This chapter provides an overview of the main findings of the articles included in the thesis, presents general conclusions and finally discusses future research regarding institutions in regional innovations systems and advancement of innovation policies.

5.1 Summary of the Findings

Articles 1 and 2 of this thesis are oriented towards analyzing innovation support programs for three industries (Media, Life science and Food) in Scania, and their impact on the innovation practices of their respective target industry. Empirically this is done via in-depth interviews with representatives of the initiators of innovation support programs, and via structured interviews with firms in the respective industries. In line with some previous studies on innovation policies, the findings reveal that innovation policies are very generic, providing similar types of support regardless of the specificity of the industry. The organizations responsible for the initiation and execution of those programs are semi-public and include both public and private actors. Nevertheless, from a regional innovation system perspective (which is the overarching framework for this thesis), these two papers are attempts to assess the effect of public regional authorities on the innovation activities of the region. Although drawing on the same empirical material, these two articles assess the programs from somewhat different perspectives and are, therefore, complementary.

Article 1 deals with institutional conditions in regional innovation systems. The analysis of the cases is based on the assumption that there are certain profound differences with regard to the normative and cognitive institutions of the compared industries. The core question is whether different regional policies targeting these different industries are taking institutional differences into account, and what consequences these bring in terms of success or failure of the policies carried out. The article compares the three most available benefits of the policy support program with what companies perceive as the most important support for their activities. In all the cases a mismatch is identified between the provided and demanded support. In the media case the three most available benefits, all connected to knowledge sourcing, are usually handled by the companies through informal channels and personal networks. Financial support and help with human development are perceived by the companies as the most important factor for innovation activities. However, such help is hardly provided. In the case of life

science, the three most available benefits are access to market knowledge, sharing of laboratories and sharing of knowledge with customers. The most demanded are financial support, help to find partners and education and training of employees. However, the support program lacks the competences and resources to meet such demands. In the case of the food sector, the policy initiative foremost helps firms and the university to find each other, and partly adds to human resource development and technological knowledge improvement. The companies' top needs and demands are financial support, help with human capital development and information about new technologies. Although there is no apparent, large mismatch between the provided and demanded benefits, the biggest issue in the case of the food sector is a lack of awareness of the support program.

In all three cases, policy initiatives are not intervening with regulative institutions, but are rather seeking to implement new norms within the industry – mainly positive attitudes towards networking and knowledge exchange among participants. The main tool used for achieving that is the creation of meeting places for social interaction. The specific nature of networks in each industry is ignored. The paper concludes that regional policy makers should take differences between the industries seriously into account and broaden the focus of their activities (going beyond network creation). In order to do that, there is a need for better defined tools to evaluate companies' needs and demands. Furthermore, the position of regional policies in the institutional framework of the region should be better conceptualized.

Article 2 further develops the issues raised in Article 1. It develops and applies a theoretical framework enabling the conceptualization of regional policies in an institutional setting, as well as discusses the tools for the evaluation of companies' needs and demands. The basic argument is that although demands can be assessed via surveys and other kinds of communication with the companies, characteristics of the critical knowledge base can be used as a tool to define the needs of the actors in different industries. For the innovation policy to be institutionalized, both needs and demands of the companies should be taken into account. The three industries (life science, food and new media) under study are classified (respectively) as dominated by analytical, synthetic and symbolic knowledge bases.

The findings reveal that there are big differences with regard to the needs and demands and perceived benefits among the actors representing the three industries. All three policy initiatives focus on network promotion between local firms and between firms and universities. However, firms drawing on different knowledge bases are characterized by different geography of networks. Local networks for social interaction are suitable for symbolic knowledge base dominated industries (media). However, they are much less beneficial for analytical industries (life science) that primarily focus on knowledge sourcing from global networks, and for synthetic industries (food) for which the national level is the most important one.

Relations with a university, on the other hand, are of primary importance for the analytical life science industry, but of lower importance for the synthetic and symbolic ones. Support in the form of information on new technologies is primarily demanded by the moving media and food industries, but is of little interest to actors in the life science industry. This demand is largely neglected by all the policy support programmes, and, to the extent that it is promoted, scientifically based knowledge is strongly predominant. This is somewhat paradoxical since such knowledge is most relevant to the actors not demanding it (i.e. the life sciences), whilst the actors demanding it (food and media) can neither absorb it nor let it feed into their current innovation and product development strategies, which are largely based on non-scientific knowledge.

This failure to take needs and demands into account while constructing regional policies suggests that normative patterns of the actors are hardly considered. Furthermore, in the case of the food industry, there seems to be a mismatch between needs and demands. Network stimulation from outside is not demanded by the companies, but increased collaboration is indeed needed to break path dependency and stay competitive on an increasingly global market. It follows that, in order to introduce new norms, policy makers should first address the cognitive framework of the industry by spreading information about the program and reaching out to a larger number of industry representatives. Therefore, a fine-tuning of activities and a more target-oriented way of communicating these are necessary components in a strategy to make such policies really influence the institutional framework of the regional innovation system.

In Article 3 the focus shifts from regional authorities to research organization. The theoretical framework of the paper draws on innovation studies and new institutionalism in organizational studies. As pointed out in the methodology section, space only exists through the relations of the objects that occupy it. It follows that regions (e.g. Scania) and their innovation systems develop and renew themselves when actors and their relations change (Tödtling and Trippel, 2012). This paper adds to the regional innovation system framework by analyzing how one of the actors in the system (research organization) renews itself. Furthermore, it focuses on relations between individuals and institutions in the innovation process – the topic which has been neglected in regional development and innovation system literature (Sotarauta and Pulkkinen, 2010).

The object of analysis is a cancer research center with a novel organizational structure uniting researchers from three different faculties and clinicians under one roof. In other words, the focus of analysis is on the process of organizational change. From an institutional perspective, organizational change is a more interesting object of analysis than technological (product) innovations. Research and contribution to the development of basic technologies are among the classical

tasks of university researchers. Such tasks do not need the deviation from established institutional frameworks. However, establishing an organization that crosses historically formed boundaries of different units (organizational change) requires enabling institutions and capable individuals. In other words, the fact that scientists develop new technologies is not novel. What is novel is the constellation in which the research is done.

The findings reveal that specifying diversity in respect to level and type as well as incentive and function allows the identification of different kinds of relations among institutions – reinforcing, complementary, and contradictory. Institutions are reinforcing when they provide similar incentives via similar functions. National and regional regulations create an incentive to engage in interdisciplinary activities at the interface of university research and clinical practices. They do so by providing guidelines for access to financial resources and physical infrastructure. Therefore, national and regional regulations reinforce each other.

Institutions are complementary when they provide similar incentives via different functions. The regulations mentioned above are complemented by the global norms of the epistemic research community, regional and organizational (at the center level) norms and procedures as well as global regulations regarding intellectual property. All these institutions provide an incentive to engage in interdisciplinary research and innovation. Notwithstanding, they perform different functions. Global norms set the agenda for new research techniques and constellations. Global regulations provide guidelines for intellectual protection and allow benefiting from research results. Regional norms encourage positive attitudes to innovation activities. Organizational norms (at the center level) and procedures provide guidelines for daily practices and joint conventions regarding expectations of research results.

Institutions are contradictory when they create opposing incentives. Administrational rules at a university with strict division into faculties and routine-based clinical practices provide the incentive to preserve existing organizational structure and contradict all the other institutions, discussed above, that create positive incentives for the creation of interdisciplinary center uniting researchers from different faculties and clinicians under one roof.

Although different types and levels of institutions have a joint impact on individuals, some are more prominent than the others in different phases of the change process. For example, in the early phase (preconditions), national and regional regulations as well as global norms of an epistemic community are most influential since they create institutional opportunities which are later enacted by individuals. Administrative rules at university are present during the whole process of organizational change, but they become most prominent during the establishment phase, since all the decisions related to the formalities of the unit then have to be made. After the actors decide how to respond (in this case through

formal adaptation) the contradictory aspect of institutions does not interfere anymore with their daily practices. Similarly, the actors are aware of the existence of the global protection of intellectual property rights throughout the process, but they are influenced directly by those institutions only when they have technology to patent.

The capabilities of individuals to enact institutional opportunities and overcome hindrances depend on their professional and personal characteristics. Professional characteristics refer to position in the organization and work experience. The professional characteristics of innovating individuals under study enable them to mobilize other relevant actors as well as provide the expertise crucial for the decision making process. In addition, personal characteristics such as open-mindedness, willingness to learn and collaborate are also important, supporting the ideas of previous studies that the personal qualities of innovating actors are important.

Article 4 further analyzes the role of diverse institutions in innovation processes within firms in the food sector in Scania. The diversity of actors in the food sector is captured by referring to the knowledge base underlying the innovation activities. It is argued that institutions provide incentives for innovation activities or lack of them. But since regions are places where different levels and types of institutions meet, the incentives created by this complex institutional framework might be both harmonious and contradictory. Companies' responses to those incentives vary depending on the characteristics of the knowledge base.

Three alternative development paths are identified in the analysis. In the first path companies use the combination of analytical and synthetic knowledge bases, which leads to the introduction of high value added products with health benefits. In other words, in order to develop such products, companies need to know why certain qualities lead to healthy benefits (analytical knowledge), and how to turn them into a product with the right consistency and taste (synthetic knowledge). The companies respond to the institutional incentives by radical innovation.

In the second path companies mainly respond to institutional incentives by incrementally advancing products – changing flavors or packages. The challenge in this development could be finding the right ingredients to guarantee a long shelf life when a new taste is added. Therefore, innovation processes are based on trial and error (synthetic knowledge base) from mainly one field of competence. This path can be characterized as incremental innovation path.

In the third path innovations are introduced because of new production technologies that enable firms to process food in a new way – i.e. frozen or chilled food. In order to develop such products, knowledge is needed regarding food characteristics (how food changes while processing) and actual technology

(freezing equipment, storage, and distribution). Therefore, the companies draw on a synthetic knowledge base, but it comes from two different fields of expertise (not one as in the second path). The companies follow the path of diversification and process innovation.

All of these companies are embedded in the same regional and industrial infrastructure, but their development paths differ. Sweden's membership in the EU has created incentives to compete in an open and less regulated market than before. The companies following the first path have responded by introducing very specialized high value added products – competition through quality and/or new type of product. Firms following the other two paths compete mainly through price reduction. However, if in the second path it is done by reducing the margins, in the third path the process is upgraded in order to increase efficiency. Growing consumer interest in health creates an incentive for developing healthy product alternatives. Companies innovating via combinations of analytical and synthetic knowledge bases respond by developing functional food, while companies innovating through incremental improvements in one field of synthetic knowledge launch 'not unhealthy food' – with less sugar, salt or fat. Finally, the combination of different fields of expertise leads to products processed in healthier ways than before. Shopping and consumption habits create an incentive for minor variation, as consumers are not very willing to change their routines. The companies combining knowledge bases (paths 1 and 3) might either create new habits or move to path 2 where products are changed only slightly.

This paper reveals the complexity of the regional institutional framework where the same kind of institutional incentive might have a different effect on innovation depending on the knowledge base of the actors. Furthermore, the findings support the idea that institutions can be harmonious or contradictory. EU membership and health trends are triggers for functional food development, while shopping and consumption habits are perceived as the biggest barriers. This has important implications for innovation policy since it provides a conceptualization of diversity at organizational and institutional levels. Currently, different policy initiatives at national, EU and regional levels promote convergence of food and health and the relation between industry and university. However, this is mainly relevant to the actors combining analytical and synthetic knowledge bases. Therefore, it does not reach out to a lot of other actors in the region who innovate along the two other paths where collaboration regarding process technologies or ingredient characteristics is much more relevant. Furthermore, since diversity at the institutional level leads to contradicting incentives, different institutional influences should be considered when designing regional innovation policy. Therefore, policy efforts to change firms' routines will have little success if other institutions such as consumer habits are not taken into account.

The findings of Articles 3 and 4 relate to the theoretical arguments of the open regional innovation system (Asheim et al., 2011b). In Article 3 organizational

change is initiated and developed in the region. Collaboration by the individuals responsible for organizational innovation is facilitated by geographical proximity (among other factors). However, their actions are influenced by institutions at different geographical levels, as are conditions for innovation within the region in Article 4. This is in line with the findings of previous studies; i.e., that regions are the places where different types and levels of institutions meet. However, articles 3 and 4 take this argument further by revealing how the interaction of diverse institutions influences the possibilities of innovation at the micro level of the individual and organization. They conceptualize the diversity of relations between institutions (harmonious, reinforcing, complementary, contradictory) and relate those to individual and knowledge base characteristics.

Table 2 below provides a summary of the four papers with respect to the aim, theoretical framework, object of analysis, aspect of regional innovation system and main findings.

Table 2: Overview of the papers

Article number and Title	Aim	Theoretical framework	Object of analysis/Aspect of RIS	Main findings
1. Institutional Conditions and Innovation systems: On the Impact of Regional Policy on Firms in Different sectors	<p>To assess how regional and industry-specific institutions affect the behavior of their target population (the actors of the system) and in what ways regional policy can contribute to shaping such conditions</p>	<p>RIS Institutional theory</p>	<p>Three innovation support programs in Scania region/Regional authorities</p>	<p>Different industries have different innovation practices; innovation support programs mainly focus on social networking; policy impact on the network formation is very limited.</p>
2. Regional Innovation Policy Beyond 'Best Practice': Lessons from Sweden	<p>To assess the needs and demands made on innovation policy by actors representing different industries and the extent to which existing regional policy programs have managed to meet those needs and demands</p>	<p>RIS Knowledge base Institutional theory</p>	<p>Three innovation support programs in Scania region/Regional authorities</p>	<p>Needs and demands differ in regard to knowledge base; policy does not take that into account; policy is not an effective part of regional institutional framework.</p>

<p>3. Organizational Change within Medical research in Sweden: On the Role of the Individuals and Institutions</p>	<p>To explain how organizational change within medical research evolves and is influenced by different types of institutions at different geographical levels as well as what characteristics of the key individuals are important in enacting institutional opportunities and overcoming hindrances.</p>	<p>Innovation studies Organizational studies</p>	<p>Novel cancer research center/Research organization</p>	<p>The relations between institutions influencing innovating individuals can be contradictory, reinforcing or complementary; individuals enact opportunities and overcome hindrances due to their professional and personal characteristics</p>
<p>4. Multiple Paths of Development: Knowledge bases and Institutional Characteristics of the Swedish food Sector</p>	<p>To analyze the development of the food sector in southern Sweden focusing on the relation between institutions and innovation practices while taking into account the diversity of the actors</p>	<p>Innovation studies Knowledge base Institutional theory</p>	<p>Food industry/Firms</p>	<p>Institutional framework provides harmonious and contradicting incentive structures; Because of the knowledge base companies respond differently to the incentives.</p>

Source: Own draft

5.2 Conclusions, Policy Implications and Outlook

The aim of this thesis is to advance knowledge about the role of institutions in innovation processes within regional innovation systems, taking into account institutional variety in terms of types (i.e. regulations, norms, procedures) and geographical levels (i.e. regional, national, global). It focuses on how institutional influence changes as the innovation process develops, as well as on the role of regional authorities in changing institutional conditions for the actors (firms and research organizations). In order to do so, a theoretical framework is developed to relate the insights from regional innovation systems to other institutional theories. Innovation is perceived as a cumulative process where the interaction of different kinds of actors is crucial (Asheim and Gertler, 2005, Edquist, 1997). Analyzing innovation processes organizational and institutional diversity is taken into account. Organizational diversity is addressed in several ways. First, the separate articles of this thesis analyze distinct aspects of the innovation system: regional authorities, research organizations, and firms. Furthermore, the diversity of the firms is specified from a knowledge base perspective. Due to knowledge base characteristics, firms innovate differently, implying that they also need different institutional conditions (see Figure 1 below).

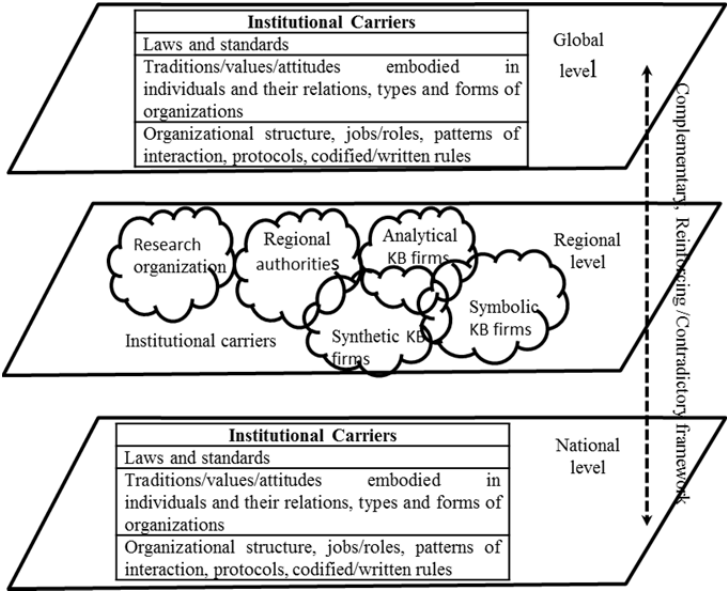


Figure1: Institutional and organizational diversity in the region.
 Source: Own draft

Institutions in this thesis are defined as rules, norms, beliefs and procedures that structure (enable and constrain) the behavior of organizations and individuals (Mahoney and Thelen, 2010, North, 1990, Scott, 2008). Following the idea of open regional innovation systems (Asheim et al., 2011b, Hayter, 2004), institutional diversity is addressed not only with regard to the type of institution (regulations, norms, routines), but also with regard to geography – global, national, regional. In other words, the institutional framework influencing conditions for innovation within a region consists of regional, national, global rules, norms, traditions and beliefs as well as organizational routines (see Figure 1).

This thesis makes a contribution to the field of economic geography by providing a detailed analysis of the role of different types and geographical levels of institutions in innovation processes of firms and research organizations within a regional innovation system. It partly corresponds with the observation by Scott (2008) that different types of institutions have a joint impact on activities. Although this holds for the innovation process as a whole, Article 3 reveals that some institutions are more relevant than others in different phases of the process. Interestingly, in the case of small scale (organizational) innovation, contrary to expectations, institutions primarily serve as enablers rather than hinderers, although some institutional barriers are identified. Different types and levels of institutions reinforce and complement each other, creating opportunities that are observed and enacted by individuals. More concretely, institutions at different levels perform different functions (enable access to finance, provide a regulative framework for protecting research outcomes, encourage actors through a positive attitude to innovation) that together create an incentive for individuals to establish a new type of organization. Individuals, on the other hand, are able to take advantage of opportunities due to their personal characteristics, position in the organization and networks.

Both harmonious and contradictory aspects of institutional frameworks can be identified in large scale change processes. As follows from the findings in Article 3, an institutional framework seems to support small scale deviation (such as establishment of a new type of research unit within the university), but hinders large scale change (such as changes in clinical practices). This idea is further developed in a discussion on the process of sectoral change in Article 4. Although embedded in the same institutional framework, innovation processes of the firms in the sector differ. This variation is influenced by organizational and institutional diversity in the region. Due to the organizational diversity (specified by knowledge base(s) critical to innovation activities), firms respond to the same institutional incentive (i.e. competition in a global market) differently (i.e. value added products vs. reduced prices).

The conclusion that can be drawn is that institutional diversity with boundedly rational diverse actors leads to multiple paths of development within a region (see

Figure 1). Since institutions have different incentives and functions, they can complement, reinforce or contradict each other while influencing innovation processes in the region. Organizational (i.e. critical knowledge base) and individual (i.e. position in the organization, personal qualities) characteristics lead to different responses to institutional incentives by the actors. Consciously or not, the actors choose how to use existing institutions for their activities. They might choose to enact the opportunities for innovation provided by institutional framework, overcome eventual hindrances or ignore them. In this way, this thesis does not only support, but also further develops the argument that regions are open systems where innovation processes are influenced by institutions from different territorial levels.

The institutional framework of regional innovation systems is not ‘something out there’ supporting or hindering innovation, but a complex framework of contradictory and harmonious relations between different types of institutions at different territorial levels. Furthermore, since innovation processes stretch over time, the institutional framework influencing it is also dynamic. Institutions that are crucial enablers at the initial stages of innovation might lose their impact at later stages, while other enabling or hindering factors become more important. Therefore, the institutional framework of regional innovation systems should not be described as one solid entity, but in relation to concrete innovation processes, taking time and space dimensions into account.

The aim of regional innovation support programs is to encourage firms to respond to institutional incentives in a way which is beneficial for regional development. They aim to influence normative institutions within the firms/sectors and promote innovation, knowledge exchange and learning. However, in order to achieve the aim (to become institutionalized) they have to take the needs and demands of their target population into account. Knowledge base characteristics can serve as important tools to define firms’ needs, such as critical sources of knowledge, collaboration patterns, and sensitivity to geographical distance. Concrete implications of the use of a knowledge base for constructing a regional support program might vary, as suggested in the articles of this thesis. In Article 2 one critical knowledge base is assigned to the whole industry (i.e. the food industry is associated with a synthetic knowledge base). In Article 4 different combinations of knowledge bases in the innovation activities of firms in the food sector are highlighted (although a synthetic knowledge base is present in all the combinations). A conclusion that may be drawn here is that general guidelines for industry development can be established by following one critical knowledge base for the industry. However, concrete implementation of the policy would benefit from fine-tuned firms’ characteristics – combinations of different knowledge bases in innovation activities. In this way, the diversity of actors within a region can be taken into account, not only across sectors, but also within a sector.

Furthermore, institutional diversity also matters when creating different innovation policies. As discussed in this thesis (see also Figure 1), the institutional framework for innovation activities consists of regional, national and global institutions, which can be harmonious (reinforcing/complementary) or contradictory. When implementing innovation programs, policy makers should take into account those institutions that are in line as well as those that contradict policy goals. The promotion of the development of high value added products via collaboration with a university has been compatible with increased competition since membership in the EU. However, EFSA regulations, which make the marketing of such products complicated, and high risk avoidance by firms are contradictory institutional incentives (see also Article 4). These issues should be taken into account (i.e. via promotion of shared risk collaborations between partners in an innovation process; marketing support or raising the issue at EU level via representatives from the region) for the innovation policy to succeed.

In addition, two important policy implications follow from Article 3. First, policy makers should create possibilities not only for the development of new technologies, but for new ways of organizing research as well, because the change in organizational form might lead to significant technological innovation with social importance. Still, new organizational forms need enabling institutions to emerge. Second, when evaluating grant applications, next to infrastructure and professional capabilities, the assessment of personal characteristics and networks of the individuals involved are important.

In the theoretical framework of this thesis the difference between institutions, resources and activities is highlighted. In addition, a list of institutional carriers is developed. These insights inform the data collection process (when institutional influences are addressed) and are implicitly used in the articles (i.e. the differentiation between events/activities and institutions influencing those events in Article 3). Future research could make more explicit use of this theoretical development. Possible future research could focus on how existing institutional frameworks influence the access to and distribution of resources, and what impact there is on the innovation activities of these processes. Such analysis would facilitate the identification of bottlenecks in the innovation system – lack of resources vs lack of (or inappropriate) institutions for their distribution – which in turn could inform the policy agenda.

Different types of institutional carriers for each type of institutions are suggested in the theoretical framework of this thesis. Institutional carriers are fundamental for the analysis of institutional change (Scott, 2008). Relating to the discussion on critical realism, it can be argued that institutional evolution (the real) can be observed via change of the carriers (the empirical) – changes in the values, organizational forms, standards and laws. In other words, the only way we can observe institutional change is via the evolution (emergence, development and decline/renewal) of the carriers. Institutional change is one of the aspects in the

evolution of regional innovation systems (Tödting and Trippel, 2012). Therefore, conceptualization and analysis of institutional change via carriers would add to development of the dynamic approach in regional innovation systems research.

References

- 1996:1414. Lag (1996:1414) om försöksverksamhet med ändrad regional ansvarsfördelning. In: FINANSDEPARTEMENTET (ed.) *1996:1414*. Stockholm.
- ALVESSON, M. & SKÖLDBERG, K. 2009. *Reflexive Methodology: New Vistas for Qualitative Research*, Los Angeles, Sage.
- AMIN, A. 1999. An Institutional Perspective on Regional Economic Development. *International Journal of Urban and Regional Research*, 23, 365-378.
- AMIN, A. & THRIFT, N. 1994. Living in the Global. In: AMIN, A. & THRIFT, N. (eds.) *Globalization, Institutions, and Regional Development in Europe*. Oxford: Oxford University Press
- AMIN, A. & THRIFT, N. 1995. Institutional Issues for the European Regions: From Markets and Plans to Socioeconomics and Powers of Association. *Economy and Society*, 24, 41-66.
- ASHEIM, B. 2000. Industrial Districts: The Contributions of Marshall and Beyond. In: CLARK, G. L., FELDMAN, M. P. & GERTLER, M. S. (eds.) *The Oxford Handbook of Economic Geography*. Oxford New York: Oxford University Press.
- ASHEIM, B. 2006. Economic Geography as (Regional) Contexts. In: BAGCHISEN, S. & SMITH, H. L. (eds.) *Economic Geography: Past, Present and Future*. London New York: Routledge.
- ASHEIM, B. 2007a. Differentiated Knowledge Bases and Varieties of Regional Innovation Systems. *Innovation: The European Journal of Social Sciences*, 20, 223-241.
- ASHEIM, B. 2007b. Regional Environment for Innovation and Entrepreneurship. In: POTTER, J. & MIRANDA, G. (eds.) *Entrepreneurship and Local Innovation Systems in Cantabria, Spain*. Paris: OECD.
- ASHEIM, B. & COENEN, L. 2006. Contextualising Regional Innovation Systems in a Globalising Learning Economy: On Knowledge Bases and Institutional Frameworks. *Journal of Technology Transfer*, 31, 163-173.
- ASHEIM, B., COENEN, L., MOODYSSON, J. & VANG, J. 2007. Constructing Knowledge-based Regional Advantage: Implications for Regional Policy. *Int. J. Entrepreneurship and Innovation Management*, 7, 28-43.
- ASHEIM, B. & GERTLER, M. S. 2005. The Geography of Innovation: Regional Innovation Systems. In: FAGERBERG, J., MOWERY, D. S. & NELSON, R. R. (eds.) *The Oxford Handbook of Innovation* Oxford New York: Oxford University Press.
- ASHEIM, B. & ISAKSEN, A. 1997. Location, Agglomeration and Innovation: Towards Regional Innovation System in Norway? *European Planning Studies*, 5, 299-330.
- ASHEIM, B., MOODYSSON, J. & TÖDTLING, F. 2011a. Constructing Regional Advantage: Towards State-of-the-Art Regional Innovation System Policies in Europe? *European Planning Studies*, 19, 1133-1139.

- ASHEIM, B., SMITH, H. L. & OUGHTON, C. 2011b. Regional Innovation Systems: Theory, Empirics and Policy. *Regional Studies*, 45, 875-891.
- ASHEIM, B. T., BOSCHMA, R. & COOKE, P. 2011c. Constructing Regional Advantage: Platform Policies Based on Related Variety and Differentiated Knowledge Bases. *Regional Studies*, 45, 893-904.
- ASHEIM, B. T. & COENEN, L. 2005. Knowledge Bases and Regional Innovation Systems: Comparing Nordic Clusters. *Research Policy*, 34, 1173-1190.
- BATHELT, H., MALMBERG, A. & MASKELL, P. 2004. Clusters and Knowledge: Local Buzz, Global Pipelines and the Process of Knowledge Creation. *Progress in Human Geography*, 28, 31-56.
- BENNEWORTH, P., COENEN, L., MOODYSSON, J. & ASHEIM, B. 2009. Exploring the Multiple Roles of Lund University in Strengthening the Scania Regional Innovation System: Towards Institutional Learning? *European Planning Studies*, 17, 1645-1664.
- BERGER, P. L. & LUCKMAN, T. 1967. *The Social Construction of Reality*, New York, Doubleday Anchor.
- BHASKAR, R. 1998. *The Possibility of Naturalism: A Philosophical Critique of the Contemporary Human Sciences*, London/ New York, Routledge.
- BOSCH, S. V. D. 2010. *Transition Experiments: Exploring Societal Changes towards Sustainability*. PhD, Erasmus University.
- BOSCHMA, R. 2004. Rethinking Regional Innovation Policy. In: FUCHS, G. & SHAPIRA, P. (eds.) *Rethinking Regional Innovation and Change: Path Dependency or Regional Breakthroughs?* Dordrecht: Kluwer International Publishers.
- BOSCHMA, R. 2005. Proximity and Innovation: A Critical Assessment. *Regional Studies*, 39, 61-74.
- BOSCHMA, R. & FRENKEN, K. 2006. Why Is Economic Geography not an Evolutionary Science? Towards an Evolutionary Economic Geography. *Journal of Economic Geography*, 6, 273-302.
- BOSCHMA, R. & FRENKEN, K. 2009. Some Notes on Institutions in Evolutionary Economic Geography. *Economic Geography*, 85, 151-158.
- BOSCHMA, R. & FRENKEN, K. 2011. The Emerging Empirics of Evolutionary Economic Geography. *Journal of Economic Geography*, 11, 295-307.
- BOSCHMA, R. & MARTIN, R. 2010. The Aims and Scope of Evolutionary Economic Geography. In: BOSCHMA, R. & MARTIN, R. (eds.) *The Handbook of Evolutionary Economic Geography*. Cheltenham, Northampton, MA: Edward Elgar.
- BUSH, V. 1945. *Science - the Endless Frontier*. Washington: National Science Foundation.
- CAMPBELL, J. L. 2006. What's New? General Patterns of Planned Macro-institutional Change. In: HAGE, J. & MEEUS, M. (eds.) *Innovation, Science, and Institutional Change*. Oxford New York: Oxford University Press.
- CARROLL, G. R. & HANNAN, M. T. 1989. Density Dependence in the Evolution of Populations of Newspaper Organizations. *American Sociological Review*, 54, 524-548.

- CHESBROUGH, H. 2003. *Open Innovation: The New Imperative for Creating and Profiting from Technology*, Boston, Harvard Business School Press.
- CLARK, G. L. 1998. Stylized Facts and Close Dialogue: Methodology in Economic Geography. *Annals of the Association of American Geographers*, 88, 73-87.
- COENEN, L. 2007. The Role of Universities in the Regional Innovation System of North East of England and Scania, Sweden: Providing Missing Link? *Environment and Planning C: Government and Policy*, 25, 803-821.
- COOKE, P. 2001. Regional Innovation Systems, Clusters, and the Knowledge Economy. *Industrial and Corporate Change*, 10, 945-974.
- COOKE, P. 2004. Regional Innovation Systems - an Evolutionary Approach. In: COOKE, P., HEIDENREICH, M. & BRACZYK, H.-J. (eds.) *Regional Innovation Systems: The Role of Governance in a Globalized World*. London New York: Routledge.
- COOKE, P., BOEKHOLT, P. & TÖDTLING, F. 2000. *The Governance of Innovation in Europe: Regional Perspectives on Global Competitiveness*, London New York, Pinter.
- COOKE, P. & LEYDESDORFF, L. 2006. Regional Development in the Knowledge-Based Economy: The Construction of Advantage. *The Journal of Technology Transfer*, 31, 5-15.
- COOKE, P., URANGA, M. G. & ETXEBARRIA, G. 1997. Regional Innovation Systems: Institutional and Organizational Dimensions. *Research Policy*, 26, 475-491.
- CROUCH, C., SCHRODER, M. & VOELZKOW, H. 2009. Regional and Sectoral Varieties of Capitalism. *Economy and Society*, 38, 654-678.
- DALUM, B., JOHNSON, B. & LUNDEVALL, B.-Å. 2010. Public Policy in the Learning Society. In: LUNDEVALL, B.-Å. (ed.) *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*. London: Anthem Press.
- DENZIN, D. K. 1970. *The Research Act in Sociology: A Theoretical Introduction to Sociological Methods*, London, Butterworths.
- DIMAGGIO, P. 1988. Interest and Agency in Institutional Theory. In: ZUCKER, L. (ed.) *Institutional Patterns and Organizations*. Cambridge, MA: Ballinger.
- DIMAGGIO, P. J. & POWELL, W. W. 1983. The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, 48, 147-160.
- DOLOREUX, D. & PARTO, S. 2005. Regional Innovation Systems: Current Discourse and Unresolved Issues. *Technology in Society*, 27, 133-153.
- DOWNWARD, P. & MEARMAN, A. 2007. Retroduction as Mixed-Methods Triangulation in Economic Research: Reorienting Economics into Social Science. *Cambridge Journal of Economics*, 31, 77-99.
- EDQUIST, C. 1997. Systems of Innovation Approaches - Their Emergence and Characteristics. In: EDQUIST, C. (ed.) *Systems of Innovation:*

- Technologies, Institutions and Organizations*. London and Washington: Pinter.
- EDQUIST, C. 2001. Innovation Policy - A Systematic Approach. In: ARCHIBUGI, D. & LUNDVALL, B.-Å. (eds.) *The Globalizing Learning Economy*. Oxford: Oxford University Press.
- EDQUIST, C. 2005. Systems of Innovations: Perspectives and Challenges. In: FAGERBERG, J., MOWERY, D. C. & NELSON, R. R. (eds.) *The Oxford Handbook of Innovation*. Oxford New York: Oxford University Press.
- EDQUIST, C. 2009. Public Procurement of Innovation (PPI) - a Pilot Study. *CIRCLE working papers, 2009/13*. Lund: CIRCLE, Lund University.
- EDQUIST, C. & JOHNSON, B. 1997. Institutions and Organizations in Systems of Innovations. In: EDQUIST, C. (ed.) *Systems of Innovations: Technologies, Institutions and Organizations*. London and Washington: Pinter.
- FAGERBERG, J. 2005. Innovation: A Guide to the Literature. In: FAGERBERG, J., MOWERY, D. C. & NELSON, R. R. (eds.) *The Oxford Handbook of Innovation*. Oxford: Oxford University Press.
- FAROLE, T., RODRIGUEZ-POSE, A. & STORPER, M. 2013. Human Geography and the Institutions that Underlie Economic Growth. *Progress in Human Geography*, 35, 58-80.
- FORAY, D. 1997. Generation and Distribution of Technological Knowledge. In: EDQUIST, C. (ed.) *Systems of Innovation: Technologies, Institutions and Organizations*. London and Washington: Pinter.
- FREEMAN, C. 2002. Continental, National and Sub-national Innovation Systems—Complementarity and Economic Growth. *Research Policy*, 31, 191-211.
- FREEMAN, C. 2010. Formal Scientific and Technical Institutions in the National System of Innovation. In: LUNDVALL, B. Å. (ed.) *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*. London/ New York: The Anthem Press.
- GERTLER, M. S. 2004. *Manufacturing Culture: The Institutional Geography of Industrial Practice* Oxford New York, Oxford University Press.
- GERTLER, M. S. 2010. Rules of the Game: The Place of Institutions in Regional Economic Change. *Regional Studies*, 44, 1-15.
- GERTLER, M. S. & WOLFE, D. A. 2002. Innovation and Social Learning: An Introduction. In: GERTLER, M. S. & WOLFE, D. A. (eds.) *Innovation and Social Learning: Institutional Adaptation in an Era of Technological Change*. New York: Palgrave Macmillan.
- GRONNING, T. 2008. Institutions and Innovation Systems: The Meanings and Roles of the Institutions Concept within Systems of Innovation Approaches. *Entrepreneurship and Innovation - Organizations, Institutions, Systems, and Regions*. Copenhagen Business School, Denmark.
- HAGE, J. 2006. Institutional Change and Societal Change: The Impact of Knowledge Transformations. In: HAGE, J. & MEEUS, M. (eds.) *Innovation, Science, and Institutional Change*. Oxford New York: Oxford University Press.

- HALL, P. A. 2010. Historical Institutionalism in Rationalist and Sociological Perspective. In: MAHONEY, J. & THELEN, K. (eds.) *Explaining Institutional Change: Ambiguity, Agency, and Power*. Cambridge New York: Cambridge University Press.
- HALL, P. A. & SOSKICE, D. 2001. An Introduction to Varieties of Capitalism. In: HALL, P. A. & SOSKICE, D. (eds.) *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. Oxford: Oxford University Press.
- HALL, P. A. & THELEN, K. 2009. Institutional Change in Varieties of Capitalism. *Socio-Economic Review*, 7, 7-34.
- HALLENCREUTZ, D., BJERKESJÖ, P. & DAAL, C. 2008. Skånes regionala innovationssystem. En funktionsanalys. Malmö: Region Skåne.
- HASSINK, R. & LAGENDIJK, A. 2001. The Dilemmas of Interregional Institutional Learning. *Environment and Planning C: Government and Policy*, 19, 65-84.
- HAYTER, R. 2004. Economic Geography as Dissenting Institutionalism: The Embeddeness, Evolution and Differentiation of Regions. *Geografiska Annaler Series B: Human Geography*, 86, 95-115.
- HENNING, M., MOODYSSON, J. & NILSSON, M. 2010. *Innovation och regional omvandling: Från skånska kluster till nya kombinationer*, Malmö, Region Skåne.
- HENRY, N. & PINCH, S. 2001. Neo-Marshallian Nodes, Institutional Thickness, and Britain's 'Motor Sport Valley': Thick or Thin? *Environment and Planning A*, 33, 1169 -1183.
- HODGSON, G. M. 1998. The Approach of Institutional Economics. *Journal of Economic Literature*, 36, 166-192.
- HOLLANDERS, H. 2013. Measuring Regional Innovation: A European Perspective. In: DUTTA, S. & LANVIN, B. (eds.) *The Global Innovation Index 2013: The Local Dynamics of Innovation*. Geneva, Ithaca, and Fontainebleau: Cornell University, INSEAD, WIPO.
- HOLLINGSWORTH, J. R. 2000. Doing Institutional Analysis: Implications for the Study of Innovations. *Review of International Political Economy*, 7, 595-644.
- IAMMARINO, S. 2005. An Evolutionary Integrated View of Regional Systems of Innovation: Concepts, Measures and Historical Perspectives. *European Planning Studies*, 13, 497-519.
- IAMMARINO, S., PEREZ, R. & TUNZELMANN, N. 2008. Technological Capabilities and Global-Local Interactions: The Electronics Industry in Two Mexican Regions. *World Development*, 36, 1980-2003.
- JARRATT, D. G. 1996. A Comparison of Two Alternative Interviewing Techniques Used within an Integrated Research Design: A Case Study in Outshopping Using Semi-structured and Non-directed Interviewing Techniques. *Marketing Intelligence & Planning* 14, 6-15.

- JOHANNISSON, B. & DAHLSTRAND, A. L. 2009. Bridging the Functional and Territorial Rationales Proposing an Integrating Framework for Regional Dynamics. *European Planning Studies*, 17, 1117-1133.
- JOHNSON, B. 1997. Systems of Innovation: Overview and Basic Concepts. Introduction. In: EDQUIST, C. (ed.) *Systems of Innovation: Technologies, Institutions and Organizations*. London and Washington: Pinter.
- JOHNSON, B. 2010. Institutional Learning. In: LUNDEVALL, B.-Å. (ed.) *National Systems of Innovation: Toward a Theory of Innovation and Interactive Learning*. London: Anthem Press.
- KLINE, S. J. & ROSENBERG, N. 1986. An Overview of Innovation. In: LANDAU, R. & ROSENBERG, N. (eds.) *The Positive Sum Strategy: Harnessing Technology for Economic Growth*. Washington: National Academy Press.
- KNIGHT, J. 1992. *Institutions and Social Conflict*, Cambridge, Cambridge University Press.
- LAM, A. 2005. Organizational Innovation. In: FAGERBERG, J., MOWERY, D. C. & NELSON, R. R. (eds.) *The Oxford Handbook of Innovation*. Oxford: Oxford University Press.
- LAMBOOY, J. G. & BOSCHMA, R. A. 2001. Evolutionary Economics and Regional Policy. *The Annals of Regional Science*, 35, 113-131.
- LANE, C. & WOOD, G. 2009. Capitalist Diversity and Diversity within Capitalism. *Economy and Society*, 38, 531-551.
- LEHRER, M. 2001. Macro-Varieties of Capitalism and Micro-Varieties of Strategic Management in European Airlines. In: HALL, P. A. & SOSKICE, D. (eds.) *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. Oxford: Oxford University Press.
- LUNDEVALL, B.-Å. 2010a. Introduction. In: LUNDEVALL, B.-Å. (ed.) *National Systems of Innovation: Toward a Theory of Innovation and Interactive Learning*. London/ New York: Anthem Press.
- LUNDEVALL, B.-Å. 2010b. Post Script: Innovation System Research - Where It Came from and Where It Might Go. In: LUNDEVALL, B.-Å. (ed.) *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*. London/ New York: The Anthem Press.
- LUNDEVALL, B. Å. & MASKELL, P. 2000. Nation States and Economic Development: from National Systems of Production to National Systems of Knowledge Creation and Learning. In: CLAR, G. L., FELDMAN, M. P. & GERTLER, M. S. (eds.) *The Oxford Handbook of Economic Geography*. New York: Oxford University Press.
- MACKINNON, D., CUMBERS, A., PIKE, A., BIRCH, K. & MCMASTER, R. 2009. Evolution in Economic Geography: Institutions, Political Economy, and Adaptation. *Economic Geography*, 85, 129-150.
- MAHONEY, J. & THELEN, K. 2010. A Theory of Gradual Institutional Change. In: MAHONEY, J. & THELEN, K. (eds.) *Explaining Institutional Change: Ambiguity, Agency, and Power*. Cambridge New York: Cambridge University Press.

- MALERBA, F. 2002. Sectoral Systems of Innovation and Production. *Research Policy*, 31, 247-264.
- MALMBERG, A. & MASKELL, P. 2002. The Elusive Concept of Localization Economies: Towards a Knowledge-based Theory of Spatial Clustering. *Environment and Planning A*, 34, 429 - 449.
- MALMBERG, A. & MASKELL, P. 2010. An Evolutionary Approach to Localized Learning and Spatial Clustering. In: BOSCHMA, R. & MARTIN, R. (eds.) *The Handbook of Evolutionary Economic Geography*. Cheltenham, Northampton, MA: Edward Elgar.
- MARTIN, R. 1994. Economic Theory and Human Geography. In: MARTIN, R. & SMITH, G. (eds.) *Human Geography: Society, Space and Social Science*. Basingstoke: Macmillan.
- MARTIN, R. 2000. Institutional Approaches in Economic Geography. In: SHEPPARD, E. & BARNES, T. J. (eds.) *A Companion to Economic Geography*. Oxford: Blackwell.
- MARTIN, R. 2010. Roepke Lecture in Economic Geography - Rethinking Regional Path Dependence: Beyond Lock-in to Evolution. *Economic Geography*, 86, 1-27.
- MARTIN, R. & MOODYSSON, J. 2011. Innovation in Symbolic Industries: The Geography and Organisation of Knowledge Sourcing. *European Planning Studies*, 19, 1183-1203.
- MARTIN, R. & MOODYSSON, J. 2012. Comparing Knowledge Bases: On the Geography and Organization of Knowledge Sourcing in the Regional Innovation System of Scania, Sweden. *European Urban and Regional Studies*
- MARTIN, R. & TRIPPL, M. 2013. Systemic Failures, Knowledge Bases and Regional Innovation Policies. *CIRCLE Working Paper Series*. Lund: CIRCLE.
- MASKELL, P. & MALMBERG, A. 2007. Myopia, Knowledge Development and Cluster Evolution. *Journal of Economic Geography*, 7, 603-618.
- MCDOWELL, L. 1992. Valid Games? A Response to Erica Schoenberger. *The Professional Geographer*, 44, 212-215.
- MEYER, J. W. 1994. Rationalized Environments. In: SCOTT, R. & MEYER, J. W. (eds.) *Institutional Environments and Organizations: Structural Complexity and Individualism*. Thousand Oaks: Sage.
- MEYER, J. W. & ROWAN, B. 1977. Institutionalized Organization: Formal Structure as Myth and Ceremony. *American Journal of Sociology*, 83, 340-363.
- MOISANDER, J. & VALTONEN, A. 2006. *Qualitative Marketing Research: A Cultural Approach*, London, Sage.
- MORGAN, K. 1997. The Learning Region: Institutions, Innovation and Regional Renewal. *Regional Studies*, 31, 491-503.
- NEE, V. 2005. The New Institutionalism in Economics and Sociology. In: SMELSER, N. J. & SWEDBERG, R. (eds.) *The Handbook of Economic Sociology*. New York: Princeton University Press.

- NELSON, R. R. 2008. Bounded Rationality, Cognitive Maps, and Trial and Error Learning. *Journal of Economic Behavior*, 67, 78-89.
- NELSON, R. R. & WINTER, S. G. 1982. *An Evolutionary Theory of Economic Change*, Cambridge, MA, Harvard University Press.
- NORTH, D. 1990. *Institutions, Institutional Change and Economic Performance*, Cambridge, Cambridge University Press.
- NORTH, D. & THOMAS, R. P. 1970. An Economic Theory of the Growth of the Western World. *Economic History Review*, 23, 1-17.
- OECD 1996. *The Knowledge-based Economy*. Paris.
- OUGHTON, C., LANDABASO, M. & MORGAN, K. 2002. The Regional Innovation Paradox: Innovation Policy and Industrial Policy. *The Journal of Technology Transfer*, 27, 97-110.
- PORTER, M. E. 1998. Clusters and the New Economics of Competition. *Harvard Business Review*, November-December, 77-90.
- RAPLEY, T. 2004. Interviews. In: SEALE, C., GOBO, G., GUBRIUM, J. F. & SILVERMAN, D. (eds.) *Qualitative Research Practice*. Londn: Sage Publications.
- RODRIGUEZ-POSE, A. & STORPER, M. 2006. Better Rules or Stronger Communities? On the Social Foundations of Institutional Change and Its Economic Effects. *Economic Geography*, 82, 1-25.
- RUTTEN, R. & BOEKEMA, F. 2007. The Learning Region: Foundations, State of the art, Future. In: RUTTEN, R. & BOEKEMA, F. (eds.) *The Learning Region: Foundations, State of the Art, Future*. Cheltenham: Edward Elgar.
- SAXENIAN, A. 1994. *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*, Cambridge, MA, Harvard University Press.
- SAYER, A. 2000. *Realism in Social Science*, London, Sage.
- SCHAMP, E. W. 2010. On the Notion of Co-evolution in Economic Geography. In: BOSCHMA, R. & MARTIN, R. (eds.) *The Handbook of Evolutionary Economic Geography*. Cheltenham, Northampton, MA: Edward Elgar.
- SCHNEIBERG, M. 2007. What's on the Path? Path Dependence, Organizational Diversity and the Problem of Institutional Change in the US Economy, 1900-1950. *Socio-Economic Review*, 5, 47-80.
- SCHOENBERGER, E. 1991. The Corporate Interview as a Research Method in Economic Geography. *The Professional Geographer*, 43, 180-189.
- SCHUMPETER, J. A. 1961. *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*, New York, Oxford University Press.
- SCHWERIN, J. & WERKER, C. 2003. Learning Innovation Policy Based on Historical Experience. *Structural Change and Economic Dynamics*, 14, 385-404.
- SCOTT, A. J. 1998. Community, Local Democracy and Citizneship. *Prospects*, XXVIII, 328-331.
- SCOTT, W. R. 2008. *Institutions and Organizations*, London, Sage Publications.
- SELZNIK, P. 1984. *Leadership in Administration: A Sociological Interpretation*, Berkeley/ Los Angeles, University of California Press.
- SIGGELKOW, N. 2007. Persuasion with Case Studies. *Academy of Management Journal*, 50, 20-24.

- SILVERMAN, D. 2007. A Very Short, Fairly Interesting and Reasonably Cheap Book about Qualitative Research. London: Sage Publications.
- SILVERMAN, D. 2011. *Interpreting Qualitative Data: A Guide to the Principles of Qualitative Research*, Los Angeles, Sage.
- SIMON, H. A. 1959. Theories of Decision Making in Economics and Behavioral Science. *The American Economic Review*, 49, 253-283.
- SMITH, A. 1776. *The Wealth of Nations*, New York, Bantam Dell.
- SOTARAUTA, M. & PULKKINEN, R. 2010. Institutional Entrepreneurship for Knowledge Regions. In Search of a Fresh Set of Questions for Regional Innovation Studies. *Environment and Planning C: Government and Policy*, 29, 96-112.
- STORPER, M. 1997. *The Regional World*, New York London, The Guilford Press.
- STORPER, M., LAVINAS, L. & CELIS, A. M. 2007. Society, Community, and the Development: A Tale of Two Regions. In: POLENSKE, K. R. (ed.) *The Economic Geography of Innovation*. Cambridge: Cambridge University Press.
- STORPER, M. & SCOTT, A. J. 1995. The Wealth of Regions: Market Forces and Policy Imperatives in Local and Global Context. *Futures*, 27, 505-526.
- STRAMBACH, S. 2010. Path Dependence and Path Plasticity: The Co-evolution of Institutions and Innovation - the German Customized Business Software Industry. In: BOSCHMA, R. & MARTIN, R. (eds.) *The Handbook of Evolutionary Economic Geography*. Cheltenham, Northampton, MA: Edward Elgar.
- STREECK, W. & THELEN, K. 2005. Introduction: Institutional change in advanced capitalist economies. In: STREECK, W. & THELEN, K. (eds.) *Beyond Continuity: Institutional Change in Advanced Capitalist Economies*. Oxford: Oxford University Press.
- SUMNER, W. G. 1906. *Folkways*, Boston, Ginn&Co.
- SWYNGEDOUW, E. 2000. Elite Power, Global Forces, and the Political Economy of 'Glocal' Development. In: CLARK, G. L., FELDMAN, M. P. & GERTLER, M. S. (eds.) *The Oxford Handbook of Economic Geography*. Oxford New York: Oxford University Press.
- THELEN, K. 2001. Varieties of Labor Politics in the Developed Democracies. In: HALL, P. A. & SOSKICE, D. (eds.) *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. Oxford: Oxford University Press.
- TRIGILIA, C. & BURRONI, L. 2009. Italy: Rise, Decline and Restructuring of a Regionalized Capitalism. *Economy and Society*, 38, 630-653.
- TÖDTLING, F., LENGAUER, L. & HÖGLINGER, C. 2011. Knowledge Sourcing and Innovation in 'Thick' and 'Thin' Regional Innovation Systems-Comparing ICT Firms in Two Austrian Regions. *European Planning Studies*, 19, 1245-1276.
- TÖDTLING, F. & TRIPPL, M. 2005. One Size Fits All? Towards a Differentiated Regional Innovation Policy Approach. *Research Policy*, 34, 1203-1219.

- TÖDTLING, F. & TRIPPL, M. 2012. Transformation of Regional Innovation Systems. From Old Legacies to New Development Paths. In: COOKE, P. (ed.) *Re-framing Regional Development. Evolution, Innovation and Transition*. London, New York: Routledge.
- UNIDO 2002/2003. UNIDO's Industrial Development Report 2002/2003. In: ORGANIZATION, U. N. I. D. (ed.). New York: United Nations Industrial Development Organization.
- UYARRA, E. 2010. What Is Evolutionary about 'Regional Systems of Innovation'? Implications for Regional Policy. *Journal of Evolutionary Economics*, 20, 115-137.
- VEBLEN, T. 1898. Why is Economics not an Evolutionary Science? *The Quarterly Journal of Economics*, 12, 373-397.
- WHITLEY, R. 2002. Developing Innovative Competences: The Role of Institutional Framework. *Industrial and Corporate Change*, 11, 497-528.
- WILLIAMSON, O. E. 2000. The New Institutional Economics: Taking Stock, Looking Ahead. *Journal of Economic Literature*, XXXVIII, 595-613.
- WOOD, S. 2001. Business, Government, and Patterns of Labor Market Policy in Britain and the Federal Republic of Germany. In: HALL, P. A. & SOSKICE, D. (eds.) *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. Oxford: Oxford University Press.
- YEUNG, H. W.-C. 1997. Critical Realism and Realistic Research in Human Geography: A Method or a Philosophy in Search of a Method? *Progress in Human Geography*, 21, 51-74.
- YIN, R. K. 2009. *Case Study Research: Design and Methods*, London, Sage.
- ZUCKER, L. G. 1970. The Role of Institutionalization in Cultural Persistence. *American Sociological Review*, 42, 726-743.
- ZYSMAN, J. 1994. How Institutions Create Historically Rooted Trajectories of Growth. *Industrial and Corporate Change*, 3, 243-283.

Article I

Institutional Conditions and Innovation Systems: On the Impact of Regional Policy on Firms in Different Sectors

JERKER MOODYSSON and ELENA ZUKAUSKAITE

CIRCLE (Centre for Innovation, Research and Competence in the Learning Economy), Lund University, PO Box 117,
SE-22100 Lund, Sweden. Emails: jerker.moodysson@circle.lu.se and elena.zukauskaitė@circle.lu.se

(Received June 2010; in revised form December 2011)

MOODYSSON J. and ZUKAUSKAITE E. Institutional conditions and innovation systems: on the impact of regional policy on firms in different sectors, *Regional Studies*. This paper deals with institutional conditions in regional innovation systems: how institutions affect the organization of innovation activities among firms; and in what ways regional policy initiatives can be supportive. The analysis draws on data on innovation networks, activities, and regional policies targeting the life science, media and food industries in Scania, Sweden. The study takes account of the ways in which regional policies can impact individuals' and organizations' action in relation to each other by being internalized. It is argued that such ability is decisive for the success or failure of the policy initiative.

Regional innovation systems Knowledge Institutions Innovation Policy

MOODYSSON J. and ZUKAUSKAITE E. 制度背景以及创意体系：区域政策对公司不同部门的影响，区域研究。本文考察了区域创新体系的制度背景：制度是如何影响公司间创意行为组织；区域政策创意通过什么途径得到支持。本分析数据来自瑞典瑞典斯堪尼亚创意网络、行为以及区域政策中针对生命科学、媒体以及食品产业的部分。本研究考虑了区域政策如何通过相互之间的内在化而影响个体与组织行为。文章指出，这种内在化的能力对于政策创意的成功与否起着决定性作用。

区域创意体系 知识 机构 创新 政策

MOODYSSON J. et ZUKAUSKAITE E. Les conditions institutionnelles et les systèmes d'innovation: à propos de l'impact de la politique régionale sur les entreprises dans divers secteurs, *Regional Studies*. Cet article traite des conditions institutionnelles dans des systèmes d'innovation régionaux: à savoir, la façon dont les institutions influent sur l'organisation des activités d'innovation inter-entreprises; et la manière dont les initiatives à priorité régionale puissent être favorables. L'analyse puise dans des données sur les réseaux d'innovation, les activités, et les politiques régionales qui ciblent la science de la vie, les médias et les industries agro-alimentaires à Scania, en Suède. L'étude tient compte des façons dont l'internalisation des politiques régionales puisse influencer sur les interactions des individus et des organisations. On affirme qu'une telle capacité s'avère primordiale quant à la réussite ou à l'échec des initiatives.

Systèmes d'innovation régionaux Connaissance Institutions Innovation Politique

MOODYSSON J. und ZUKAUSKAITE E. Institutionelle Bedingungen und Innovationssysteme: die Auswirkung der Regionalpolitik auf Firmen in verschiedenen Sektoren, *Regional Studies*. Thema dieses Beitrags sind die institutionellen Bedingungen von regionalen Innovationssystemen, d. h. die Fragen, wie sich Institutionen auf die Organisation von Innovationsaktivitäten unter Firmen auswirken und welche Unterstützung regionalpolitische Initiativen hierbei leisten können. Die Analyse beruht auf Daten über innovationsfördernde Netzwerke, Aktivitäten und Regionalpolitiken in den Branchen der Life-Sciences, Medien und Lebensmittelindustrie in Scania (Schweden). In der Studie wird berücksichtigt, auf welche Weise sich Regionalpolitiken auf die Handlungen von Einzelpersonen und Organisationen im Verhältnis zueinander im Rahmen einer Internalisierung auswirken können. Es wird argumentiert, dass eine solche Fähigkeit für den Erfolg oder das Scheitern der politischen Initiative entscheidend ist.

Regionale Innovationssysteme Wissen Institutionen Innovation Politik

MOODYSSON J. y ZUKAUSKAITE E. Condiciones institucionales y sistemas de innovación: el efecto de la política regional en las empresas en diferentes sectores, *Regional Studies*. Este artículo trata sobre las condiciones institucionales en los sistemas de innovación regional: es decir, de qué modo influyen las instituciones en la organización de las actividades de innovación entre las empresas; y qué apoyo pueden ofrecer las iniciativas de la política regional. Este análisis se basa en datos sobre las redes, actividades y políticas

regionales de innovación que tratan sobre las industrias de las ciencias de la vida, los medios de comunicación y la alimentación en Scania, Suecia. En este estudio consideramos cómo pueden influir las políticas regionales en las acciones de personas y organizaciones entre ellas al ser interiorizadas. Sostenemos que tal capacidad es decisiva para el éxito o el fracaso de la iniciativa política.

Sistemas de innovación regional Conocimiento Instituciones Innovación Política

JEL classifications: L2, O38, R11, R58

INTRODUCTION

This paper deals with institutional conditions in regional innovation systems. The main aim is to assess how regional- and industry-specific institutions affect the behaviour of their target population (the actors of the system) and in what ways regional policy can contribute to shaping such conditions. Institutions are referred to as ‘regulating’ aspects of social life such as rules, practices, routines, habits, traditions, customs and conventions that, by being internalized by the vast majority of actors in a population, contribute both to providing stability in society and to shaping evolutionary economic trajectories (NORTH, 1990; SCOTT, 1995; MASKELL and MALMBERG, 1999; GERTLER, 2004). A central observation among institutional scholars, particularly geographers (for example, GERTLER, 2004; SAXENIAN, 1994; STORPER *et al.*, 2007), is that the regional context, in particular the regional institutional framework, is perceived to be highly influential for the way actors perform. However, as opposed to what might be expected based on previous research (for example, ANTONELLI, 2000; STORPER, 1997), such regional conditions do not always primarily matter by shaping a local arena for knowledge exchange and direct interaction between the regional actors. Such inter-organizational relations are often, at least in some sectors, to a large part organized within globally configured professional communities (ASHEIM and GERTLER, 2005; GERTLER, 2009; MOODYSSON, 2007). In this paper, the life science, media and food industries are compared to address such sector specificities with regard to the organization of innovation activities. Innovation is understood in a broad sense, including new products, new processes, new methods of production, new sources of supply, the exploitation of new markets and new ways of organizing business (FAGERBERG, 2005). Differences between the cases are assumed to draw partly on the specific industrial and organizational culture built up over time, but also on the specific modes of innovation characterizing the respective industries. In other words, industries differ not only in their products, processes or sources of supply, but also in the way they organize their innovation activities.

To structure the analysis, some aspects are to be kept constant and some are to be analysed through observing variations. The objects of study are located in the southern-most province of Sweden, a region named Scania. The formal institutional framework (such as general laws, labour market regulations, tax policies, the education system, etc.) is thus uniform across the

cases. But of course certain regulative institutions are more or less sector specific. Copyright laws are, for instance, primarily relevant to the media sector; stem cell regulations (and similar) to the life science sector; and safety requirements for food processing (and similar) to the food sector. These regulative differences are indeed important to keep in mind, but they do not have a major impact on the formation or efficiency of regional innovation policies. They form the very basic institutional framework for these industries; obeying these rules is central to being in the business. They are thus by default internalized by all actors. There is, however, a range of other sector-specific institutions that strongly affect the preconditions for shaping efficient regional innovation policies targeting different sectors and to which the policies can relate and possibly also affect and change. These are primarily sorted into the category that SCOTT (1995) and followers would classify as normative and cognitive institutions. Concrete examples are the dependence of and attitudes towards social networks as an alternative to more formalized inter-organizational alliances, a sensitivity to territorially embedded cultural factors such as differences with regard to trends and taste, a perceived relevance of scientific knowledge for product and process development within different sectors, and the perceived need for geographical proximity between organizations which interact in business and knowledge-exchange activities.

The selection of cases for the empirical analysis reported in this paper – regional clusters of firms representing three different industries – is based on the assumption that there are certain profound differences with regard to such normative and cognitive institutions between the compared industries. The core question is whether different regional policies targeting these different industries are taking these institutional differences into account and what consequences these bring in terms of success or failure of the policies carried out.

CONCEPTUAL FRAMEWORK

Functional and territorial integration

An obvious point of departure for a study of the regional preconditions for innovation is the work on industrial districts in Italy and elsewhere from the 1980s and 1990s (for example, BECATTINI *et al.*, 2010), as well as

more recent work on regional innovation systems (for example, COOKE *et al.*, 2004). A central aspect of these writings is the emphasis on the combination of functional and territorial integration of activities which creates beneficial effects for the integrated actors that are larger than those each actor could generate in isolation. In other words, these theories stress that geographical proximity between actors tends to facilitate interaction, which, in turn, promotes the generation and transfer of skills and qualifications by both reducing transaction costs and providing possibilities for 'spillovers' of knowledge and information (AUDRETSCH and FELDMAN, 2004). A popular term to describe the latter is 'localized learning' (MALMBERG and MASKELL, 2006).

Since the seminal contribution by MARSHALL (1920), numerous elaborations of these basic ideas have been examined in a range of studies by economic geographers and other scholars, focusing both on traditional manufacturing (for example, GERTLER, 2004) and more research-based industries (for example, COOKE, 2007). Although there may be discussion about whether the informal ties that develop in the local milieu go deeper than contracts (HARRISON, 1992), there seems to be a broad consensus that the co-location of related actors is beneficial at least partly because of the embeddedness stemming from interdependencies between small firms and the local community. Sometimes the term 'Marshallian agglomeration economies' is used to describe informal spillovers rising from geographically close friendship and family relations rather than organizational linkages (MARTIN and SUNLEY, 1996). Some studies stress the associational capacity based on Marshallian agglomeration economies as something so strong that it even goes beyond the actual awareness of the individuals embraced by it. As BATHELT (2005) put it:

actors do not have to search their environment or make particular investments to get access to this information. They are automatically exposed to news reports, gossip, rumours and recommendations about technologies, markets and strategies just by being in the cluster.

(p. 206)

Other studies provide a different view, stressing the exclusive character of the associational capacity, including members and excluding non-members (MOODYSSON, 2008). These findings, whether stressing the locally contained or the globally distributed associational capacity, are however not very specific on what it is that shapes this thick texture of interdependencies in the local (or global) community, beyond a general argument that it has something to do with institutions shaping trust, commitment and mutual understanding.

Societal institutions shaping action

One way of moving towards a concrete framework for studying the impact of regional policy on innovation is to specify further the institutions in play. A basic distinction

is made between institutions depending on their degree of formalization (NORTH, 1990). Formal institutions are officially stated, whereas informal institutions are not necessarily explicitly communicated among their target population. A further refinement is presented by SCOTT (1995), who separates regulative, normative and cognitive pillars of institutions. The regulative dimension represents rules and laws that work as coercive mechanisms and are legally sanctioned. The normative dimension is connected to values, norms and codes of conduct, not legally sanctioned but morally governed. The cognitive dimension is based on beliefs and models of reality taken for granted and supported by culture and everyday practices. These should thus be understood as interdependent and mutually reinforcing pillars that, seen as a whole, define the workings of the institutional framework of an innovation system (MOODYSSON, 2007).

When it comes to activities shaping and supporting region-specific institutions it is necessary that those appeal to all three pillars of institutions. From a public policy point of view, the formation and underpinning of institutions affecting regional development, network creation and innovation usually takes place at more than one geographical level. Constitutionally Sweden has two main levels: national (central) and local (municipalities and county councils). As Sweden is part of the European Union, its laws and directives are also applied in the country. At the national level, Swedish inhabitants are represented by the Swedish parliament (Riksdagen), which has legislative power. It follows that authorities at the national level are responsible primarily for the formation of regulative institutions. In other words, the most important task for the central state is to create favourable basic conditions, within whose overall structures the local (and regional) level is functioning (MCCALLION, 2007).

In 1997 Sweden introduced a Regional Pilot Programme that transferred the responsibilities in areas of regional development and planning from the central government to regions. Scania was one of the regions participating in the pilot. Within the programme the region coordinates efforts to develop industry, communications, culture, and cooperation with other regions within and outside Sweden. However, since regional actors do not have legislative power, they have to adopt their activities to the framework provided by authorities at the central level. Within this framework they influence the development of the region in many important areas. Since the mid-1990s, a popular strategy for Swedish regional policies has been to target the promotion of clusters (LUNDEQUIST and POWER, 2002). These strategies also emphasize the regional universities' role as growth engines. In this way regional actors affect the economic development of the region and contribute to creating normative institutions for many activities (EGSTRAND and SÄTRE, 2008). The following section discusses in closer detail the effect of regional policy on institutions.

Regional policy shaping institutions

In line with the arguments above, policy promoting regional innovation systems must appeal to all three pillars of institutions. Traditional science and technology policies purely focusing on the supply side of research and development investments have proven insufficient. In Sweden as well as in other Nordic countries this observation has led to a reformulation of national and regional strategies for supporting innovation (ISAENSEN, 2009; LUNDEVALL and BORRÁS, 2005), away from a one-sided focus on high-technology and science. OUGHTON *et al.* (2002) identify three main objectives for a more broad-based regional innovation policy, stating that this should (1) facilitate coherence and collaboration among actors, (2) identify and express the needs and demands of the actors, and (3) coordinate strategies for approaching these needs and demands. In an attempt to move from a general discussion of policy challenges and objectives towards a more concrete description of actual policy activities targeting these objectives, NAUWELAERS and WINTJES (2002) provided an overview of instruments based on various needs identified in different types of regions (see also TÖDTLING and TRIPPL, 2005). A shared characteristic of these instruments is that they aim at stimulating behavioural change of actors, that is, they aim at affecting institutions rather than providing direct support. Many initiatives geared towards such behavioural value added take explicit account of at least two of the objectives identified by OUGHTON *et al.* (2002), that is, coherence and the coordination of needs and demands. One of the most common activities for achieving coherence and collaboration among actors is stimulation of inter-firm networking (for example, match-making and creation of umbrella organizations, etc).

Another characteristic of these activities is that they tend to target the regional system as a whole, rather than individual firms within the system, especially those targeting coherence and collaboration, but also those coordinating strategies for approaching the needs and demands of the actors. Examples are the development of local strategic plans and schemes promoting the culture of innovation, instead of more firm-oriented support programmes for research and development subsidies and directed provision of venture capital, but also more concrete attempts at setting up schemes for mobility between and cooperation among industry and academia. As implicitly indicated by both NAUWELAERS and WINTJES (2002) and OUGHTON *et al.* (2002), none of these activities is likely to fulfil the goals set out – shaping conditions supporting regional innovation – if not combined with at least some of the others. This, in turn, raises a challenge of coordination since such a policy portfolio, by definition, is mastered by actors at various geographic levels (for example, regional, national, international) and with various type of influence on the workings of the system (for example, direct, indirect). An increasing trend among regions is

the formation of umbrella organizations filling the role of coordinating various support activities, representing the regional as well as the national government, drawing on sources from the public as well as the private sector, and including business as well as academia and other interest organizations (ETZKOWITZ and LEYDESDORFF, 2000). The term ‘policy’ should thus be understood in a broad sense, embracing activities carried out not only by the public sector, but also by actors from all three spheres of the triple helix constellation (BORRÁS and TSAGDIS, 2008).

Many recent studies urge for a customized regional policy approach, taking unique regional characteristics into account (ASHEIM *et al.*, 2011; IAMMARINO, 2005; SCHWERIN and WERKER, 2003; TÖDTLING and TRIPPL, 2005). However, regardless of this urge for customization, concrete policy guidelines (as well as the instruments applied in such policy initiatives) remain quite generic. The main message sent by academic work is that regional innovation policy should support network creation within the region, at a global level, and promote university–industry links of various types (COOKE *et al.*, 1997, 2000; LAMBOOY and BOSCHMA, 2001). The main instrument implemented in regional policy initiatives following these guidelines is the provision of platforms for interaction (BORRÁS and TSAGDIS, 2008). The discussions about customization due to different innovation practices within different industries and firms are not explicitly elaborated.

There have been several studies analysing the impact of regional policies on regional development and network creation. EGSTRAND and SÄTRE (2008) analysed the effect of policies promoting collaboration in two Swedish cities. They took a critical stand, arguing that there is a risk that resources are devoted to various application processes and to creating a long series of partnerships and networks rather than being allocated to practical development initiatives. They also pointed out that too much attention is paid to the notion that collaboration in itself leads to economic development, while their empirical findings suggest that despite very different strategies for collaboration the labour markets in the analysed cities do not differ significantly. The main conclusion is that the politicians’ focus on collaboration is one way of justifying the revised regional policy rather than a delegation of actual power to the local level. Such imprecise regional policy can lead to a situation in which the original aim of emphasizing the importance of economic development becomes counterproductive.

A more positive approach is taken by GELLYNCK and VERMEIRE (2009). Their analysis of the food sector in the Meetjesland region of Belgium revealed that regional networking has a positive contribution to market and process innovation, to quality assurance, and to the organization of research and development. However, the attitude to public support differed within the firms, depending on their innovation competence. The authors concluded that the main challenge for regional

policy-makers is to develop a more targeted approach to particular subgroups with respect to their behaviour in networking and their innovation capacity.

These divergent findings are but two examples that motivate increased focus on inter-sector comparative studies to assess the impact of and preconditions for regional innovation policy. The remainder of this paper presents an empirical analysis of policy initiatives promoting innovation systems in three different types of industries in the Scania region of Sweden.

RESEARCH DESIGN AND METHODS

The main method for data collection was structured and semi-structured interviews with representatives of a selection of firms from the media, food and life science industries. Data collected through interviews reflect the respondents' points of view and perceptions. This might limit the validity of the study given that the main objective was to assess the actual preconditions for influence of policy initiatives on the organization of innovation in different sectors. However, since policies are internalized by organizations only if they become integrated parts of their individuals' natural frame of reference, there is strong correspondence between the actual and perceived situation, which make interviews a preferred methodological choice.

A total of thirty-seven semi-structured interviews were conducted, mainly with chief executive officers (CEOs), chief research officers (CROs), and other leading staff at firms and research organizations. The narratives collected through these interviews were combined with data on organizational networks and a perceived dependence on regional support programmes, collected through structured interviews and secondary sources. A total of fifteen interviews were conducted with policy-makers. Additional input for assessing the policy initiatives was received through participation in focus group meetings involving representatives of the regional council, one of the main stakeholders responsible for the design and implementation of these initiatives. Interviews were also conducted with key individuals representing the regional policy initiatives, combined with secondary data describing those.

A total of ninety-five structured interviews were conducted with firms (mostly CEOs, general managers or entrepreneurs). The aim was to find out the following:

- With which regional activities supporting their sector development in the region are the companies familiar?
- Which ones do they use?
- In which ways do they benefit from them?
- What kind of support do they perceive as most important for their firm?

The analysis of the media sector draws on thirty-seven such structured interviews. The initial list of companies

included firms engaged in film production, design, advertising, animation, computer programming, software publishing and other activities. After a manual selection process, excluding inactive firms and firms that only have sales departments in the region as well as independent artists and interest organizations without real commercial activities, the cluster (the source population) was defined as being composed of seventy-one companies. Thus, the structured interviews covered a sample of approximately 50%.¹ The analysis of the food industry drew on twenty-eight structured interviews. The initial list of companies included firms engaged in food production and food processing as well as interest organizations of various kind. Since the food sector is much larger and more dispersed than the media and life sciences, the principles for defining the source population had to be adjusted. After a manual selection process (similar to the media case), attention was paid to identifying companies explicitly targeting innovation as their competitive strategy. Thirty-five such companies were identified and defined as the source population. The structured interviews thus covered a sample of 80% of the source population. The analysis of the life science sector drew on thirty structured interviews. The initial list of companies was based on the information provided by regionally and nationally administered business organizations. After a manual selection process, forty-three companies were defined as constituting the source population. The response rate for the life science case study was thus 72%. The results of the interviews are discussed below.

Analysis

The regional context. As stated above, all three cases analysed in this study are located in the region of Scania in southern Sweden. The region hosts 1.2 million inhabitants; and the actors analysed in this paper are located in or in immediate connection to the two cities of Malmö and Lund. Malmö is the third city of Sweden; and Lund hosts one of the largest, oldest and most prestigious universities in the country (according to a recent evaluation by the Swedish National Agency for Higher Education). As regards industrial profile, the region has transformed from being dominated by agriculture and heavy manufacturing towards more high value-added sectors. Lund University played an important role in this transformation (BENNEWORTH *et al.*, 2009). This study focuses primarily on the parts of the regional innovation system constituted by, and affecting, the new media, food and life science industries. The rationale behind this selection of cases is that they represent three distinct types of crucial knowledge bases. According to theoretical assumptions outlined above, these differences have implications for the needs on innovation policy shaping the workings of the regional innovation system.

The remainder of this paper provides an account of these policy initiatives and an analysis of how they

have managed (or failed) to appeal to their respective target population, and to what extent they have been internalized. Even though there may exist several more or less interdependent and overlapping policy initiatives supporting the respective industries, those analysed in this paper are the most influential ones currently taking place in the region.² They are based on a combination of regional, national and international funding, and they are implemented by a constellation of actors representing the triple helix of industry, university and the public sector. They are typical illustrations of the present strategy of regional industry support in Sweden through their organization as sector-focused 'platforms' in which a range of previously independent policy measures in support of regional industries are collected, including measures provided by VINNOVA and European Union Structural Funds. They share many characteristics, such as a strong focus on local network promotion, but they also display some differences, partly related to their various age and size, and partly their various abilities to adapt to the specific demands of their target industry. Each section below describes the activities in the policy programmes and presents an assessment of how these activities match the needs from the industry.

Media. The new media cluster in Malmo and surroundings represents a new niche in a local economy historically based on heavy manufacturing. With regard to industrial activities, the sector covers the scope from traditional film and broadcasting to digital design and computer games software. A shared feature of all these activities, despite their broad scope with regard to applications, is that they draw primarily on artistic knowledge. Another shared feature, partly coming as a natural consequence of the crucial knowledge base, is that they are geared towards creating images and experiences rather than production. An important aspect of innovation is related to new ways of creating artistic artefacts – process innovations emerging from capabilities to use new technologies. The companies in the sample are working with different types of media innovations, not only new products and processes, but also new market concepts and organizational structures. Some of these innovations are defined as new to the firm, for instance when a company moves from pure artistic movies to more market-oriented, commercial ones (changing its product and market concept); some are more radically new to the sector as a whole. One example of the latter is the development of user-friendly graphical interfaces for hand-held digital devices (for example, mobile phones) that unite high-quality design and cutting-edge technology in a completely new way. Companies also find new ways for competence-building by organizing joint events with regional support organizations, municipality and the local university; however, this type of renewal is not defined as

innovation in the present study. Project organization and informal networking are important for firms in this sector, for both products and process innovations. Formalized networks appear less frequent. Knowledge exchange for innovation usually takes place within local networks as actors are more context sensitive due to cultural factors and cognitive schemes of interpretation.

There have been numbers of different policy initiatives supporting new media development in the region. In order to unite different activities, and to allow them to benefit from each other, the regional authority has initiated an umbrella organization (that is, platform) called Media Mötesplats Malmö (MMM), recently renamed Media Evolution (ME). ME has around one hundred members comprising companies, universities, local and regional organizations. A large part of ME's activities, integrating the above-mentioned initiatives, focuses on promoting networks between actors in this sector, primarily within the region, but to some extent also in an international arena. Concrete examples are the organization of meetings and conferences, and the use of social media for stimulating interaction. In the publicly available information (for example, website, strategic plans, project descriptions) there is no clear definition of innovation, but their concrete activities reveal a focus on the promotion of the development of new products, services and processes within new media, as well as the entrance to new markets (geographically as well as sectorally). At a first glance the focus of the policy initiative thus seems to correspond with the actual focus of the companies' innovative strategies. In most cases ME does not provide support through direct investment, but through information about opportunities for new markets or products, joint competence building or through coordination of networking activities. Through its dominant position in the media industry in the region ME also acts to a large extent as a 'gatekeeper' for the implementation of new initiatives – that is, applications to national and international funding agencies are usually coordinated and hosted by ME.

The structured interviews reveal that in general media companies are well aware of available support activities. All companies but one knew of ME (or its predecessor) and twenty-five claimed they had benefited from it in one way or another. The three most available benefits provided by the support programmes were help with access to market knowledge, in sharing knowledge with customers, and in sharing knowledge with competitors. The three least available benefits were help with management knowledge, financial provisions, and human resource development. Comparing these results with what firms actually perceive as most important for their activities indicate a slight mismatch. The two most important needs – financial support for innovation projects and help with human resource development – were the ones least

met by regional policy initiatives. At the same time the three most available benefits, all connected to knowledge sourcing, were usually handled by the companies through informal channels such as pre-established personal networks, blogs and other Internet-based intermediates (MARTIN and MOODYSSON, 2011). The policy initiatives, however, try to respond to the third most important need – help to find partners – by promoting business networking and encouraging the sharing of knowledge with competitors and customers. In concrete terms this is provided through the organization of more or less informal workshops, seminars and physical as well as virtual platforms for spontaneous meetings.

While not intervening on regulative institutions affecting actors in this type of industry, except through the formation of the member organization as such and by providing specific funds for networking only applicable for the members, these activities aim explicitly at shaping the normative institutions among actors in the region, and to reduce the institutional mismatch that seem to appear between different segments of the industry and different parts of the region. However, while the companies need help to find partners for very concrete problem-solving and actual collaboration, these activities aim towards more open-ended social networking and harmonized agendas among the firms and related actors. As revealed in the interviews, such networking is virtual and totally informal. There is thus no need for a formalized top-down initiative to promote it. Normative institutions arise and evolve in self-organized communities, largely out of reach for policy. While the policy initiative may succeed in increasing the interaction between firms classified as belonging to the same cluster, such interaction rarely results in more long-term relations. Instead, these relations are shaped within interpersonal subgroups that form and grow in a more organic manner.

Food. The food cluster in Scania is a prime example of a traditionally strong but declining industry which recently has entered a phase of renewal. The need for renewal was partly triggered by Sweden entering the European Union in 1995. To deal with the challenges from increased international competition, the Skåne Food Innovation Network (SFIN) was founded in 1998. It is an umbrella organization that unites companies, universities and governmental agencies related to the food industry in Scania. Its main aim is to increase the competitiveness of the industry by encouraging business-to-business and business-to-research collaboration. In parallel, it seeks to increase the attractiveness of the industry to young, educated people to ensure a supply of human capital. Similarly to ME, SFIN seeks to raise the pace of innovation and processing proficiency in the business. It is marketed as a platform for innovation in the food industry, but again the concept of innovation is not clearly defined. However, it is

primarily a matter of the development of new products, processes and patterns of food consumption. Recently the capabilities to enter new markets have also been promoted. Similarly to ME, SFIN mostly provides a platform for interaction rather than direct investments to support innovation, and a large share of available support for food in the region is channelled through SFIN.

A shared feature of the firms composing this cluster is that they have their roots in engineering-based knowledge, but to a varying extent have been able to adapt to novel input from science-based knowledge (represented by the university as well as other firms in the region and abroad). One intermediate observation from previous studies of this case is that the policy support initiative faces challenges based on the conservative culture characterizing many of the actors in this industry (LAGNEVIK *et al.*, 2003). The main characteristic of this industry with regard to the organization of innovation activities can be summarized in the following way. Most innovation processes are carried out within the boundaries of traditional firms and formally established inter-organizational alliances (GRABHER, 2004). The local environment is important as it contains historical linkages embedded in the economic system. The innovative capacity of the actors is expected to gain from transcending such spatial and organizational boundaries, tapping into novel sources of knowledge input. The dominant mode of innovation is thus quite different from the case of new media, in which informal networking on and temporary alliances are crucial. As opposed to organizationally dispersed but geographically dense knowledge sourcing, most development activities draw on pre-established organizationally tight networks. The most known and successful examples of innovation in this sector are niche products such as functional food, developed in collaboration between biotechnology and food companies. Other types of innovations include new ways of organizing large-scale production and processing of food products, or entering a new niche market (for example, by producing healthy and/or environmentally friendly products in new ways).

The structured interviews reveal that when only provided the name of the policy initiative, nineteen companies could identify that they had heard of it, while only two said that they actually used and benefited from it. However, according to the data on SFIN's website, at least thirteen companies from the list were involved in the initiative's activities in one way or another. In follow-up interviews the companies were asked not about the initiative itself, but about the projects initiated by SFIN in which the company should be involved (according to SFIN). Also after this follow-up discussion some of the firms could not confirm that they were involved in the projects or specify how they contributed to its development. Two firms were aware of the activities and knew they were formally involved, but they

could not indicate any benefits from this participation. One of these is an old established firm whose CEO thought this a very good initiative for young, small companies in their early stage of development. However, she did not see how their company could benefit from it and therefore soon withdrew from it. Therefore, finally from twenty-eight companies, eight could identify the benefits of the support activities.

The findings suggest that the policy initiative foremost helps the firms and the university to find each other. Partly, it adds to human resource development and technological knowledge improvement. The companies' top three needs are financial support, help with human capital development, and help with information about new technologies. SFIN does not provide financial support, but is engaged in human capital development by attracting young people to the industry and through supporting relations between firms and the university. It seems that the main challenge for SFIN is to engage the firms to participate in the activities, to make them aware of the organization and its benefits, and to persuade the companies that the time invested in the activities will eventually pay off. Another challenge is to establish more organizational relations with the companies. As it is now, most contacts are established with one or a couple of individuals within each company, while the company as a whole is not aware of the projects, their goals and potential benefits.

While not intervening on the regulative institutions, SFIN, like most regional innovation policies, seeks to implement new norms within the industry where innovation is organized in open, temporary networks. However, these new norms are not compatible with the cognitive schemes of interpretation among actors in the food sector. The culture of organizational practices among the entire group of companies should change in order for the initiative to succeed. By working actively to increase the firms' awareness of the potential benefits from interacting with academia, the initiative tries to promote network formation within the region. However, so far it has reached only a small group of dedicated enthusiasts within the companies. Companies' attitudes and awareness of public support for networking seems to be very different. It might be that, similar to the Belgian food case presented by GELLYNCK and VERMEIRE (2009), a more targeted approach is needed according to the capacities of the companies. Another challenge is related to coping with the sometimes diverse interests of individuals and organizations in the network. The participation in SFIN's activities is handled by a number of 'enthusiasts' at the companies; these tend to act as gatekeepers, in many cases not willing or not able to spread the word within their organization.

Life science. The life science cluster in Scania represents one of the fastest growing niches in the regional economy of the past couple of decades. It draws on

long traditions through the presence of several large pharmaceutical companies. In the mid-1990s a cluster initiative, Medicon Valley Alliance (MVA), was put in motion with the aim to stimulate industry–university linkages and bi-national (Swedish–Danish) interaction. The initiative has contributed massively to the development of the cluster, not least because of its power of attraction on venture capital, research funds and human capital. Previous studies, though, indicate that the initial attempts of stimulating industry–university linkages within the region, as well as local firm–firm linkages, has been gradually supplemented with a heavier focus on promoting global visibility (MOODYSSON, 2007). Part of the rationale for this change of focus was that the organization behind the initiative gradually realized that they were unable to affect the formation of networks among the local actors (BENNEWORTH *et al.*, 2009). The initiative could not intervene in the professional networks of their target population; it was unable to become a natural part of their frame of reference.

The interviewed companies were mostly involved in medical and chemical life science. Their innovation activities were related to products such as new drug components, medical diagnostics and cosmetics. In order to achieve their goals they improved the ways in which they conducted research (by introducing new processes) and/or changed their organizational structure. Some of the companies with already developed products also entered new markets or broadened the scope of their research areas. In many cases it was actually hard for an observer to delineate between basic research and product development since these are so strongly integrated. Also, clinical practice served as an important part of the innovation processes, not least in the phase of verifying the new products or processes. The main characteristics of this industry with regard to the organization of innovation activities can thus be summarized in the following way. University–industry linkages are crucial, however not primarily on a local scale, but also through global linkages. Knowledge exchange as such allows long-distance relations; and the knowledge transferred is largely embedded in the specific skills of key personnel. Another key feature of the networks, besides being globally configured, is that they, at least in the initial stages of development, to a large extent draw on interpersonal rather than inter-organizational relations. The literature usually refers to such networks using terms such as 'epistemic communities' (HAAS, 1992). In later stages of development these networks transform into more established, and strongly regulated, alliances, usually involving university actors and small research-oriented companies; however, being led by large companies with sufficient financial resources for carrying out long and complex development processes has a high risk of failure (MOODYSSON and JONSSON, 2007). Yet, key individuals remain crucial knowledge providers. In this respect the life

science sector displays similarities with the food sector; however, the key individuals are in this case less 'gatekeepers' than holders of very specific technical and/or scientific knowledge. The long-term success of regions hosting strong research environments in the field of life science stand and fall with the ability of sustaining this key fraction of human capital in the region.

The structured interviews reveal that companies are generally well aware of different policy initiatives. The situation is a little different when it comes to use and benefits. Four companies did not use any support programme at all, mostly because of lack of time and because they could not see how their firm could benefit from participation. Three companies were official members of MVA, but could not specify any benefits they gained from it. The benefits of regional activities supporting life science development were indicated by twenty-four companies. The three most available benefits were access to market knowledge, the sharing of laboratories, and the sharing of knowledge with customers. The biggest needs perceived by firms were financial support, help to find partners, and the education and training of employees. Therefore, such as in the cases of media and food, there is a mismatch between what companies need and what it is available in the region.

Help to find partners is, as the two previous cases also illustrated, quite complicated to provide. Firstly, companies are mostly interested in partnership for real problem-solving and actual project group formation rather than open-ended social networking that is provided through conferences and seminars. Such as in the case of media, social networks and informal knowledge exchange are created through personal contacts and professional communities without a need, or possibility, for top-down support initiatives. However, finding partners for actual problem-solving and project group formation requires very specific competences from those that provide this support. Such competences are held primarily by key employees within the companies. Thus, in similarity with the other two cases, policy initiatives do not affect the regulative dimension of the institutional framework. This is very much defined by the national government (for example, laws applicable to all regions) and the specific regulations stated by the Food and Drug Administration and the Swedish Medical Products Agency. However, the creation of MVA itself, its activities during the first years after its establishment, and the strong support received from both the Swedish and Danish central administrations have had an influence on the normative institutions of this subsection of the regional innovation system. Many companies in this sector, especially the larger and more successful ones, feel 'obliged' to be part of the network (it became a norm), even when the benefits to the firm are not clear. In this way the influence of the policy initiative on network formation could be described as successful. However, since these 'obligated'

interactions seldom are accompanied with real knowledge exchange, and even more seldom with business transactions, the outcome is more debatable. Instead of responding to the encouraged network formation between firms and universities in the region, several of the firms, especially in the Swedish part of the region, display alienation. Furthermore, while this normative pressure reaches the organization (in particular, at the middle management level), it usually does not affect the key individuals within the companies.

DISCUSSION AND CONCLUSIONS

Looking at the concrete activities of the regional policy initiatives targeting three different regional industry clusters, they prove to be very similar in scope. They follow the commonsense formula for cluster organizations derived from the literature. The main focus is geared towards promoting the formation of coherence and collaboration in local networks, especially between industry and academia. The rationale for this strategy is that such networks are assumed to promote knowledge spillovers, innovation and the formation of new companies. None of the initiatives has presented any effect assessment of these activities, but the general opinion among stakeholders reflects strong confidence in the long-term results. However, firms and researchers targeted by the initiatives provide a slightly different view. Their initial enthusiasm partly diminished when several of the commercial actors gradually realized that network-promoting activities without substantial output in terms of new formal collaboration or business deals were hard to justify, and academic actors felt a growing alienation. This can partly be explained by the mismatch between the generic focus of these network-promoting activities (which is necessary to attract a critical mass) and the increasingly specialized demands identified by the actors, especially the key individuals in the media and life science companies. In addition to network promotion, much attention is paid to formulating strategic plans. Usually these are manifested in more or less concise mission and vision statements. An important effect of these, besides branding the region and the initiative, is the establishment of a shared vision among the regional actors. Surprisingly though, these strategies are fairly general, despite the widely recognized insight that such strategies must be attuned to and embedded in the specific needs and available resources of respective region. Furthermore, it seems like the more the organization in charge of the initiative grows (in size as well as influence), the more general the strategies become. At the same time, the opportunities for alternative measures being implemented in the region decrease since these platforms gradually develops into 'monopolies' for regional sector-specific policy support, acting as gatekeepers and nodes in which the vast majority of available support

measures are allocated. A general opinion among actors targeted by these three initiatives is that they are good for the region, but often of limited value for the firm. The firms support the initiatives because of this perceived positive impact on the region, but in the long run they consider withdrawing from their engagement and focusing on their core activities.

A dilemma rising from the way in which these activities are organized is that the policy initiatives gradually transform from more or less bottom-up managed and unregulated umbrella organizations towards more formal bodies displaying similar patterns of structures and hierarchies as regular organizations (for example, companies). This is a common phenomenon in the evolution of networks (BOSCHMA and FRENKEN, 2006), which, in turn, leads to a situation in which the initiative, created for the purpose of stimulating renewal, fails to fulfil this aim. Linking back to the basic objectives identified by OUGHTON *et al.* (2002), it is manifest that too strong efforts towards shaping coherence and collaboration through inclusion trigger a counter-reaction which, paradoxically, hampers the coherence it is set to support. This can be explained by the unavoidable need of creating hierarchies able to carry out large-scale programmes. In addition to such organizational factors another consequence works in the same direction: formalizing the initiative in an organization automatically leads to demands on consensus. This, in turn, creates a need for more general activities which reduces the applicability for single actors. Consequently, they resign from participation.

To sum up, this paper illustrates that different industries have different innovation practices and that regional capabilities are the sum of very diverse capabilities embedded in various actors within the region. Additionally, it reveals that regional policy-makers' possibilities to influence firms' networks seem to be limited. Despite that, the promotion of networks, mostly through social interactions, is at the core of all three analysed initiatives. However, the organization of innovation includes more aspects than knowledge exchange through social networking. Regarding next-

generation regional innovation policy, two main guidelines can be suggested. First, regional policy initiatives should become more specific. Regional policy-makers should take differences between industries seriously into account and establish sector- and firm-customized approaches into their programmes. Clear tools are needed to assess the needs and demands of their target population. This is closely related to the second guideline. In order to meet these specific needs, regional policy-makers should broaden the focus of their activities and include support for various aspects of the organization of innovation, not only, maybe not even primarily, network promotion.

Finally, both policy-makers and academics would benefit from better defined tools to evaluate companies' needs and demands. An improved conceptual discussion defining the position of regional policies in the institutional framework of the region, as well as combinations of different methods, would add interesting insights to the topic. These are just some of the questions to be addressed in future research.

NOTES

1. A desktop-based non-response analysis revealed no systematic differences in terms of size, age, and type of activities between responding and non-responding firms.
2. This judgment is based on a range of previous studies and official reports on policy support strategies in the region. In 2009 the regional authority (Region Skåne) initiated a large survey aiming to identify all actors and activities composing the regional innovation system (in which they also collected previous studies on the regional innovation system). The 'platform initiatives' analysed in the present study were identified as the most influential measures targeting these three industries (HALLENCREUTZ and BJERKESJÖ, 2009). Also in Region Skåne's official response to the Organisation for Economic Co-operation and Development (OECD) Territorial Review of Skåne (to be finalized in June 2012) these initiatives were put forward as the only examples of policy supporting media, food and life science in the region (REGION SKÅNE, 2011).

REFERENCES

- ANTONELLI C. (2000) Restructuring and innovation in long-term regional change, in CLARK G. L., FELDMAN M. P. and GERTLER M. S. (Eds) *The Oxford Handbook of Economic Geography*, pp. 395–410. Oxford University Press, New York, NY.
- ASHEIM B. T. and GERTLER M. S. (2005) The geography of innovation: regional innovation systems, in FAGERBERG J., MOWERY D. and NELSON R. (Eds) *The Oxford Handbook of Innovation*, pp. 291–317. Oxford University Press, Oxford.
- ASHEIM B. T., MOODYSSON J. and TÖDTLING F. (2011) Editorial: Constructing regional advantage: towards state-of-the-art regional innovation system policies in Europe?, *European Planning Studies* **19**(7), 1133–1139.
- AUDRETSCH D. B. and FELDMAN M. P. (2004) Knowledge spillovers and the geography of innovation, in HENDERSON J. V. and THISSE J. F. (Eds) *Handbook of Regional and Urban Economics*, pp. 2731–2739. Elsevier, Amsterdam.
- BATHELT H. (2005) Geographies of production: growth regimes in spatial perspective (II) – knowledge creation and growth in clusters, *Progress in Human Geography* **29**, 204–216.
- BECCATTINI G., BELLANDI M. and DE PROPRIIS L. (2010) *A Handbook of Industrial Districts*. Edward Elgar, Cheltenham.
- BENNEWORTH P., COENEN L., MOODYSSON J. and ASHEIM B. (2009) Exploring the multiple roles of Lund University in strengthening the Scania Regional Innovation System: towards institutional learning?, *European Planning Studies* **17**(11), 1645–1664.

- BORRÁS S. and TSAGDIS D. (2008) *Cluster Policies in Europe: Firms, Institutions, and Governance*. Edward Elgar, Cheltenham.
- BOSCHMA R. A. and FRENKEN K. (2006) Why is economic geography not an evolutionary science? Towards an evolutionary economic geography, *Journal of Economic Geography* **6**, 273–302.
- COOKE P. (2007) *Growth Cultures: The Global Bioeconomy and its Bioregions*. Routledge, London.
- COOKE P., BOEKHOLT P. and TÖDTLING F. (2000) *The Governance of Innovation in Europe: Regional Perspectives on Global Competitiveness*. Pinter, London.
- COOKE P., HEIDENREICH M. and BRACZYK H.-J. (Eds) (2004) *Regional Innovation Systems – The Role of Governance in a Globalized World*. Routledge, London.
- COOKE P., URANGA M. G. and ETXEBARRIA G. (1997) Regional innovation systems: institutional and organizational dimensions, *Research Policy* **26**, 475–491.
- EGSTRAND Å. K. and SÄTRE A.-M. (2008) Collaboration for local economic development: business networks, politics and universities in two Swedish cities, *European Planning Studies* **16**(4), 487–505.
- ETZKOWITZ H. and LEYDESDORFF L. (2000) The dynamics of innovation: from National Systems and ‘Mode 2’ to a Triple Helix of university–industry–government relations, *Research Policy* **29**(2), 109–123.
- FAGERBERG J. (2005) Innovation: a guide to the literature, in FAGERBERG J., MOWERY D. and NELSON R. (Eds) *The Oxford Handbook of Innovation*, pp. 1–27. Oxford University Press, Oxford.
- GELLYNCK X. and VERMEIRE B. (2009) The contribution of regional networks to innovation and challenges for regional policy, *International Journal of Urban and Regional Research* **33**(3), 719–737.
- GERTLER M. (2004) *Manufacturing Culture: The Institutional Geography of Industrial Practice*. Oxford University Press, Oxford.
- GERTLER M. (2008) Buzz without being there? Communities of practice in context, in AMIN A. and ROBERTS J. (Eds) *Community, Economic Creativity, and Organization*, pp. 203–226. Oxford University Press, Oxford.
- GRABHER G. (2004) Temporary architectures of learning: knowledge governance in project ecologies, *Organization Studies* **25**(9), 1491–1514.
- HAAS P. (1992) Introduction: Epistemic communities and international policy coordination, *International Organization* **46**, 1–35.
- HALLENCREUTZ D. and BJERKESJÖ P. (2009) *Skånes regional innovationssystem: en funktionsanalys*. Region Skåne, Malmö.
- HARRISON B. (1992) Industrial districts: old wine in new bottles?, *Regional Studies* **26**(5), 469–483.
- IAMMARINO S. (2005) An evolutionary integrated view of regional systems of innovation: concepts, measures and historical perspectives, *European Planning Studies* **13**(4), 497–519.
- ISAKSEN A. (2009) The innovation dynamics of global competitive regional clusters: the case of the Norwegian centres of expertise, *Regional Studies* **43**(9), 1155–1166.
- LAGNEVIK M., SJÖHOLM I., LAREKE A. and ÖSTBERG J. (2003) *The Dynamic of Innovation Clusters: A Study of the Food Industry*. Edward Elgar, Cheltenham.
- LAMBOOY J. G. and BOSCHMA R. A. (2001) Evolutionary economics and regional policy, *Annals of Regional Science* **35**, 113–131.
- LUNDEQUIST P. and POWER D. (2002) Putting Porter into practice? Practices of cluster building: evidence from Sweden, *European Planning Studies* **10**(6), 685–704.
- LUNDVALL B.-Å. and BORRÁS S. (2005) Science, technology, innovation and knowledge policy, in FAGERBERG J., MOWERY D. and NELSON R. (Eds) *The Oxford Handbook of Innovation*, pp. 599–631. Oxford University Press, Oxford.
- MALMBERG A. and MASKELL P. (2006) Localized learning revisited, *Growth and Change* **37**(1), 1–19.
- MARSHALL A. (1920) *Principles of Economics: An Introductory Volume*, 8th Edn. Macmillan & Co, London.
- MARTIN R. and MOODYSSON J. (2011) Innovation in symbolic industries: the geography and organisation of knowledge sourcing, *European Planning Studies* **19**(7), 1183–1204.
- MARTIN R. and SUNLEY P. (1996) Paul Krugman’s geographical economics and its implications for regional development theory: a critical assessment, *Economic Geography* **72**(3), 259–292.
- MASKELL P. and MALMBERG A. (1999) The competitiveness of firms and regions: ‘ubiquitification’ and the importance of localized learning, *European Urban and Regional Studies* **6**(1), 9–26.
- MCCALLION M. S. (2007) Multi-level governance in Sweden?, *Regional and Federal Studies* **17**(3), 335–351.
- MOODYSSON J. (2007) *Sites and Modes of Knowledge Creation: On the Spatial Organization of Biotechnology Innovation*. Lund University, Lund.
- MOODYSSON J. (2008) Principles and practices of knowledge creation: on the organization of ‘buzz’ and ‘pipelines’ in life science communities, *Economic Geography* **84**(4), 449–469.
- MOODYSSON J. and JONSSON O. (2007) Knowledge collaboration and proximity: the spatial organization of biotech innovation projects, *European Urban and Regional Studies* **14**, 115–131.
- NAUWELAERS C. and WINTJES R. (2002) Innovating SMEs and regions: the need for policy intelligence and interactive policies, *Technology Analysis and Strategic Management* **14**(2), 201–215.
- NORTH D. (1990) *Institutions, Institutional Change and Economic Performance*. Cambridge University Press, Cambridge.
- OUGHTON C., LANDABASO M. and MORGAN K. (2002) The regional innovation paradox: innovation policy and industrial policy, *Journal of Technology Transfer* **27**, 97–110.
- REGION SKÅNE (2011) *Detta är Skåne*. Region Skåne, Malmö.
- SAXENIAN A. (1994) *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Harvard University Press, Cambridge, MA.
- SCHWERIN J. and WERKER C. (2003) Learning innovation policy based on historical experience, *Structural Change and Economic Dynamics* **14**, 385–404.
- SCOTT W. R. (1995) *Institutions and Organizations*. Sage, London.

- STORPER M. (1997) *The Regional World: Territorial Development in a Global Economy*. Guilford, New York, NY.
- STORPER M., LAVINAS L. and CELIS A. M. (2007) Society, community, and development: a tale of two regions, in POLENSKE K. R. (Ed.) *The Economic Geography of Innovation*, pp. 310–339. Cambridge University Press, Cambridge.
- TÖDTLING F. and TRIPPL M. (2005) One size fits all? Towards a differentiated regional innovation policy approach, *Research Policy* **34**(8), 1203–1219.

Article II

Regional Innovation Policy Beyond ‘Best Practice’: Lessons from Sweden

Roman Martin · Jerker Moodysson ·
Elena Zukauskaitė

Received: 29 September 2011 / Accepted: 30 September 2011 /
Published online: 12 October 2011
© Springer Science+Business Media, LLC 2011

Abstract This paper deals with policy measures in the regional innovation system of Scania, Southern Sweden. Focus is on the innovation policy requirements of actors representing industries that draw on different knowledge bases. Previous studies have identified profound industry-specific differences concerning the organisation of knowledge sourcing between firms and other actors. In correspondence with these findings, industries are also expected to vary with regard to how policy measures aiming to support innovation are perceived and implemented. Still, there is a tendency among regional policy programmes to base their strategies on one ‘best practice’ model, inspired by successful (or sometimes less successful) cases in other parts of the world. Here, regional policy initiatives targeting three distinct industries in Scania, namely life science, food and moving media, are discussed, in particular their ability to meet the specific needs and demands of firms in these industries. The findings reveal that the existing initiatives are customized on a rather generic level and not sufficiently fine-tuned to the particular needs and demands of the respective actors. Policies are recommended to take the specific characteristics of the industrial knowledge base into account in order to provide appropriate support and to become an effective part of the institutional framework of the regional innovation system.

Keywords Innovation policy · Regional innovation systems · Knowledge bases · Sweden

R. Martin (✉) · J. Moodysson · E. Zukauskaitė
CIRCLE (Centre for Innovation, Research and Competence in the Learning Economy),
Lund University, P.O. Box 117, 22100 Lund, Sweden
e-mail: roman.martin@circle.lu.se

J. Moodysson
e-mail: jerker.moodysson@circle.lu.se

E. Zukauskaitė
e-mail: elena.zukauskaitė@circle.lu.se

Introduction

This paper deals with policy measures in the regional innovation system of Scania, Southern Sweden. Particular focus is devoted to assessing the needs and demands made on innovation policy by actors representing different industries and the extent to which existing regional policy programmes have managed to meet these needs and demands.

Previous studies have identified profound differences in the modes of innovation among industries that draw on different knowledge bases [5, 34]. In correspondence with these findings, industries are also expected to differ with regard to how policy measures aiming to support innovation are perceived and implemented. Summarizing the differences in the modes of innovation, it can be said that knowledge sourcing and inter-organisational collaboration in geographical proximity are especially important for industries that rely on a synthetic or symbolic knowledge base since interpretation of the knowledge they deal with tends to differ substantially from place to place. This is less the case for industries drawing on analytical knowledge since such knowledge is codified, abstract and universal. Knowledge sources related to scientific knowledge and principles are particularly important for analytical industries, whilst synthetic industries rely more on experience-based learning and applied R&D, and symbolic industries on creativity and non-scientific knowledge [3].

We argue that regional innovation policies should take these differences seriously into account in order to provide appropriate support and shape good conditions for innovation to take place. However, there is a tendency among regional policy programmes to base their strategies on one ‘best practice’ model, neglecting such industry-specific needs and preconditions [20]. This paper presents three existing regional innovation policy programmes supporting three different industries located in the same region and analyses to what extent these have been fine-tuned to the needs and demands of the respective industries. The knowledge-base approach serves as a conceptual framework and principle for the selection of cases. The main questions addressed in the paper are thus (1) how needs and demands on policy support differ between industries that draw on different knowledge bases, (2) whether and how the existing regional policy support programmes meet these distinct needs and demands, and, partly as a consequence of the previous two, and (3) whether and how the existing policy measures have a real impact on the behaviour of their target population and succeed in becoming an integral part of the institutional framework of the regional innovation system.

Conceptual Framework

With the aim of generating economic growth, regional authorities are more and more engaged in designing framework conditions to support innovation [16]. This emphasis on innovation in regional policy was initially triggered by the recognition that regions can no longer compete merely by offering basic technical infrastructure, skilled labour and financial incentives to attract investors. Policies following such a traditional approach have been proven to be rather ineffective when it comes to

solving problems of unfavoured regions today. A central problem of many old industrial and declining regions is the low performance with regard to innovation and a reluctance to change, which leads to a certain risk of locking into a development path that, although perhaps previously successful, holds little promise for the future. In order to create sustainable economic growth, regions need to redefine themselves continuously and move towards more auspicious trajectories [21].

The literature on regional development highlights different aspects of regional infrastructure in the process of redefinition. Storper [42] emphasizes the importance of region-specific assets such as norms, habits and conventions which add to regional uniqueness, creating competitive advantage. This idea is also supported by Swyngedouw [43] who argues that the economic success of cities and regions is highly dependent on the local sectoral and institutional configuration and on the framework of governance in which regional and urban economies are embedded. However, due to increased economic reflexivity [42], concrete patterns of competitive advantage are constantly changing, requiring the economic actors to catch up. Therefore, an institutional framework and governance that facilitate learning are necessary for survival in contemporary capitalism. Those that can learn faster or better are more competitive [1]. As a response, regional policy makers are typically advised to promote and support interactive learning and cooperation in the local sphere.

This is in line with one of the key arguments in the literature on regional innovation systems; that is, regional growth and competitiveness are dependent on the ability of local actors to exchange knowledge and build networks. The important actors in this respect are private firms, governmental agencies, as well as universities and other public research [5]. The regional innovation systems approach thereby emphasizes the importance of networking and considers the firm as having the leading role in innovation [8]. Missing or inappropriate institutions supporting innovations or missing or inappropriate interactions of the actors in the system are among the most common failures preventing the fluent functioning of innovation systems [11]. Very much related, the triple helix model describes a spiral trilateral interaction of the academia, industry and government, and thereby stresses the role that universities can play for economic development beyond being organisations for education and knowledge generation. Universities, government and industry are learning to promote economic growth within a specific local context through the development of what is called ‘generative relationships’, that is loosely arranged reciprocal relations between actors that persist over time [15].

Both the RIS and the triple helix approach emphasize the crucial role of networks and relations between learning counterparts. The importance of networking for innovation is also supported by Lambooy and Boschma [26] who define two objectives for regional policies—efficient capital markets and good access to information and stimulation of economic actors’ innovative capabilities through networking and interactive learning. This is in line with Schwerin and Werker’s [39] argument that innovation policy should support knowledge networks in a non-selective manner. As a consequence, regional polices tend to focus strongly on designing framework conditions for knowledge exchange as their main measure of innovation support. However, what is often missed in theoretical discussions is that

actors within these networks differ depending on the industry to which they belong, partly as a consequence of their specific knowledge-base characteristics [5]. This implies different barriers to innovation, and it follows that, in order to succeed, policies need to account for such specific needs and characteristics of their target industry.

Regional Policy and Institutional Framework Conditions

Despite wide acceptance among researchers as well as policy makers that societal institutions matter in economic operations, there is neither consensus on what is meant by institutions, nor how institutions matter more precisely [24, 38]. To begin with, institutions and organisations are not the same. Institutions are considered to be the rules of the game, relatively enduring features of political and social life that shape, constrain and structure the behaviour of organisations (universities, firms, governmental agencies, etc.) and individuals [28, 36]. Sheingate [41] argues that institutions are *constraining* insofar as they establish parameters for action, but they are also *empowering* for individuals to develop innovation in practice. Such rules are essential for the systematic actions of organisations and individuals.

Many studies of institutional change analyse the possibilities for institutional innovations resulting from the interpretation and application of existing rules [29]. This is also the context in which Sheingate [41] grounds his arguments. However, in the case of innovation policies, institutions might have a direct impact on innovative actions. One example of the ambiguous relations between constraining and empowering institutions is the system for public funding of new research activities. By giving priority to some research areas or collaboration, the funding system contributes to shaping the development of research. On the one hand, the funding system thus constrains the paths that research might take by excluding certain areas and organisational forms at the same time as empowering those that are found strategically important. From a policy point of view, such efforts might be necessary to create a critical mass and contribute to shaping possibilities for more efficient research.

On a more general level, North [36] classifies institutions into formal (i.e. officially stated) and informal. The latter are not necessarily explicitly communicated but rather shaped by common social context and implicitly perceived by the actors. Scott [40] specifies institutions in even more detail and separates regulative, normative and cognitive ones. Regulative institutions represent rules and laws that work as coercive mechanisms and are legally sanctioned. Normative institutions are values, norms, codes of conduct, not legally sanctioned but morally governed. Cognitive institutions are beliefs and models of reality taken for granted and supported by culture and everyday practices. These should thus be understood as interdependent and mutually reinforcing pillars, which, seen as a whole, define the institutional framework within which economic actors function and interact [32]. The three industries analysed in this paper are obviously embraced by regulative frameworks at a national as well as at a supranational (e.g. EU) level, and to some extent, these regulations can be described as sector-specific (e.g. formalized standards, safety regulations, etc.). However, and more importantly in the context of this study, everyday practices, norms and routines of industries, which can be referred to as constituents of cognitive and normative frameworks, also differ.

Before moving on to a discussion of the relations between policies and the formation and development of institutional frameworks, it is worth clarifying what is meant by regional innovation policy in this paper. A full account of existing regional innovation policies would include a wide range of measures promoting innovation not only at regional but also at national and supranational levels (to the extent that these have an impact on innovation in regions, which they almost by definition have). Concrete examples of the latter would be EU structural funds (notably the European Regional Development Fund) and various national funds in support of innovation (e.g. those provided by VINNOVA in Sweden). Although acknowledging their potential impact on innovation in regions (either directly or indirectly), it would go beyond the scope of this paper to include all such general framework conditions in the actual analysis. Following Edquist's [13] definition of innovation policy as actions by public organisations to influence innovation processes, we therefore refer to regional innovation policies as concrete support programmes targeting innovation in specific regions (in this case Scania). Since our aim was to assess the abilities to fine-tune policy for specific industries, we focus on sector-specific examples of such regional initiatives and analyse by what means and to what extent they add to the creation of a regional institutional framework supporting innovation in their target industries.

This choice of focus is partly influenced by the governance structure in Sweden in which regional authorities have a quite limited direct influence on economic policies. They are responsible for promoting regional development and planning in the areas of industry, communication, culture and cooperation with other regions within and outside Sweden. In this way, they influence to some extent the preconditions for the economic performance of the region and contribute to creating normative—constraining and enabling—institutions for many activities [14]. Their efforts might also, in an indirect manner, influence the regulative framework, but most concrete measures are ultimately handled either by the central (state) government or the local (municipality) authorities. For this reason, most regional innovation policies (defined as above) are carried out in collaboration with local and national stakeholders. Among the most influential and visible regional innovation policy constructs are the type of consortia analysed in this paper in which regional, national and local representatives, from public as well as private sectors, join forces in dedicated efforts to influence the regional institutional framework. Most of those target specific sectors.

As noted by Mahoney and Thelen [29], institutions are not just designed but also have to be applied and enforced. It follows that institutions 'work' only if the actors whom they target comply with them [25]. Cognitive institutions are perceived unconsciously; thus, actors do not think about not complying [29]. In the case of regulative institutions, compliance is enforced by law and the perception of non-compliance might be very costly. However, normative institutions come into being only if actors perceive that certain norms and codes of conduct are beneficial for their performance and meet conventional conceptions of fairness [19]. The central challenge for regional innovation systems policy is thus to promote such compliance with the rules, regulations, norms and patterns of cognition defining the institutional framework of the system at the same time as stimulating the change towards innovation. Regional innovation system policies will thus feed into the institutional

framework in a fruitful way only if they meet practical, appropriate and sensible requirements [6].

According to Helgoy and Homme [22], authorities might use two types of policy tools to influence institutional change. The first type is input regulations which include legislation, organisational frameworks and funding possibilities. The other category is made up of accountability tools which include information, training, education and value-based marketing of policy programmes. These tools attempt to influence behaviour through the transfer of knowledge and through persuasive reasoning. Relating to Scott's [40] typology, we argue that the input regulation tools primarily address change in the regulative institutional framework, whilst accountability tools can potentially influence the normative and cognitive institutions (to the extent that policy has an impact at all). Regional innovation policies primarily aim at changing normative institutions within the region by promoting collaboration, learning and knowledge exchange [35]. In other words, since regional policy makers have quite limited access to input regulation, they primarily use accountability tools to introduce the change. We illustrate below how preconditions for such policy impact differ from industry to industry, even though they are part of the same regional innovation system.

Industry Needs, Demands and Crucial Knowledge Bases

Demands for policy support from firms might be assessed in an indirect manner through studying the actual involvement of industry representatives in various forms of activities initiated by the support structure of the regional innovation system. Another, in our view more fruitful approach, would be to assess the demands in a more direct way, simply by asking the firms what they demand from policy. Identifying the real needs is more complicated. As noted by Edquist [13], needs are not the same as demands—they have to be translated into articulated demand. It follows that companies do not necessarily know what their real needs are, and the translation process into articulated demand might suffer from bias. Consequently, only satisfying the explicitly communicated demands of target groups might lead to fatal mistakes in which the policy support programme contributes to creating a lock-in situation.

To deal with this (potential) problem, the empirical assessment of firm demands is enriched by a theoretically based assessment of needs derived from the main arguments of the differentiated knowledge-base concept [5]. We argue that this concept, through clarifying different preconditions for innovation in different industries, can serve as a heuristic model for designing fine-tuned regional innovation policy. To explain patterns and modes of innovation in different regions, industries or firms, three different types of knowledge base are distinguished, namely analytical, synthetic and symbolic. It is important to say that this distinction is intended as a mode of conceptual abstraction. In practice, most activities will comprise more than one knowledge base, and the degree to which a certain knowledge base prevails can vary substantially between different activities [2, 4]. Nevertheless, the distinction has been proven to be suitable for specifying and explaining the differences of economic activities in an ideal-typical manner. The main characteristics of the respective knowledge bases are described in the following.

An analytical knowledge base is dominant in economic activities where scientific knowledge is important and where knowledge creation is primarily based on formal models, codified science and rational processes [5]. Examples mentioned in the literature are genetics, biotechnology and information technology [10]; this paper focuses on the life science industry. For analytical industries, basic as well as applied research is an important activity, and new products and processes are developed in a relatively systematic manner. Firms usually have their own R&D departments, but also rely on knowledge generated at universities and other research organisations. For that reason, the linkages between private firms and public research organisations are considered as particularly important and take place more frequently than in other industries. Since analytical industries deal with scientific knowledge stemming from universities and other research organisations, they depend to a large extent on codified forms of knowledge contained in scientific publications and patents. These forms of knowledge are relatively easy to share and exchange over long distances. Therefore, knowledge sourcing in these industries is assumed to take place on a wide geographical scale, often within globally configured networks.

A synthetic knowledge base prevails in industries that create innovation through the use and new combinations of existing knowledge with the intention of solving concrete practical problems [5]. Examples mentioned in the literature are plant engineering, specialized industrial machinery and shipbuilding; this paper focuses on innovative food production. In these industries, formal R&D activities are of minor importance; innovation is driven by applied research or more often by incremental product and process development. Linkages between university and industry are relevant, but occur more in applied R&D and less in basic research. New knowledge is generated partly through deduction and abstraction, but primarily through induction, encompassing the process of testing, experimentation, practical work or computer-based simulation. Knowledge that is required for these activities is partially codified, but the crucial form of knowledge is in many cases tacit due to the fact that new knowledge often results from experience gained through learning by doing, using and interacting. In comparison with analytical industries, knowledge networks are assumed to be less globally configured, and much knowledge sourcing takes place within national or regional boundaries, be it through the mobility of employees or cooperation with other firms. At the same time, many synthetic firms are involved in international user–producer relations, which provide knowledge linkages not to be neglected.

The symbolic knowledge base is a third category that is receiving increasing attention in the scientific discourse in view of the growing importance of cultural production [4]. It is present within a variety of industries such as film, television, publishing, music, fashion and design, whereas the example in the present study is the moving media industry. All these activities have in common the fact that they are devoted to the generation of aesthetic value and images and less to physical goods. Symbolic knowledge can be embedded in material goods such as clothing or furniture, but the impact on consumers and the economic value as such arise from its intangible character and aesthetic quality. Symbolic knowledge also includes forms of knowledge applied and created in service industries such as advertising. Since these industries often produce through short-term contracts and within small project teams, knowledge about possible partners for cooperation and knowledge exchange

(know-who) are particularly important. Symbolic knowledge is highly context-specific as the interpretation of symbols, images, designs, stories and cultural artefacts “is strongly tied to a deep understanding of the habits and norms and ‘everyday culture’ of specific social groupings” [4]. Therefore, the meaning and the value associated with symbolic knowledge vary considerably from one place to another. This also reflects the spatial dispersion of knowledge networks, which are, due to the context specificity of symbolic knowledge, predominantly locally configured [31].

Empirical studies have confirmed the theory-led expectations of the distinct geography and organisation of knowledge sourcing of industries drawing on different knowledge bases [30]. The exchange of knowledge in geographical proximity is particularly important for symbolic industries since the interpretation of knowledge they deal with tends to vary. Accordingly, cooperation and knowledge exchange occur above all within locally configured networks. Models and principles stemming from academia have little importance since innovation is driven by creativity rather than the application of scientific laws. Synthetic industries deal to a higher extent with codified knowledge, which is less context-specific; however, the dominating form is still tacit. Therefore, cooperation and knowledge exchange occur primarily among partners in the same functional region, but actors on the national and global levels also play considerable roles, not least in user–producer relations [7]. Analytically based industries rely on scientific knowledge that is codified, abstract and universal, and are therefore not very sensitive to geographical distance. In line with this, knowledge exchange occurs in globally configured epistemic communities rather than in locally configured, trust-based networks [17, 33].

Survey and Analysis

The three industries under study are (1) the life science industry, (2) the food industry¹ and (3) the moving media industry. The empirical cases are clusters of firms, representing these three industries, located in the southernmost province of Sweden. The main method for data collection was structured interviews with representatives of the firms. A total of 95 structured interviews were conducted: 30 for the life science industry, 28 for the food industry and 37 for the moving media industry. This corresponds to a response rate of 72% for the life science cluster, 80% for the food cluster and 50% for the moving media cluster.² The main aim of these interviews was to identify the type of support, according to the perception of the firms, that is needed by them and the type of support that is provided by the existing policy programmes.

To find out in more detail what the existing policy programmes claim to provide in terms of support, document studies were combined with in-depth interviews with key individuals representing the regional policy programmes. A total of 15 such

¹ The study is limited to a specific sub-segment of the food sector, including firms working specifically on the development of new products and/or processes related to food production. A large number of food-producing companies are hence excluded from the sample.

² A desktop-based non-response analysis has revealed no systematic differences in terms of size, age and type of activities between responding and non-responding firms.

interviews with policy makers were conducted. These interviews allowed us to make an in-depth assessment of the actual activities carried out in the policy programmes despite the fact that most of the documents are fairly vague when it comes to specifying the concrete activities. Additional input for assessing the policy programmes was received through participation in focus group meetings involving representatives of the regional council, one of the main stakeholders responsible for the design and implementation of the programmes. These meetings allowed us to discuss the stakeholders' views on the workings of their activities as well as the main challenges and achievements in the course of the programmes. Eight such meetings were held during the period from February 2009 to March 2010. Through this combination of different strategies for data collection, we aim at assessing the correspondence between the required and provided policy support from the point of view of both the target population (the firms) and the policy stakeholders.

Overview of the Three Industries Under Study

As stated above, all three cases analysed in this study are located in the region of Scania, southern Sweden. The actors are clustered in (or close to) two cities, Malmö and Lund. Malmö is the third largest city of Sweden and Lund hosts the largest university of the country. All three industries are considered to be of high importance for regional development by the regional governmental body Region Skåne [23].

The cluster of life science, the third largest in Sweden (after Stockholm and Västra Götaland), is a heterogeneous sector in terms of size and areas of activity. It contains about 30 research-based biotechnology companies focusing on new pharmaceuticals and medical R&D, and about the same number of medical biotechnology and equipment-oriented companies. However, the regional value chain of this sector is quite limited in scope; pure production is not well developed. The majority of biotechnology companies have been established after 1995 and are clustered around Lund University and in the Ideon or Medeon science parks. Most of the companies are spin-offs from Lund University or large pharmaceutical companies that have been present in the region for many decades. The companies are small and most often unprofitable, measuring their success in terms of R&D investments rather than economic revenues. The life science industry in Scania is part of a larger cross-border cluster named Medicon Valley, which also includes life science companies and research institutes in the Danish capital Copenhagen and its surroundings.

Scania has a strong national position in food production. One quarter of the country's food industry is located in the region, employing about 25,000 people. The majority of companies are clustered in the western part of the region. Their activities cover the whole food production value chain from primary production to storage, transport, and packaging and processing. Global competition accelerated as a consequence of Sweden's accession to the European Union in 1995, which increased the pressure on the Scanian food industry to develop towards higher value-added niche products involving greater knowledge content. Examples of such renewal towards knowledge-intensive activities are the developments of the so-called convenience food, functional food and specific niches of healthy food. The food cluster under study in this paper is composed of such innovative companies which

build their competitive advantage on the ability to produce new and better products through new and better processes in areas such as dairy, bakery, meat and fish processing, juice production and the like. The case study thus covers a specific knowledge-intensive subset of the food industry in the region.

The concept of moving media is used to describe the intersection of industries such as film, television, computer games, mobile technology and other types of graphical design applications. Drawing on its roots in traditional media and ICT, this sector, a relatively new niche in the regional economic structure, experienced strong growth in the beginning of the last decade. Most of the companies within the region are young and small. They are located in Malmö's Western Harbour, the same location of large parts of the publicly administered knowledge and support infrastructure targeting this industry.

Overview of the Three Regional Policy Support Programmes

There are three main regional policy support programmes specifically targeting these different industries. All three are organised as consortia in which public and private organisations representing different spatial administrative levels (local, regional, national) join forces in support of their target industry. Medical Valley Alliance (MVA) aims at promoting the life science industry (drawing on an analytical knowledge base). Skåne Food Innovation Network (SFIN) focuses on the food industry (drawing on a synthetic knowledge base) and Media Evolution (ME) provides support to the moving media industry (drawing on a symbolic knowledge base). More detailed accounts of each policy initiative, with a focus on what they (claim to) provide to the respective industries, are provided below.³

MVA started in the middle of the 1990s as a cluster initiative with the aim of stimulating industry–university linkages and binational (Swedish–Danish) interaction in the field of life science. It was a result of an EU Interreg project in which Lund University and the University of Copenhagen took the lead, joined by three of the region's largest pharmaceutical companies and a number of public actors responsible for regional development in Sweden and Denmark (within the framework of the Öresund Committee, a platform for cross-border policy cooperation). Initially, the main focus of this initiative was to increase the economic integration of the cross-border region and to stimulate cooperation between companies and universities. With time, the focus of the initiative transformed and broadened; MVA now has several initiatives with possible benefits for their member companies. Some activities, such as the MVA annual meeting, MVA golf championship and MVA executive club, primarily aim at social networking of members in the cluster. The MVA Life Science Ambassador programme and the Meeting MVA initiative aim at global knowledge exchange among life science companies. It is implemented by exchanging ambassadors between Medicon Valley and clusters in Japan, Canada and South Korea whose task is to assist foreign firms

³ In the remainder of this paper, we also refer to these policy support programmes, and the activities they claim to provide, in the section discussing the benefits perceived by the firms. It is important though to note that some of these activities are provided through synergies with the broader support structure of the regional innovation system, such as more generically focused science parks, incubators and business support organisations.

to get in touch with local companies or organise seminars and conferences on how to do business in the respective areas. Thus, together with strengthening cross-border relations and local cooperation in MVA activities, there has been a shift towards international marketing of the region and global networking.

SFIN was created in the middle of the 1980s in order to increase the food sector's international competitiveness, mainly through connecting the food industry with other relevant industries such as packaging, machinery, logistics and academia. SFIN is involved in human capital and competence development within the industry through presenting the food sector to students during career days, specially organised tours and internship programmes. The initiative also assists in opening new innovative markets and supports the development of innovations by facilitating connections with academia and, to some extent, providing financial support for R&D. It is also engaged in the design and development of higher education programmes at Lund University. However, the main focus of the initiative is networking and communication among the actors. It runs a 10-year development project called Food Innovation at Interfaces, funded by a consortium of state actors (primarily VINNOVA), Region Skåne, Lund University and some food companies in Scania. The overall objective is to improve cooperation within the food industry and between food companies and academia, thereby stimulating innovation and economic growth.

ME is a continuation of a policy initiative named Media Mötessplats Malmö, a project which started in 2004. It was initiated by Region Skåne, Region Blekinge, the City of Malmö and Scandvision, which is one of the larger companies in the sector. ME is an umbrella organisation unifying several small initiatives that were present in the region. A key task of the initiative is to strengthen links between traditional and new media for moving images and to serve as a meeting place for actors focused on the production, distribution and consumption of new media. More concretely, the initiative claims to support the development of the industry by providing knowledge about new market possibilities and initiating collaboration projects among the actors in the region (e.g. living labs); competence development and social networking (e.g. fairs, conferences, seminars); entrepreneurial consultations, contact and business development (e.g. incubator); and access to venture capital. ME also strives to promote the linkages between industry and academia, partly through providing platforms for interaction, lobbying and information campaigns about the university sphere.

The following section outlines the results from the structured interviews with firms belonging to the moving media, food and life science clusters in Scania. Firm representatives were asked to specify the type of policy support they require and perceive as relevant for their innovation activities and to describe how they benefit from existing policy programmes available in the region (i.e. ME, SFIN and MVA).

Demand for Policy Support

There is a set of policy measures that can be implemented in order to stimulate innovation in the regional economy. Typical support measures are financial provisions in the form of grants for R&D and innovation activities, support for knowledge exchange through various forms of networking, human resource

development in the form of seminars and training courses, and improved access to knowledge related to technologies or to new developments on the market. The companies were asked what types of policy support they require and perceive as relevant for their innovation activities.

Table 1 summarizes the types of policy support demanded by firms and reveals both a general trend and industry-specific differences. Irrespective of what sector they belong to, firms request policy support programmes to identify and mobilise additional sources of funding. Monetary support seems to be important in general, even though there are observable differences between industries. Public funding is particularly demanded by firms in the life science industry (73.3%), whilst this is less so for the moving media (64.9%) and even less so for the food industry (53.6%). Innovation in the life science industry is often carried out in R&D laboratories with rather sophisticated and expensive technical equipment. Only companies with sufficient financial assets can afford their own equipment, whereas young and small firms need to rent facilities and machinery. The importance of public funds can also be explained by the risky nature and lengthy time horizon of innovation projects in life science in which the transformation of scientific research into commercial products can take several years [9, 18]. Innovation in the food industry, in contrast, is less dependent on high-cost technical equipment and time-consuming trials; it is instead driven by the know-how, craft and practical skills of people. Firms in the food industry need, above all, a workforce with good practical training, which is reflected by a high demand for policy initiatives addressing staff training (53.6%).

Very clear differences can be observed when it comes to networking of industries, e.g. policies facilitating the search for new partners. Whilst firms in the moving media (51.4%) and life science industry (56.7%) have a high demand for networking, only a few firms in the food industry (17.9%) are interested in such support. In the media industry, innovation activities are often carried out in flexible and short-term alliances involving various partners. Thus, access to a wide range of possible collaborators is important. Previous research has shown that collaboration in the moving media industry occurs predominantly with other firms in the same region, whereas collaboration with universities and actors outside the region plays a minor role [30]. Similar to moving media, actors in the life science industry are continuously seeking partners for cooperation, but such alliances often occur within globally configured networks between firms and various research organisations [17]. In contrast to this, the food industry is less engaged in the search for new partners; it

Table 1 Policy support demanded by firms in different industries

	Life science (<i>n</i> =30)	Food (<i>n</i> =28)	Moving media (<i>n</i> =37)	Total (<i>n</i> =95)
Financing (%)	73.3	53.6	64.9	64.2
Networking (%)	56.7	17.9	51.4	43.2
Staff training (%)	50.0	53.6	48.6	50.5
Information about market (%)	46.7	14.3	29.7	30.5
Information about technology (%)	16.7	35.7	40.5	31.6

Source: Own survey

is a rather mature industry with a long history in the region, which implies that partnerships have developed and persist for a long time. However, the industry is increasingly exposed to international competition; thus, firms need to reconfigure their established networks and improve their access to technological knowledge. This is in line with the observation that a large share of firms demands policy support regarding access to information on technologies (35.7%), whereas only a few demand support for access to information on markets (14.3%). The opposite can be observed for the life science industry in which few firms require help to find information about technologies (16.7%), whilst a larger share demands access to market information (46.7%).

Perceived Benefits from Existing Policy Support Programmes

The previous section presented the kind of support that is perceived as important by companies' representatives. This section elaborates on the benefits that companies perceive they have achieved through their respective policy support programmes (Table 2).

To begin with, there are large differences between the food industry (28.5%) and the two other industries (69.4% and 80.0%) regarding the share of the companies that could identify benefits from any type of policy support. As mentioned above, the food industry has had a long history in the region, with established routines and partnerships for its business activities. Food companies thus do not express any demand for external help to find partners (see Table 1). A policy initiative like SFIN, primarily focusing on promoting networking between companies or between companies and the university, can hardly attract firms to participate in its activities since the immediate benefits are not obvious to the firms. Part of the challenge for policy makers is thus to translate the identified needs for network renewal to an offer meeting the demands articulated by the companies. Due to low participation in the policy initiative, the results of the various types of benefits are not comparable with the results for the other two industries. The remainder of this section will thus primarily discuss the results for the life science and media industries.

Both the media and the life science industries perceived that they benefited most by receiving support for getting access to market knowledge. Around half of the

Table 2 Benefits achieved by firms in different industries

	Life science (<i>n</i> =30)	Food (<i>n</i> =28)	Moving media (<i>n</i> =37)	Total (<i>n</i> =95)
Financing (%)	6.6	10.7	5.4	7.3
Networking (%)	36.6	17.8	54.0	37.9
Staff training (%)	23.3	14.2	13.5	16.8
Information about market (%)	46.6	10.7	48.6	36.8
Information about technology (%)	23.3	17.8	18.9	20.0
Any type of policy support (%)	80.0	28.5	69.4	60.0

Source: Own survey

moving media (48.6%) and life science (46.6%) firms indicated this as a concrete benefit from their respective policy support programmes in the region. Since information about markets is one of these industries' most clearly identified demands (see Table 1), it is likely that the firms consciously use these policy programmes to improve their competitive advantage. It has to be said, however, that fewer moving media firms expressed a demand for market knowledge compared with life science firms. Despite the big demand for financing (see Table 1), very few firms in the media (5.4%) and life science (6.6%) industries indicated that they acquired any financial support from existing policy initiatives. This is not surprising since regional policy programmes of the type analysed in this paper generally aim for indirect support targeting the system level rather than direct support targeting individual firms. The contribution to financial capital mobilisation in the region is thus indirect, mostly through attracting investors and providing information about venture capitalists and various sources of R&D support, primarily administered at the national and international levels [37].

The firms in both industries got only moderate support regarding access to technology knowledge and staff training. However, some differences should be addressed. More life science firms (23.3%) indicated that they received help with human resource development than media firms (13.5%). One potential explanation for this could be that staff training in symbolic industries is less related to formal education and codified knowledge, whilst tacit understanding of local culture and personal abilities to create artistic artefacts are crucial. Both these are hard to provide from outside, and even if achieved through interactions with other companies during social events and workshops, organised by policy support programmes, they are not necessarily consciously perceived by companies' representatives. In the case of codified knowledge exchange and formal education, the support is easier to notice and evaluate. This is also in line with the main focus of Swedish innovation policy in which most attention is paid to support for R&D and higher education [12, 27].

The findings on access to technological knowledge are interesting in relation to demands on the policy initiatives by companies. As mentioned above, support for access to technological knowledge is perceived as moderate in both industries. About 18.9% of the moving media firms and 23.3% of the life science firms indicated this as a concrete benefit. However, the life science industry does not demand it (see Table 1), possibly because technological knowledge defines the core competence of these firms and, therefore, largely managed internally. The media companies, on the contrary, display a high demand for technological knowledge. Symbolic industries do not produce new technologies; however, they use them in the creation of cultural artefacts. Technological knowledge is thus needed for competitiveness of the firms, but it is not at the core of their competence. Thus, in order to access it, they might need external support. Important to note, though, is that technological knowledge does not necessarily equal scientifically based knowledge, which is indeed strongly prioritized in Swedish and European innovation policies [12, 20, 27]. The media companies are clearly more in need of experience-based practical knowledge such as craftsmanship, which can help them materialize their ideas and communicate their symbolic knowledge, than scientific and engineering-based knowledge as input for product or process innovations. Such support is rare, if not nonexistent, in Swedish and European innovation policies.

The results with regard to how the firms perceive the benefits in terms of support for networking activities of the industries reveal observable differences. More than half of the companies in both industries expressed a high demand for help to find partners (i.e. network promotion). Nonetheless, the share of firms that benefited from support in networking activities was much larger in the moving media industry (54.0%) than in life science (36.6%). This result is most likely a consequence of the different modes of innovation characterizing the different industries. Firms in symbolic industries mostly collaborate and exchange knowledge locally, whilst knowledge exchange in analytically based industries is embedded in globally configured professional knowledge communities [17, 31, 33].

Naturally, regional policy support programmes have better capacity to promote local than global networking, and a vast majority of the network promoting activities initiated by the regional policy support programmes are geared towards intra-regional networks. There is also a tendency among these activities to prioritize university–industry networks, whilst the firms’ demands are more in favour of networking in the same or related sectors. Furthermore, and somewhat paradoxically given the focus on industry–university networks, the support programmes mostly promote networking through various forms of social events. In symbolic industries, it might be appropriate to acquire ‘know-who’ information about each other and to discuss possible collaboration. In analytical industries, on the other hand, research is very specialized and social events are not sufficient to exchange knowledge of scientific and technological ‘know-why’. There is thus a double mismatch connected to network promotion through such industry-specific regional policy support programmes in Scania. In terms of geographical scope, there is a mismatch between needs/demands and received policy benefits primarily for life science and partly for food industries, whilst in terms of scope, there is a mismatch between needs/demands and received policy benefits for all three sectors.

Discussion and Conclusions

This paper addresses three main research questions. Firstly, how needs and demands for policy support differ for industries that draw on different knowledge bases; secondly, whether and how the existing regional policy support programmes meet the needs and demands; and, thirdly, whether and how the existing policy measures have a real impact on the behaviour of their target population and succeed in becoming an integral part of the institutional framework of the regional innovation system.

To sum up the findings in relation to the first and second questions, the three industries have both similarities and differences. All three demand financial support; however, this is the demand least met by regional policies. About half of the interviewed companies in all three industries demand labour training activities, but, similarly to financial support, only a minority of the companies identify any such benefits from existing policy support programmes. Important to note in this connection is that labour training does not necessarily equal formal education. Such training (i.e. higher education) might be of importance for the life sciences and, to some extent, the food industry, whilst the media industry requires different types of

training such as on-the-job training, tutorials and guidance for various forms of experience-based learning. Support in the form of information on new technologies is primarily demanded by the moving media and food industries, but is of little interest to actors in the life science industry. This demand is largely neglected by all the policy support programmes, and to the extent that it is promoted, scientifically based knowledge is strongly predominant. This is somewhat paradoxical since such knowledge is most relevant to the actors not demanding it (i.e. the life sciences), whilst the actors demanding it (food and media) can neither absorb it nor let it feed into their current innovation and product development strategies, which are largely based on non-scientific knowledge. Finally, industries differ a lot in the geography and organisation of their networking activities. More than half of both media and life science companies demand policies that help them find partners, whilst only a few food companies do so. So far, policy measures targeting the moving media industry have been more successful in promoting network activities than measures targeting the life science and food industries. This is due not only to the predominant focus on informal networks in the current regional policy programmes but also to the geographical intra-regional scope, which suits the media industry better than life science. The strong emphasis on industry–university relations, also characterizing the network promotion activities in all three policy support programmes, is less well suited to the media industry.

The aim of all three policy support programmes was to be adopted and ‘internalized’ by their target population, empowering the firms to conduct innovative actions in order to foster regional development. With regard to the third research question of whether the existing policies render a real impact on the behaviour of the target population (the firms) and thereby succeed in becoming an integral part of the institutional framework of the regional innovation system, the findings are less convincing. As suggested by institutional theory referred to in the conceptual framework, for a new initiative to be adopted, it must meet regulative as well as normative and cognitive requirements. All three policy support programmes are in line with existing regulations, primarily set on an administrative level beyond the region (i.e. national, international). However, profound differences with regard to the needs and demands and the perceived benefits among the actors representing the three industries reveal that normative patterns among the actors are hardly taken into account. Furthermore, in the case of the food industry, there seems to be a mismatch between needs and demands. Network stimulation from outside is not demanded by the companies, but increased collaboration is indeed needed to break path dependency and stay competitive on an increasingly global market. It follows that in order to introduce new norms, policy makers should first address the cognitive framework of the industry. As mentioned in “[Conceptual Framework](#)”, cognitive patterns are primarily addressed using accountability tools such as spread of information and marketing of policy programmes. This could possibly happen through collaboration with pioneering industry representatives, widely distributed successful examples, and other communication and information tools policy makers could use to contribute to translating the need into an articulated demand.

The results from the survey carried out in this study are thus clearly in line with the theoretically derived assumptions following the knowledge-base approach to innovation studies, highlighting profound differences among industries drawing on

different knowledge bases. However, rather than addressing the needs and demands in customized ways and taking the differences of the industries into account, the policy support programmes appear to be very similar in scope. They provide more or less generic support in line with best practice models, which have had a strong impact on the predominant policies defining the Swedish and European research and innovation policy agenda over the past decades. Typical activities defining those are regional industry–university network promotion, technology transfer support through incubation, human capital development through higher education, and regional branding in attempts to attract venture capital and nationally and internationally governed funds for R&D.

These best practice models, with the exception of their predominant geographical scope, seem to be most well suited to industries drawing primarily on an analytical knowledge base. This is also reflected in the analysis of perceived benefits presented in this paper. A large share of firms representing the life science industry (drawing on analytical knowledge) identify benefits from existing policy programmes, whilst firms in the food industry (drawing on synthetic knowledge) clearly refuse to comply with attempts to change the institutional framework for their activities. However, regional policies fail to be fully institutionalized even in life science as support related to financial capital, global networking and human resource development is limited. We argue that regional innovation policy ought to take this complexity and diversity into account and resist the temptation of implementing universal ‘one-size-fits-all’ formulas [44]. Such fine-tuned policies would require new policy support instruments that are not necessarily part of the policy makers’ current portfolio. They would also require new ways of communication to enhance compliance and participation among the target population. Both a fine-tuning of activities and a more target-oriented way of communicating these are necessary components in a strategy to make such policies really influence the institutional framework of the regional innovation system.

References

1. Asheim B (2000) Industrial districts: the contributions of Marshall and beyond. In: Clark GL, Feldman MP, Gertler MS (eds) *The Oxford handbook of economic geography*. Oxford University Press, Oxford, pp 413–431
2. Asheim B, Hansen HK (2009) Knowledge bases, talents, and contexts: on the usefulness of the creative class approach in Sweden. *Econ Geogr* 85:425–442
3. Asheim BT, Coenen L (2005) Knowledge bases and regional innovation systems: comparing Nordic clusters. *Res Policy* 34:1173–1190
4. Asheim BT, Coenen L, Vang J (2007) Face-to-face, buzz, and knowledge bases: sociospatial implications for learning, innovation, and innovation policy. *Environ Plan C Gov Policy* 25:655–670
5. Asheim BT, Gertler MS (2005) The geography of innovation: regional innovation systems. In: Fagerberg J, Mowery DC, Nelson RR (eds) *The Oxford handbook of innovation*. Oxford University Press, Oxford, pp 291–317
6. Campbell JL (2006) What’s new? General patterns of planned macro-institutional change. In: Hage J, Meeus M (eds) *Innovation, science, and institutional change*. Oxford University Press, Oxford, pp 505–524
7. Cappellin R, Wink R (2009) International knowledge and innovation networks: knowledge creation and innovation in medium-technology clusters. Edward Elgar, Cheltenham
8. Cooke P (1996) The new wave of regional innovation networks: analysis, characteristics and strategy. *Small Bus Econ* 8:159–171

9. Cooke P (2002) Biotechnology clusters as regional, sectoral innovation systems. *Int Reg Sci Rev* 25:8–37
10. Cooke P, de Laurentis C, Tödting F, Trippi M (2007) Regional knowledge economies: markets, clusters and innovation. Edward Elgar, Cheltenham
11. Edquist C (2001) Innovation policy—a systematic approach. In: Archibugi D, Lundvall B-Å (eds) *The globalizing learning economy*. Oxford University Press, Oxford, pp 219–238
12. Edquist C (2002) Innovationspolitik för Sverige. Mål, skäl, problem och åtgärder. VINNOVA Forum. Innovationspolitik i Fokus. VINNOVA, Stockholm
13. Edquist C (2009) Public procurement of innovation (PPI)—a pilot study. CIRCLE working papers, 2009/13. CIRCLE, Lund University, Lund
14. Egstrand ÅK, Sätre A-M (2008) Collaboration for local economic development: business networks, politics and universities in two Swedish cities. *Eur Plan Stud* 16:487–505
15. Etzkowitz H, Leydesdorff L (1997) Universities and the global knowledge economy: a triple helix of university–industry–government relations. Pinter, London
16. Fritsch M, Stephan A (2005) Regionalization of innovation policy—introduction to the special issue. *Res Policy* 34:1123–1127
17. Gertler MS (2008) Buzz without being there? Communities of practice in context. In: Amin A, Roberts J (eds) *Community, economic creativity and organization*. Oxford University Press, Oxford, pp 203–226
18. Gertler MS, Levitte YM (2005) Local nodes in global networks: the geography of knowledge flows in biotechnology innovation. *Ind Innov* 12:487–507
19. Hall P (2010) Historical institutionalism in rationalist and sociological perspective. In: Mahoney J, Thelen K (eds) *Explaining institutional change: ambiguity, agency, and power*. Cambridge University Press, Cambridge, pp 204–224
20. Hansen T, Winther L (2010) Innovation, regional development and relations between high- and low-tech industries. 8th European Urban and Regional Studies Conference, Vienna, Austria
21. Hassink R (2005) How to unlock regional economies from path dependency? From learning region to learning cluster. *Eur Plan Stud* 13:521–535
22. Helgoy I, Homme A (2006) Policy tools and institutional change: comparing education policies in Norway. *Swed Engl J Public Policy* 26:141–165
23. Henning M, Moodysson J, Nilsson M (2010) Innovation and regional transformation: from clusters to new combinations. Malmö, Region Skåne
24. Hollingsworth JR (2000) Doing institutional analysis: implications for the study of innovations. *Rev Int Polit Econ* 7:595–644
25. Knight J (1992) *Institutions and social conflict*. Cambridge University Press, Cambridge
26. Lambooy JG, Boschma RA (2001) Evolutionary economics and regional policy. *Ann Reg Sci* 35:113–131
27. Lundequist P, Waxell A (2010) Regionalizing “mode 2”? The adoption of centres of excellence in Swedish research policy. *Geografiska Annaler Ser B Hum Geogr* 92:263–279
28. Mahoney J, Thelen K (eds) (2010) *Explaining institutional change: ambiguity, agency, and power*. Cambridge University Press, Cambridge
29. Mahoney J, Thelen K (2010) A theory of gradual institutional change. In: Mahoney J, Thelen K (eds) *Explaining institutional change: ambiguity, agency, and power*. Cambridge University Press, Cambridge, pp 1–37
30. Martin R, Moodysson J (2011a) Comparing knowledge bases: on the geography of knowledge flows in the regional innovation system of southern Sweden. CIRCLE Electronic Working Paper Series, WP 2011/02
31. Martin R, Moodysson J (2011b) Innovation in symbolic industries: the geography and organisation of knowledge sourcing. *European Planning Studies* 19:1183–1203
32. Moodysson J (2007) Sites and modes of knowledge creation: on the spatial organization of biotechnology innovation. Department of Social and Economic Geography, Lund University, Lund
33. Moodysson J (2008) Principles and practices of knowledge creation: on the organization of “buzz” and “pipelines” in life science communities. *Econ Geogr* 84:449–469
34. Moodysson J, Coenen L, Asheim BT (2008) Explaining spatial patterns of innovation: analytical and synthetic modes of knowledge creation in the Medicon Valley life-science cluster. *Environ Plan A* 40:1040–1056
35. Nauwelaers C, Wintjes R (2002) Innovating SMEs and regions: the need for policy intelligence and interactive policies. *Technol Anal Strateg Manag* 14:201–215

36. North DC (1990) *Institutions, institutional change, and economic performance*. Cambridge University Press, Cambridge
37. OECD (2009) *Interim Report on the OECD Innovation Strategy. An Agenda for Policy Action on Innovation*. OECD, Paris
38. Peck J (2000) Doing regulation. In: Clark G, Gertler M, Feldman M (eds) *The Oxford handbook of economic geography*. Oxford University Press, New York, pp 61–80
39. Schwerin J, Werker C (2003) Learning innovation policy based on historical experience. *Struct Chang Econ Dyn* 14:385–404
40. Scott WR (1995) *Institutions and organizations*. Sage, Thousand Oaks
41. Sheingate A (2010) Rethinking rules: creativity and constraint in the U.S. House of Representatives. In: Mahoney J, Thelen K (eds) *Explaining institutional change: ambiguity, agency, and power*. Cambridge University Press, Cambridge, pp 168–203
42. Storper M (1997) *The regional world*. Guilford, New York
43. Swyngedouw E (2000) Elite power, global forces, and the political economy of ‘glocal’ development. In: Clark GL, Feldman MP, Gertler MS (eds) *The Oxford handbook of economic geography*. Oxford University Press, Oxford, pp 541–558
44. Tödting F, Trippel M (2005) One size fits all? Towards a differentiated regional innovation policy approach. *Res Policy* 34:1203–1219

Article III

Organizational Change within Medical Research in Sweden: On the Role of the Individuals and Institutions

Elena Zukauskaitė

Abstract

The focus of this paper is on how organizational change within medical research evolves and is influenced by different types of institutions at different geographical levels, as well as what characteristics of the key individuals are important in enacting institutional opportunities and overcoming hindrances. The paper reveals the complexity of institutions influencing change processes. First, the relations between institutions can be complementary, reinforcing or contradicting, suggesting that individuals initiating change should consider possible responses to institutions contradictory to the initial opportunities, as well as take advantage of reinforcing and complementary norms, rules and procedures. Second, although different types and levels of institutions have a joint impact on change processes, some institutions are more prominent than others in different phases of the process. Individuals can take advantage of institutional opportunities and overcome hindrances due to their personal qualities and position in the organization.

Keywords: Institutions, Individuals, Medical research, Sweden

Introduction

The assumption that innovation processes are affected by the institutional framework consisting of different types of institutions at various geographical levels has been emphasized in many studies within the geography of innovation (e.g. Asheim et al., 2011; Gertler and Wolfe, 2002). Further, it is highlighted that, although being influential, institutions alone cannot predetermine innovation processes. Individual actors are considered to be boundedly rational – making choices and decisions which in turn have an impact on innovation processes (Atherton and Smallbone, 2013; Freeman, 2010; Gertler, 2010; Sotarauta and Pulkkinen, 2010). However, although institutional diversity is mentioned in the literature, how that diversity can be conceptualized, while analyzing the actions by innovating actors, is seldom specified.

This paper aims to contribute to filling this gap by analyzing the process of organizational change within medical research¹. The focus is on the institutional diversity which creates hindrances and possibilities for change, as well as on the personal and professional characteristics of innovating individuals. The empirical case for analysis is a novel cancer research centre, at Lund University (LU) (Southern Sweden), of translational medicine integrating basic research and clinical practices. The center is considered to be a success when taking into account scientific publications, attracted funding, and, most importantly, the efficient development of novel technology for cancer diagnostics. However, the focus of this paper is not on a new technology, but on the initiation and establishment of organizational preconditions which have been crucial for the success and innovativeness of the center. Therefore, the object of analysis is the organizational change – the process of initiation, establishment and development of a novel organizational form of research unit at a university. More concretely, the focus is on how organizational change evolves and is influenced by the different types of institutions at different geographical levels, as well as what characteristics

of the key individuals are important in enacting institutional opportunities and overcoming hindrances.

A theoretical framework is developed in order to reach the aim. Scott's (2008) conceptualization of institutional analysis and insights from the studies in the geography of innovation are applied and further developed in the data selection and analysis process. Scott's (2008) conceptualization is chosen since it combines different institutional schools and therefore is compatible with the interdisciplinary nature of innovation studies. In addition, his framework of regulative, normative and cognitive institutions provides detailed characteristics of both formal and informal institutions and, thus, fits with the geography of innovation where a variety of institutions is emphasized. The studies on the geography of innovation (e.g. Asheim and Gertler, 2005; Gertler, 2004, 2010; Storper, 1997; Strambach, 2010) add a geographical dimension to the discussion on institutions.

The paper is structured as follows. The theoretical framework relating the geography of innovation literature and institutional theory (mainly using the framework by Scott, 2008) is developed in the first part. The main methods for data collection and analysis are discussed in the research design part. The main findings and data analysis are presented in the third part. The results are summarized and recommendations for future research are made in the final part of the paper.

Conceptual framework

Institutions as hinderers and enablers of change

Institutions comprise regulative, normative and cultural-cognitive elements that provide stability and meaning to social life (Scott, 2008:48). Although it is possible to identify a situation in which one or another aspect of institutions is predominant in defining behavior, different types of institutions are most often experienced in a combined manner and have a

collective impact on the social and economic order (see also Scott, 2010). In other words, the process of organizational change is influenced by regulations, norms, traditions and routines in a combined way. However, although experienced in a joint manner, the functions of institutions differ. Regulatory frameworks set rules, monitor and sanction activities. Norms and values introduce prescriptive, evaluative, and obligatory dimensions into social life. They prescribe how things should be done and might be applicable to all members or just specific individuals of a certain collectivity (society, community, organization etc). Routines combine normative and regulative dimensions of institutions at organization and/or industry level. Routines are carried by protocols, standard operating procedures (regulative dimension) and jobs, roles which define appropriate goals and activities for individuals (normative dimension) and jointly provide stability/guidelines for organization or industry specific practices (Scott, 2008).

On a more general level, all types of institutions provide incentives to which individual actors respond by performing certain activities (Edquist and Johnson, 1997; North, 1990). According to Edquist and Johnson (1997), institutions may provide both negative and positive incentives to innovate. For example, well-functioning protection of property rights, which enables temporary monopolization of knowledge, creates a positive incentive to innovate, while negative attitudes to people that fail in innovation processes, and skepticism about the value of innovation, create negative incentives. Relating the arguments by Scott (2008) and Edquist and Johnson (1997), three types of relations can be identified between institutions influencing change processes – contradicting, reinforcing and complementary. Institutions are *contradicting* when they have opposing incentives (i.e. encourage innovation via protecting intellectual property vs discourage innovation via norms leading to skepticism of innovation). They are *reinforcing* each other when they create similar incentives (i.e. encourage to innovate) via similar functions (i.e. regulating the distribution of resources for innovation).

Finally, they are *complementary* when they create similar incentives (i.e. encourage to innovate) via different functions (i.e. one regulates the distribution of resources, while the other encourages positive attitudes towards innovation).

Geography of innovation studies are usually interested in national/global regulatory frameworks, soft institutions in the form of norms, values, beliefs and organizational routines and procedures (Asheim and Gertler, 2005; Freeman, 2010; Gertler, 2004; Lundvall, 2010; Lundvall and Maskell, 2000; Storper, 1997). In these studies institutions at the national level often refer to rules – regulations, standards and funding guidelines for innovation. They highlight that innovation activities differ depending on how markets, education systems, and labor are organized, how much is invested in R&D and how well property rights are protected (Edquist and Johnson, 1997; Gertler, 2004; Strambach, 2010).

Cognitive and normative aspects rather than regulations are addressed in many regional studies. Storper (1997) argues that regional specific assets such as conventions, informal rules and habits, which coordinate economic actors under conditions of uncertainty, are central forms of scarcity in contemporary capitalism and therefore create competitive advantage. Innovation activities differ depending on some kind of local institutional framework which influences knowledge creation, exchange and learning capabilities (Asheim, 2012; Bathelt et al., 2004; Swyngedouw, 2000). Regions are considered as places where different networking arrangements are taking place (Fuller et al., 2004). In addition, to these two levels, there are organizational institutions – specific routines, habitual practices (procedures) – guiding the organizational behavior (Boschma and Frenken, 2009), as well as supranational or global institutions such as EU regulations and international standards (Cooke and Proprius, 2011).

Similarly to different types of institutions, institutions at different geographical levels do not function in isolation but are closely interrelated and have an impact on innovation in an

interactive manner (Gertler, 2010). Procedures (habitual organizational practices) might be influenced by education system and labor market at the national level (Gertler, 2004), while at the same time benefit from the regional culture of civic participation encouraging knowledge sharing (Scott, 1998), and be guided by the funding requirements for innovation activities at the EU level. Changed EU regulations might lead to reconfiguration of state capacities in the regions as well as changes in regional institutional structure in order to implement new types of activities (Clark, 2006). It follows that the process of organizational change is embedded in this complex institutional framework. However, it is also possible that one or another institution is more important during some periods than others (Scott, 2010). Therefore, it is important to analyze the sub-processes and their characteristics in the process of organizational change.

Furthermore, Edquist and Johnson (1997) highlight that, as mentioned above, the institutions at different geographical levels create positive and negative incentives for individuals to engage in change process. Therefore, individuals make use of opportunities (created by positive incentives) and have to find the ways to cope with/overcome negative incentives for innovation. Individuals' characteristics that are relevant in change processes are discussed in the next section.

Motivation and capabilities of individuals

The basic premise for this paper is that individuals who initiate and implement change are influenced by institutions since those hinder or enable certain activities (Scott, 2008). However, this does not mean that actions by individuals are predetermined by the environment. When perceiving new opportunities or reacting to new threats affecting their well-being, individuals initiate change. Moreover, most often they undertake the activities leading to change only if it provides benefits that exceed the costs (Scott, 2008). This does not

necessarily mean monetary benefits, but can come in a form of self-realization, preservation of certain values etc. In the presence of opportunities and/or threats, individuals need resources and ideas to put into practice (Freeman, 2010; Scott, 2008). Therefore, while individuals are the actors who initiate the change, their capabilities to do so often depend on the position in the organization.

Individuals who have ideas and (access to) resources initiate change. However, further development depends on the response by other stakeholders in the field, and is an outcome of a variety of roles and functions distributed across diverse players (Scott, 2008). Van de Ven, Polley, Garud and Venkataraman (2008) also support the idea that implementation of change exceeds the efforts of a single individual and includes diverse stakeholders who apply their different skills, energy levels, and frames of reference to innovation ideas. According to the authors, in change processes individuals perform a variety of roles such as entrepreneurs/champions, sponsors, mentors, critics, institutional leaders, followers and opponents. Although those roles are more applicable when the focus of the analysis is the creation of new technologies in the private sector and when real time data collection is possible, an important implication for any change process is that it requires the interaction of various individuals who perform different functions due to their expertise and capabilities.

In the geography of innovation, the relations with diverse players in innovation processes often refer to the duality of local-global relation. These relations can refer to a global epistemic community of practice which is united by functional proximity in the form of a profession or organizational field (Moodysson et al., 2008). On the other hand, not only functional, but also spatial myopia is of high importance (Maskell and Malmberg, 2007). Individuals search for partners for knowledge exchange and monitor existing solutions which are close to their own environment: these processes are facilitated by the common norms

embedded in a certain space. However, innovative ideas most often come via global relations and interactions with other fields and communities (Bathelt et al., 2004; Scott, 2008).

Next to formal characteristics of individuals, such as a position in the organization or access to the other actors, several innovation studies highlight the personal qualities of innovating actors, such as cosmopolitanism, an unconventional, cooperative and visionary nature, openness to alternative viewpoints, implying a wish to learn from others (see e.g. Kimberly and Evanisko, 1981; Steiner, 1995).

Organizational change – between individuals and institutions

There are several reasons why organizational change takes place. New types of organizational structures emerge when there is a tension between the expectations stemming from the institutional environment (e.g. traditions as well as regulations requiring the organization of activities at universities into faculties and disciplines), and the most optimal structure for the best performance of an organization (delivery of high quality research having impact on medical practices in multidisciplinary settings) (Meyer and Rowan, 1977). In other words, new types of organizational structures emerge when existing organizational forms cannot respond to the new challenges and possibilities in the society. However, it takes innovative and resourceful individuals to identify tensions, opportunities, create alternatives and start enacting change processes (Freeman, 2010; Meyer, 1994). As summarized in Table 1, in the process of enacting change, individuals are embedded in the diverse institutional environment. Some institutions create positive incentives to innovate while others aim to prevent innovation and preserve existing structures (Edquist and Johnson, 1997). Furthermore, the relations between institutions influencing a change process can be reinforcing, complementary or contradicting. Individuals involved in enacting change draw on their professional and

personal characteristics, as well as relations to different local and global communities, to use positive incentives to their advantage and to overcome negative ones (see Table 1).

Table1. The summary of the conceptual framework

Institutions	Organizational change	Individuals
Creates positive or negative incentives for action (North, 1990). Embedded in different geographical levels (Gertler, 2010). Related in reinforcing, complementary or contradicting manner (Edquist and Johnson, 1997; Scott, 2008)	Emerge in a tension between expectations stemming from institutional environment and optimal structure (Meyer and Rowan, 1977). Enacted by individuals (Freeman, 2010).	Diverse stakeholders with different skills (Scott, 2008). Draw on professional and personal characteristics, as well as relations to global and local communities (Bathelt et al., 2004; Scott, 2008; Steiner, 1995).

Source: own draft

Research design

The main method for data collection is semi-structured interviews with representatives of the center, and funding organizations that provide financial support for its establishment. The selection of respondents consisted of several phases. In the first phase 7 founders, as the initiators for this new organizational structure, were contacted with an interview request. During these interviews the respondents mentioned other people that could provide important insights into the development and functioning of the center. 4 such interviews were conducted with a research officer, former and present PhD students and moral and scientific supporters of the center. Finally, as the call for the strategic research centers was initiated by the Swedish foundation for strategic research (SSF), it was crucial for the study to interview SSF representatives in order to get the information about initiation of the call. Four such interviews were conducted with two research secretaries and former and present managing directors of SSF. A total of 15 interviews were conducted.

The focus of this paper is on how organizational change within medical research evolves and is influenced by different types of institutions at different geographical levels, as well as what characteristics of the key individuals are important in enacting institutional opportunities and overcoming hindrances. The interview method enables the analysis of actors in their institutional contexts (Schoenberger, 1991). Furthermore, it gives access to the opinions and events that cannot be accessed otherwise (Rapley, 2004). Therefore, interview method was an appropriate way to find out how individuals realized the need for change, what obstacles they faced and what forces were beneficial in the process. Second, in order to avoid possible respondent-bias, most of the open-ended questions were asked in ‘courtroom questioning’ manner – those focused on facts rather than opinions (e.g. individuals involved in the creation process, infrastructure, resources etc). Following Denzin’s (1970) typology of data triangulation, interviews were carried out with different stakeholders in the process, allowing triangulating the data in respect to the person. Additionally, use was made of extensive secondary sources such as the center’s publications, SSF annual reports, statutes, calls, and minutes of the preparation committee for strategic research centers in order to get as balanced and full a view of the process as possible.

Short overview of the case

The center under study was established in 2006 after a SSF call for strategic research centers in 2004. To become a strategic research center financed by SSF, the center had to fulfill certain requirements which included the ability to address larger and more complex issues with different time perspectives and with the participation of complementary scientific and technical competence (SSF, 2004 April 16). The center addresses the problem of slow and expensive transfers of basic discoveries to the clinics. It also seeks individually-based cancer treatment and aims to develop novel diagnostics and therapeutics.

There are seven research groups and about 100 employees at the center. It unites researchers from three faculties: Medicine, Natural Science and Engineering. However, at LU organizational structure it is a part of the Faculty of Engineering.

The center has generated several world-wide patents ranging from basic research to applied biomedical inventions. Some of them have been transferred to the center's newest spin-off and hopefully will be commercialized and applied in wider practice in the future. Scientifically the center is also considered to be a success model. Following its example, similar centers are being created in other European and USA universities.

The center can be considered as a continuation of previous resource center Swegene, which was established in 2000 and financed by the private Wallenberg foundation. It was a resource center with heavy expensive machinery that provided a lab service and consultation in functional genomics for researchers from different faculties.

The center is located in southern Sweden in the Scania region. The region has a growing life science cluster with 7000 employees in 2007. A majority of the firms are located around LU and the Ideon and Medeon science parks. The regional governmental body Region Skåne considers this sector to be of considerable importance for regional development (Henning et al., 2010). In addition, LU, in cooperation with other partners, has opened a large biomedical centre, BMC, to ensure that research and development achieve close contact with health-care activities. The center under study is located in the BMC building.

Medicon Village, established in 2012, represents a new constellation uniting research, innovation and entrepreneurship in the region. It was established by LU in order to unite health care practitioners, researchers and entrepreneurs. The difference between the center under study and other organizations uniting researchers and practitioners lies in the basic rationale for the establishment. Medicon Village and BMC are meta-organizations uniting a

variety of other organizations (research units, health-care firms, public sector) under one roof in order to facilitate the interaction. In the case analyzed in this paper, individuals from three faculties, together with health-care practitioners, form one organization which is located in the meta-organization of BMC.

The center was chosen for this analysis for both practical and theoretical reasons. Although each place or field has a unique institutional constellation, and identical replication of organizational structures in different environments is not possible, this does not contradict the idea of learning from success. Therefore, identification of the mechanisms behind the success of the center would facilitate the translation and adaptation of the organizational structure into a different field or place. From a theoretical point of view, this case is an interesting one since its institutional environment is very complex. On the one hand, as discussed above, Skåne is considered an innovative region and, therefore, it is expected that there are institutions providing positive incentives for change. On the other hand, LU is one of oldest universities in Sweden, with deep traditions in research in general and medical research in particular. Therefore, there might be institutions aiming at the preservation of traditionally developed structures and hindering (organizational) change processes. This institutionally rich and complex environment enables the development and application of the theoretical framework where relations between different institutions are conceptualized. Therefore, the analysis of the case enables a theoretical abstraction which is relevant for other studies in different institutional contexts.

Analysis

The process of organizational change stretches over time. As suggested by Scott (2008, 2010), what types/levels of institutions and individuals have an impact might vary throughout the process. Based on the collected data, the process of organizational change is divided into four

phases (sub-processes) – preconditions, initiation, establishment and development. Table 2 below provides an overview of each phase and the main events that take place.

Table2. Institutions, individuals and main events

Phase	Description	Event	Institutions (Geography: type)	Responsible Individuals
Preconditions 1990-2004	Center does not exist even at the idea level Important foundations laid for the establishment	Development of functional genomics Swegene Support for life science	Global: Norms and values National: Regulations Regional: Regulations and traditions	Initiators of Swegene Managing director SSF
Initiation 2004-2006	The need for change realized Purposive action begins	SSF call Mobilization of initial group Defining problems and opportunities	National: Regulations	7 founders Research officer Faculty deans Mentors
Establishment 2006-2008	Center starts its activities	Administration Creation of joint projects Employment/mobilization of other staff	Organization (university): Routines Organization (center): Routines/procedures	Research Officer 7 founders Junior staff
Development 2009-	The outcomes of previous activities become visible	Efficient research Granted patents Spin-off Diffusion of organizational form	Global: Regulations Regional: Traditions and culture Organization (center): Routines/procedures	Head of the center Other staff

Source: Own data

In the preconditions phase the center did not exist even at the idea level. However, in retrospect, it is possible to identify the events which laid important foundations for the establishment of the center. Such events were the establishment of the resource center which provided human and technological infrastructure and facilitated the mobilization of the initial

group of founders, initiation of the SSF call for strategic research centers, the development of support for life science at national and regional levels, and the development of functional genomics in other countries. In the initiation phase the need for organizational change was realized, and the initial group of actors was mobilized. Learning about problems (cancer, traditional organization of research activities), opportunities (a new call for funding), resources and capabilities then started. The center started its activities in the establishment phase: execution of the ideas took place, and joint projects and events were created. In addition, mobilization of other researchers and physicians took place. Administrative aspects of the center were attended to. In this paper the development phase reveals the performance of a new organizational structure. It includes such events as patenting of the technologies developed in the projects, establishment of the spin-off, and, as a result of those signs of success, the diffusion of the organizational form to other places. In the rest of the analysis the events in each phase are discussed in more detail, addressing the relations between institutions which create opportunities or hindrances for individuals initiating change.

Preconditions phase – resources, institutions, and networks

As summarized in Table 2, institutions at global, national and regional levels play a role in the preconditions phase. Regulative institutions (funding structures) at national and regional levels facilitate the creation of needed physical (location) infrastructure and provide access to financial resources. At the national level, from about 1990, SSF has supported graduate biotechnology schools, providing the work force for life science research. Around 2000 the focus was redirected to life science research (as opposed to education), resulting in two calls for strategic research centers, recommended by the managing director of SSF. The second one leads to the needed financial support for the establishment of the center. At the regional level, as the outcome of regional support for life science, BMC was opened in 2001 by LU in

cooperation with Region Skåne. It provided a space where scientists from different faculties as well as practitioners could meet. Later, it became the location for the center. Institutions at regional and national level have a reinforcing impact on the change process under study, since these institutions provide similar incentives (engage in the innovative activities through interdisciplinary collaborations) via similar functions (providing the guidelines for investment and distribution of resources).

The development of functional genomics at the global level is changing the perceptions (norms) of what is considered to be good quality research: it has to be performed in an interdisciplinary environment including researchers with different competences, and use the possibilities that have opened up with the emergence of technologies in genetics. It started around 1990 in such countries as the USA and Germany and inspired scientists in Sweden working in the fields of biotechnology and medical research to introduce this type of development due to its social implications (for the patients) and scientific importance (a must for those who want to be in the front line of research). These global normative changes are complementary to regional and national regulations since they also promote interdisciplinary collaborations by creating a new perception (prescriptive dimension) of what good research is.

Interaction among the individuals mobilized in the initiation and establishment phases was facilitated by the resource center Swegene (in function 2000-2005). Five of the seven founders of the center started their collaboration in it. In addition, it opened up scientific possibilities for a new type of research. However, to be implemented, it requires different kinds of financial resources. Furthermore, the funding for Swegene expired in 2005. Therefore, if the individuals within the organization wanted to preserve the technologies and continue their work, they needed an alternative source of funding. In other words, the motivation for the action was a reaction to new threats (expiring funding), new institutional opportunities (a new call by SSF) and scientific possibilities (the chance to perform a new

type of research). To sum up, institutional development creates a structure of opportunities which is realized by the actors in the region as a response to new threats and possibilities.

The initiation and establishment phases – realization of opportunities

The start of the initiation phase means that the purposive actions, geared toward the establishment of the center, begin. Institutional changes in the preconditions phase create opportunities that are realized by individuals in the initiation and establishment phases. Since institutional change is a gradual process, there is a time lag between changes in the institutional environment and actual realization of the opportunities. The role of individuals becomes more visible in these phases, since their purposive actions lead to the establishment of organizational innovation. The focus is on who are doing what and why they are capable of doing it.

As pointed out in the conceptual framework, a change process is initiated and implemented by a group of individuals performing different roles according to their capabilities, which depend on their positions in the organizations, networks they have access to and personal characteristics. Table 3 (Appendix A) provides an overview of the main individuals (or groups of individuals) involved in the initiation and establishment of the center.

In the majority of the interviews, the future head of the center is identified as the key initiator of the initial group of founders who took advantage of the opportunities. He performed the roles of champion and institutional leader, setting the structures for activities and promoting and managing the new unit. Being a professor in immunotechnology, the head of the center has great competence in research. This competence is complemented by expertise in university administration and industry. Therefore, he serves as a bridge between different fields (industry and university research). Due to his different positions in various organizations, he has knowledge needed to identify application possibilities for research

outcomes as well as administration practices. Other founders are invited to participate in the initiation of change because they are known as ‘being the best people in the field’ for planned interdisciplinary research and because of their personal qualities (such as willingness to learn and adapt).

Next to the founders of the center, the research officer plays a role in the initiation and establishment process. She has a PhD degree in molecular biology (therefore research-related knowledge) and was also responsible for the organization of activities in Swegene (knowledge of research administration). In the initiation process her function is to put the application for funding together. In the establishment of the center she contributes to keeping the involved individuals together by organizing common lunches, seminars, and workshops which in turn add to the creation of common norms and routines.

PhD students and post-doctoral researchers perform similar roles, but in a different way. Since the research projects relate to several research groups within the center, they add to strengthening the unity of the organization. In addition, the values represented by the organization (interdisciplinary research within life science in relation to clinical practices) are passed to junior researchers. They become followers of this new organizational form.

Future strategic research centers can obtain the grant only if the establishment of such a center is in line with overall university strategy. Therefore, support from a university and faculty administration (the deans of three faculties) is very important. Their role resembles that of sponsors who support the idea of the center when funding decisions have to be made. Finally, the center has what can be called ‘fans’ or moral supporters – experienced old and influential researchers who are not involved directly in the activities of the center. They were in the front lines of Swegene and admire this new constellation of research. They act as mentors and add

to the opinion building about the center at the university and among the broader community of scientists and funding structures.

This case is interesting for the analysis not only due to the interdisciplinary nature of the research, but because of the connection to clinical practices as well. A clinical connector plays a major role in the creation and development of the center and, together with the head of the center, performs the roles of champion and institutional leader.

Other applicants value the clinical connector for his personal qualities (open minded, visionary) and for his position in the organization (the head of the Oncology department when the center was established and of the Oncology division at the time of the interview) where he has authority to influence other clinicians. Similarly to the head of the center, he is a bridge between different fields – administration at the hospital, clinical practices and research (Professor in Oncology). He also connects the group of researchers within the center with clinical practitioners and patients. This connection is especially valued since clinical practices in general (on a larger scale) are perceived as hardest to change and influence:

Inertia, slavishness of the whole enormous health-care system: change attitudes of doctors, change principles of hospitals, way of looking at new techniques, it takes such a long time. This new way of looking is not taught to medical students today. (Informant7)

The possibility of renewal is identified through the change of generations and the networks of the key individuals who appreciate and know how to use new types of techniques and collaborations. Therefore, the relations with the clinical side are of such high importance. The center under study does not change the norms and regulations guiding health-care practices as a whole. However, it is a step in that direction through the establishment of networks with key individuals, who in turn are able to diffuse new practices through these networks.

The center also has to comply with the formal rules for the units at the university. Nonetheless, the university is traditionally divided into faculties, while the center unites researchers from different faculties. PhD students cannot be employed at several faculties, although the fulfillment of the projects requires diverse competences. Since one unit within the university cannot reform the whole administrative structure, the organization is adapted to the university requirements. The center is officially placed under the Faculty of Engineering. PhD students are employed at one faculty, but have supervisors and consultants from other faculties as well. A bigger institutional challenge is the creation of common norms and procedures (i.e. joint expectations regarding the length and outcomes of the projects) among the researchers with diverse backgrounds. Partly, this is achieved by drawing on the personal characteristics of individuals: open-mindedness, eagerness to learn from each other and adapt. The creation of common norms and procedures is also facilitated by joint projects, face-to-face meetings, common PhD students (having supervisors from several faculties), PhD lunches, seminars and other events.

To sum up, individuals play a role in both institutional fields – university research and clinical practices – that influenced the initiation and establishment process of the center. Due to their positions in organizations and personal characteristics, they have the power, resources and ideas to establish a novel research environment within the field of health-care. Interestingly, all the main individuals come from Lund-Malmö region, supporting the idea that although inspired by changes in the epistemic community of scientists, individuals searching for knowledge exchange seek those who are close to their own environment. The impact of institutions is complex at this stage. Regulatory and normative aspects of routines within the fields of university research and clinical practices create incentives to preserve traditional organizational structures. This contradicts the SSF guidelines for funding and routines of the

center under study, where the value of interdisciplinary organization at the interface of clinical practices and university research is highlighted.

The development phase – the individual capabilities and institutional support

The last phase of the center, stemming from the collected data, is related to the outcomes of its activities and first signs of diffusion. As summarized in Table 2, there are signs of both scientific and commercial success. The research practices emerging from a new organizational form led to faster development of innovative cancer diagnostics. The things that were planned to be accomplished in five years were accomplished in three. The scientists are also successful in attracting additional funding and publishing in top-ranked journals. In-between scientific and commercial success is the fact that the center has generated several world-wide patents. Finally, the spin-off from the research activities supports the notion that the center is successful in turning the scientific ideas into applied solutions. As a result of all these successes, the structure of the center is being copied by several universities around the world.

These signs of efficient work practices suggest that the individuals involved in the creation of the center have been able to develop procedures and norms within the organization which enable the use of wide individual competences. However, institutions at other geographical levels have also played a role. Commercialization of the scientific invention seems to benefit from the regional supportive infrastructure for life science and entrepreneurial culture, as the spin-off is established within the biotechnology cluster in Lund. Patenting process is enabled by global-level regulations regarding intellectual property rights. Norms and procedures within the center, regional tradition in life science and entrepreneurship in general, as well as global regulations regarding property rights, complement each other and allow the individuals to benefit from the organizational change process. However, the ability to benefit from the

framework is also dependent on the professional and personal characteristics of the actors who initiate change. As indicated in several interviews, the decisions on what to patent and commercialize are highly influenced by the head of the center due to his experience in the life science industry. This supports the idea that a change process requires both enabling institutions and individuals who actually perform the activity.

Summing up – institutional complexity and characteristics of individuals

The actions of the individuals initiating organizational change are influenced by diverse institutions. Specifying diversity in respect to level and type as well as incentive and function allow identifying different kinds of relations between institutions: contradictory, reinforcing and complementary. As summarized in the Table 4 (Appendix B), most of the influential institutions have created positive incentives to initiate and enact organizational change. Those institutions perform different functions and therefore are related in a complementary manner. National and regional regulations which reinforce each other, while providing guidelines for access to the necessary financial resources and physical infrastructure (building), are complemented by the global norms of the epistemic research community, encouraging and inspiring activities in the interface between clinical practices and university research. These are further complemented by global intellectual property regulations which allow benefiting from research results as well as organizational routines of the center that provide guidelines for daily practices and joint conventions regarding expectations stemming from activities. Routines in the university and clinical fields perform a function of preserving traditionally established structures of daily activities and administrative rules. Therefore, they discourage change and are contradictory to the enabling institutions discussed above.

Nevertheless, it is important to differentiate between the administrative rules of university and clinical practices and the role of the university and university hospital in the region.

Administrational rules with strict division into faculties and routine-based clinical practices are contradicting institutions that create positive incentives for the creation of an interdisciplinary center uniting researchers from different faculties and clinicians under one roof. However, the presence of one of the oldest and most prestigious universities in Scandinavia, with its long tradition of medical research, combined with a high-class university hospital, has contributed to regional norms supporting innovation as well as an emergence of a thriving biotechnology cluster. In this way, regional norms and traditions also create positive incentives for change and are complementary to other institutions with similar incentives.

The capabilities of individuals to enact institutional opportunities depend on their professional and personal characteristics. Professional characteristics refer to position in the organization and work experience. A clinical connector could get access to other clinicians and patients due to his position at the Oncology division. The head of the center had the necessary expertise due to his position in the university administration, industry and research field. Other founders have become part of the center due to their experience as researchers, which in turn is influenced by their position as researchers at the university. In addition, personal characteristics such as open-mindedness, willingness to learn and collaborate are also important, supporting the idea of previous studies that the personal qualities of innovating actors are important.

Discussion and Conclusions

The focus of this paper is on how organizational change evolves and is influenced by different types of institutions at different geographical levels, as well as what characteristics of the key individuals are important in enacting institutional opportunities and overcoming hindrances. Three types of factors can be identified behind the emergence and development of

organizational change. First, there are problems in society, such as cancer and slow technology transfer from university to clinic, which are not solved efficiently in a traditional way. Therefore, there is a need for new types of organizational structures. This is in line with the Meyer and Rowan (1977) argument that if the organizational structure is not optimal anymore for its best performance, deviations from the institutionalized forms emerge. Second, the findings also support Scott's (2008) observation that individuals react to the tension between institutionalized and optimal organizational forms, and initiate change only when they perceive new opportunities and when their well-being threatened; in this case, an opportunity to perform novel research (opportunity for improved self-realization) and the threat of expiring funding. Third, opportunities to perform novel research take place partly due to the changes in institutional framework (e.g. new funding possibilities, changing norms in global communities of practice). Therefore, the findings of this paper support the enabling aspect of institutions emphasized by Scott (2008).

Developing the idea further, the conclusion can be drawn that, although different types and levels of institutions have a joint impact on organizational change, some institutions are more prominent than others in different phases of the process. In the precondition phase, as mentioned above, the most prominent are those institutions that create opportunities for change at later stages, since individuals would not be able to start their actions without some enabling conditions (such as national and regional regulations providing funding and global norms of the epistemic community in this case). In the initiation and establishment phases, the institutions that hinder change processes (such as rigid administrative rules at university) become most visible. Although administrative rules at university are present during the whole process of organizational change, they become most prominent during the establishment phase, since all the decisions related to the formalities of the unit then have to be made. After the actors decide how to respond (in this case through formal adaptation), the contradictory

aspect of institutions does not interfere with their daily practices. In the development phase, the institutions that are related to benefiting from the results of a change process start playing an important role. In the case of the center under analysis, the actors are aware of the existence of the global protection of intellectual property rights throughout the process, but they are only influenced directly by such institutions when they have technology to patentⁱⁱ.

This paper reveals the complexity of institutional diversity. First, it emphasizes that enabling and hindering forces of institutions can be in action simultaneously. Rigid clinical practices and administrative rules for units at a university are in action at the same time as funding guidelines for research at the national level requiring interdisciplinary structures. Second, enabling institutions (the ones creating positive incentives) can be complementary to each other (if they have different functions) or reinforcing (if they have the same/similar function). It follows that when reacting to institutional opportunities, innovating individuals should consider the contradictory, complementary and reinforcing aspects of an institutional framework as a whole. More concretely, they should consider possible responses to institutions contradictory to the initial opportunities, as well as identify reinforcing and complementary norms, rules and procedures. Therefore, identification of the complexity behind institutional diversity is not just a theoretical exercise, but has a practical value since it facilitates learning from success stories.

The findings of this paper are in line with the proposition in the literature that individuals look for partners for knowledge exchange who are close to their environment, but are inspired by changes at the global level (Maskell and Malmberg, 2007). The founders were inspired by and inspired changes in the research organization in other countries. However, the process of initiation and establishment of the center is on a local scale. All the seven founders of the center were working in Lund-Malmö region at the time when the center was initiated. Furthermore, the ‘fans’ of the center – moral supporters – as well as a research officer were

also present in the Lund-Malmö region. However, physical proximity alone is not a sufficient condition for interaction between actors. Position in the organization or research field as well as personal qualities are of crucial importance when identifying possible collaboration partners.

An organizational form can be a manifestation of certain values and norms in societies and communities (Meyer and Rowan, 1977; Scott, 2008). The organizational form of the center under study represents the value of interdisciplinary research within life science related to clinical practices. In this way it unites two different fields – university research and clinical practices. Both fields are highly institutionalized and resistant to change. Traditionally universities are divided into faculties and disciplines and this is how the activities are administrated, hindering the full development of interdisciplinary centers. However, the field of university research seems to be less resistant to change than the field of clinical practices. The center is considered a success story (generating patents, spin-offs and high level publications) and its organizational structure has been copied by other universities. In addition, LU is an initiator of Medicon Village, taking the idea of uniting different types of expertise under one roof further. On the other hand, clinical practices, as mentioned several times, are very difficult to change. A change requires renewed education curricula and a new generation of practitioners. Future research could apply the framework developed in this paper to large scale processes changing whole organizational fields or sectors, not just a small-scale local deviation from mainstream institutional practices.

Some policy implications can be drawn from this analysis. Novel organizational forms allowing for interfaces between different fields of activities might be an important precondition for ground-breaking technologies to emerge. Therefore, while announcing and evaluating funding applications, it is important to asses (as well as provide support for) the structures (organizational forms) in which research takes place. In addition, the personal

characteristics of key individuals involved in application matter, and should be assessed next to their professional and leadership experience.

Reference list

Asheim B, 2012, "The Changing Role of Learning Regions in the Globalizing Knowledge Economy: A Theoretical Re-examination" *Regional Studies* **46** 993-1004

Asheim B, Gertler M S, 2005, "The Geography of Innovation: Regional Innovation Systems", in *The Oxford Handbook of Innovation* Eds J Fagerberg, D S Mowery, R R Nelson (Oxford University Press, Oxford New York) pp 291-317

Asheim B, Smith H L, Oughton C, 2011, "Regional Innovation Systems: Theory, Empirics and Policy" *Regional Studies* **45** 875-891

Atherton A, Smallbone D, 2013, "Promoting private sector development in China: the challenge of building institutional capacity at the local level" *Environment and Planning C: Government and Policy* **31** 5-23

Bathelt H, Malmberg A, Maskell P, 2004, "Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation" *Progress in Human Geography* **28** 31-56

Boschma R, Frenken K, 2009, "Some Notes on Institutions in Evolutionary Economic Geography" *Economic Geography* **85** 151-158

Clark J, 2006, "The institutional limits to multifunctional agriculture: subnational governance and regional systems of innovation" *Environment and Planning C: Government and Policy* **24** 331-349

Cooke P, Propris L d, 2011, "A policy agenda for EU smart growth: the role of creative and cultural industries" *Policy Studies* **32** 365-375

Denzin D K, 1970 *The research act in sociology: a theoretical introduction to sociological methods* (Butterworths, London)

Edquist C, Johnson B, 1997, "Institutions and Organizations in Systems of Innovations", in *Systems of Innovations: Technologies, Institutions and Organizations* Ed C Edquist (Pinter, London and Washington) pp 41-63

Freeman C, 2010, "Formal Scientific and Technical Institutions in the National System of Innovation", in *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning* Ed B Å Lundvall (The Anthem Press, London/ New York) pp 173-192

Fuller C, Bennett R J, Ramsden M, 2004, "Local government and the changing institutional landscape of economic development in England and Wales" *Environment and Planning C: Government and Policy* **22** 317-347

Gertler M, Wolfe D A, 2002, "Innovation and Social Learning: An Introduction", in *Innovation and Social Learning: Institutional Adaptation in an Era of Technological Change* Eds M Gertler, D A Wolfe (Palgrave Macmillan, New York) pp 1-24

Gertler M S, 2004 *Manufacturing Culture: The Institutional Geography of Industrial Practice* (Oxford University Press, Oxford New York)

Gertler M S, 2010, "Rules of the Game: The place of Institutions in Regional Economic Change" *Regional Studies* **44** 1-15

Henning M, Moodysson J, Nilsson M, 2010 *Innovation och regional omvandling: Från skånska kluster till nya kombinationer* (Region Skåne, Malmö)

Kimberly J R, Evanisko M J, 1981, "Organizational Innovation: The Influence of Individual, Organizational, and Contextual Factors on Hospital Adoption of Technological and Administrative Innovations" *The Academy of Management Journal* **24** 689-713

Lundvall B-Å, 2010, "Introduction", in *National Systems of Innovation: Toward a Theory of Innovation and Interactive Learning* Ed B-Å Lundvall (Anthem Press, London/ New York) pp 1-19

- Lundvall B Å, Maskell P, 2000, "Nation States and Economic Development: from National Systems of Production to National Systems of Knowledge Creation and Learning", in *The Oxford Handbook of Economic Geography* Eds G L Clar, M P Feldman, M S Gertler (Oxford University Press, New York) pp 353-372
- Maskell P, Malmberg A, 2007, "Myopia, knowledge development and cluster evolution" *Journal of Economic Geography* **7** 603-618
- Meyer J W, 1994, "Rationalized Environments", in *Institutional Environments and Organizations: Structural Complexity and Individualism* Eds R Scott, J W Meyer (Sage, Thousand Oaks)
- Meyer J W, Rowan B, 1977, "Institutionalized Organization: Formal Structure as Myth and Ceremony" *American Journal of Sociology* **83** 340-363
- Moodysson J, Coenen L, Asheim B, 2008, "Explaining spatial patterns of innovation: analytical and synthetic modes of knowledge creation in the Medicon Valley life-science cluster" *Environment and planning. A*
- North D, 1990 *Institutions, Institutional Change and Economic Performance* (Cambridge University Press, Cambridge)
- Rapley T, 2004, "Interviews", in *Qualitative Research Practice* Eds C Seale, G Gobo, J F Gubrium, D Silverman (Sage Publications, London) pp 15-33
- Schoenberger E, 1991, "The Corporate Interview as a Research Method in Economic Geography" *The Professional Geographer* **43** 180-189
- Scott A J, 1998, "Community, Local Democracy and Citizenship" *Prospects* **XXVIII** 328-331
- Scott W R, 2008 *Institutions and Organizations* (Sage Publications, London)
- Scott W R, 2010, "Reflections: The Past and Future of Research on Institutions and Institutional Change" *Journal of Change Management* **10** 5-21

Sotarauta M, Pulkkinen R, 2010, "Institutional Entrepreneurship for Knowledge Regions. In Search of a Fresh Set of Questions for Regional Innovation Studies" *Environment and Planning C: Government and Policy* **29** 96-112

SSF, 2004 April 16, "The Swedish Foundation for Strategic Research announces grants for Strategic Research Centres", (Stockholm)

Steiner C J, 1995, "A Philosophy for Innovation: The Role of Unconventional Individuals in Innovation Success" *Journal of Product Innovation Management* **12** 431-440

Storper M, 1997 *The Regional World* (The Guilford Press, New York London)

Strambach S, 2010, "Path dependance and path plasticity: the co-evolution of institutions and innovation - the German customized business software industry", in *The Handbook of Evolutionary Economic Geography* Eds R Boschma, R Martin (Edward Elgar, Cheltenham, Northampton, MA) pp 406-431

Swyngedouw E, 2000, "Elite Power, Global Forces, and the Political Economy of 'Glocal' Development", in *The Oxford Handbook of Economic Geography* Eds G L Clark, M P Feldman, M S Gertler (Oxford University Press, Oxford New York)

Ven A H V d, Polley D E, Garud R, Venkataraman S, 2008 *The Innovation Journey* (Oxford University Press, Oxford New York)

Appendix A.

Table3. Individuals and their roles in the creation and development process

Individual	Functions/Characteristics	Field
The Head of the center	Initiation of the process; Mobilization of other actors; Expertise in science, industry and administration	Research/University
Clinical connector	Expertise in clinical practice, research and administration; Authority in mobilization of other practitioners	Health care practice/Hospital
Research officer	‘Glue’ helping to keep group together; Expertise in science and administration	Research administration/University
Applicant1	Expertise in cancer genetics	Research/University/Medical Faculty
Applicant2	Expertise in nanotechnology	Research/University/LTH
Applicant3	Expertise in bioinformatics	Research/University/Faculty of Science
Applicant4	Expertise in tumor biology	Research/University/Medical faculty
Applicant5	Expertise in proteomics	Research/University/LTH
Deans of the three faculties	Authority to support application	Research administration/University
Junior staff (PhD students, post-docs, physicians)	Strengthening the development as one unit; Continuation of ideas	Research/University
‘Fans’ – experienced researchers	Expertise in research and administration; Opinion building through social networks	Research/University
The Managing director of SSF	Initiation of the call for strategic research centers	Funding structures/SSF

Source: Own data

Appendix B

Table 4. Incentives, functions and relations of institutions

	(1) Routines at university and clinics	(2) Global regulations	(3) National regulations	(4) Regional regulations	(5) Global norms	(6) Regional norms	(7) Organizational routines/ procedures at the center
Incentive	Preserve the functioning of existing structures/administration	Engage in innovation activities	Establish interdisciplinary research centers, engage in biotech	Engage interdisciplinary innovation and research	Engage interdisciplinary research	Engage in innovation	Engage in interdisciplinary research and innovation
Function	Provide regulative guidelines for daily activities	Provide regulations for protecting IPR	Provide guidelines for funding possibilities	Provide guidelines for establishing physical infrastructure	Setting the agenda for new research techniques and constellations	Encourage positive attitudes towards innovation, creating tradition of thriving biotech cluster	Provide guidelines for daily practices and joint conventions regarding expectations of research results
Contradictory	2,3,4,5,6,7	1	1	1	1	1	1
Reinforcing	-	-	4	3	-	-	-
Complementary	-	3,4,5,6,7	2,5,6,7	2,5,6,7	2,3,4,6,7	2,3,4,5,7	2,3,4,5,6

Source: own draft

ⁱ Although this paper addresses organizational change, it does not aim to contribute to the organizational studies literature. On the contrary, it brings some of the insights from Scott's (2008) study in order to better understand change processes within the geography of innovation literature. Since innovation by definition is change, it would add to a better understanding of innovation processes. In addition, the author is aware that the topic of organizational change can be addressed through different perspectives – i.e. the interrelations of organizational change and institutional change, organizational change (innovation) and other types of innovations. Although these are interesting topics, they are not addressed here.

ⁱⁱ In the case analyzed in this paper, the institutions created positive incentives for change and allowed benefiting from the results. However, it might be that, in some other cases, the institutions hinder possibilities of benefiting (i.e. complicated rules for commercialization of research results developed in a new unit). Thus, the issue of whether institutions are hinderers or enablers at this phase has to be addressed empirically in each case.

Article IV

Multiple Paths of Development: Knowledge Bases and Institutional Characteristics of the Swedish Food Sector

Elena Zukauskaitė and Jerker Moodysson

Abstract

The aim of this paper is to explain the complex development of the food sector in Southern Sweden in the past decades, focusing on the relation between institutions and innovation practices and taking into account the diversity of actors composing the sector. The paper develops a theoretical framework combining concepts of path dependency and knowledge bases, and applies it empirically. The three paths identified in the paper resemble path development via radical change, incremental change and diversification.

Keywords: Food sector, Innovation, Sweden, Institutions, Knowledge base

Introduction

Much attention has been dedicated in recent years towards trying to better understand and explain the evolutionary paths among firms in different industries, not least in research fields like economic geography and regional studies (Asheim and Coenen, 2005; Boschma and Iammarino, 2009; Boschma and Wenting, 2007). Empirical observations show distinct differences with regard to the paths of development between different types of economic activities, and between regions and countries with different characteristics. Among the most common models for explaining such differences are those that take their main point of departure in either sectoral aspects (Breschi and Malerba, 1997) or in aspects related to the national or regional context in which the sectors are located (Cooke, 2002; Whitley, 2002; Zysman, 1994). While not dismissing sectoral and contextual characteristics as potentially important sources for explaining differences between firm and industry transformations, this paper acknowledges recent research indicating that such factors can only explain variety to a limited extent. Following Srholec and Verspagen (2012), far more of the variance is due to heterogeneity among firms within both countries and sectors. Even in the most narrowly defined industries, firms do not follow the same pattern of innovation behavior (Leiponen and Drejer, 2007). These findings call for alternative explanations, and this paper presents one attempt at finding such alternatives. As opposed to many studies which focus on input (e.g. investments in R&D) or output factors (e.g. types of products or processes), mainly dealing with how much resources firms invest and how much they get out of their investments, this study instead aims at capturing how firms actually go about innovating, and why their modes of innovation differ. The paper compares different paths of development of the food sector in Southern Sweden. All the firms are embedded into the same national, regional, and sectoral institutional framework, which changes over time, such as when Sweden was accepted into the EU and/or when new funding support programs are initiated.

An initial empirical observation serving as a point of departure is that there are at least two contrasting narratives describing the development of the food sector in Southern Sweden during the past couple of decades. One of these describes the sector as largely transforming into an emerging field of functional food in which value added products are developed by exploiting new knowledge and modern technologies, often in cooperation with universities located in the region (Asheim and Coenen, 2005). The other, which describes a sector in crisis with diminishing R&D departments and low survival rates of innovations, mainly focusing on incremental improvements in existing products (Beckeman, Forthcoming; Lagnevik et al., 2003). The existence of these alternative stories is without doubt influenced by the fact that the food sector is diverse when it comes to perception of innovation, absorptive capacity and openness to policy support programs (Gellynck and Vermeire, 2009; Tripl, 2011). Policy makers should take this diversity into account when designing support programs for the industry. They should not only make the programs attuned to and embedded in the sector and region they aim to influence, but also adapted and open to variations in the knowledge base of various branches of the sector (Coenen and Moodysson, 2009). Diversity is thus specified not on the level of the sector or industry, but on the knowledge base of firms in the same industry. While focusing on the crucial knowledge base of firms representing different development paths, the research design also allows us to pay attention to changing market conditions in which the firms operate, which has been highlighted as a potentially important explanatory factor in previous studies (Laursen, 2012; Leiponen and Drejer, 2007).

Conceptual framework

Institutions, path dependence and regional innovation systems

The innovation systems approach defines innovation as an outcome of the systemic interaction of actors (firms, research organizations and governmental authorities) embedded in

an institutional framework (Edquist, 1997). The institutional framework of a regional innovation system provides formal and informal rules for interactions between organizations and individuals. It influences learning, knowledge exchange, cooperation patterns and innovation diffusion (Lundvall, 2010, Storper, 1997, Asheim and Gertler, 2005). Some authors reject the importance of territorial institutions, limiting those to basic regulative requirements such as the rule of law. They argue that a single firm has its distinct routines that can be applied in any territorial context, while each territory is characterized by a variety of routines. Therefore, institutional renewal is possible only through technological renewal when firms develop new routines in relation to new technology (see e.g. Boschma and Frenken, 2009, 2011). On the other hand, Gertler (2004) convincingly reveals how territorial institutions influence varying development paths within the same industry. This implies that industry-specific institutions alone cannot explain variation in the development processes and innovation activities.

Due to geographical and industrial variation, some institutional constellations might be more favorable for innovation than others. Therefore, institutions can be both hinderers and enablers of innovation processes (Hodgson, 2003). The duality of institutions as obstacles and triggers for innovation is a central aspect in the analysis of this paper. In the discussion on the dual relation between institutions and innovations, path dependency is one of the central concepts (Strambach, 2010). It highlights the historical nature of change emphasizing that present choices are influenced by past experiences (North, 2010). The basic rationale is that historical accidents lead to the establishment of certain institutional infrastructures. Since different kinds of institutions are closely interrelated, the change is slow and accumulative, leading to a certain path of development. Institutions are furthermore embedded in geographical space. Therefore, path dependency is place specific (Martin and Sunley, 2010).

Path dependency can lead to both positive and negative institutional lock-in. Positive lock-in refers to the accumulation of institutions that encourage cooperation, learning, knowledge exchange and other aspects beneficial for innovation (Asheim and Gertler, 2005). In the case of negative lock-in, previously successful institutions become outdated and turn into obstacles to innovation. However, since there have been lots of investment and time devoted to the development of procedures and interaction patterns, there might be resistance or inability to change. This might take place at organizational, sectoral or regional levels. Economic geography addresses the issue of negative lock-in mainly as the decline of previously successful regions due to loss of learning capabilities caused by long standing personal ties, the search for external ideas, conservative culture and common world views excluding alternative perceptions (Asheim, 2000; Boschma and Lambooy, 1999; Grabher, 1993; Hassink, 2010). What is often omitted or implicit in the analysis of declining regions is that lock-in exists not only on the producer side, but also on the consumer side (Barnes et al., 2004). Consumers are guided by their shopping habits, preferences and capabilities. Therefore, for a new type of product to be developed and established in the market, there is a need for innovative activities on both the producer and consumer sides.

Evolutionary economic geography highlights the fact that path dependency and lock-in are geographically bounded processes. However, while some regions get trapped in path dependency and decline, others create new paths and phases of development (Martin and Sunley, 2006, 2010). The same national institutional framework might stimulate varying paths of regional development (Strambach, 2010). The literature on regional development and regional innovation systems addresses this question, highlighting the importance of regional institutions in innovation processes (Asheim, 2012; Asheim and Gertler, 2005; Cooke et al., 1997; Storper, 1997). However, this paper analyzes differences not between different regions, but between different paths in the same region and even within the same industry. More

concretely, we observe that some firms in the same region and sector follow new or renewed paths, while others remain in established paths with very little variation. This relates to Strambach's (2010) argument that actors can interpret and combine regional, sectoral and organizational institutions in many different ways, enabling several developments within the same region or country.

It is not only combination and interpretation of institutions that might lead to several developments within the same region. One of the functions of institutions is to provide incentives, to 'specify and implement the sticks and carrots of economic life' (Edquist and Johnson, 1997:53). Examples of institutions providing incentives for innovations are income tax, labor regulations, educational traditions and entrepreneurial values. Several developments within the same incentive structures are possible, because actors can choose how to respond to them. Consciously or not, humans make choices and in this way create multiple paths (Hodgson, 2003; North, 2010). The institutions of high wages create the incentive to reduce labor-intensive activities. The choices of firms might be either to move to low-wage countries or try to optimize and upgrade their activities through innovation. Since actors within the same location (and industry) are very heterogeneous, they might make different choices leading to varying paths of development (Martin and Sunley, 2006, 2010). Therefore, there is some flexibility even in the interpretation of formal institutions. Actors in the food sector in Scania are embedded in the institutional framework consisting of national and global regulations (e.g. free flow of capital, goods and people within EU), regional norms (e.g. scientific culture of the region, emphasis on innovation), sectoral traditions (e.g. traditionally highly regulated domestic market) and procedures within the organizations (e.g. initiations of innovations by marketing department or through cooperation with university).

Seminal work on path dependency (David, 1985) conceptualizes path creation as an outcome of 'historical accidents', while more recent studies within economic geography tend to

highlight the interrelatedness between former paths and new path creation. New path creation is a historical process influenced by conditions, resources, competences, and assets rooted in the area – stemming from previous rounds of path development (Martin and Simmie, 2008; Martin and Sunley, 2006, 2010; Simmie, 2012; Trippel and Otto, 2009; Tödtling and Trippel, 2012). According to Martin and Sunley (2010), previous paths in a certain location can be enabling (if they allow for openness to new industrial and technological development) or constraining (if there is a built-in legacy of old industrial structures and restrictive business culture) the emergence of new paths (see also Martin and Simmie, 2008). However, from an institutional point of view, treating locational characteristics as necessarily enabling or constraining is too simplistic. Martin and Sunley (2006) themselves emphasize that regional paths are embedded in and influenced by the changes in organizational routines, other regions, and national and global levels. It follows that institutions influencing path dependent processes consist of rules, norms and procedures at different geographical levels, and might trigger or hinder innovation processes. In other words, within the same region some institutional characteristics enable, while others hinder, the creation of new paths. Furthermore, because of institutional complexity (different types of institutions at different geographical levels), and heterogeneity of the actors, the reactions by firms to incentives provided by institutions vary. Some actors actively create new paths, while others remain in an existing paradigm (David, 1992; Simmie, 2012). This leads to multiple paths within the same region and industry. Trippel and Otto (2009) differentiate between the path of incremental change associated with modest modifications in the existing trajectory; diversification associated with renewal via relations to other established industry; and radical change associated with new knowledge intensive industries (i.e. new path creation)¹.

In the analysis part of this paper the main discussion is centered on which institutions have an impact on the food sector in Skåne, what incentives those institutions create and how actors

respond to them – i.e. via incremental, radical change or diversification – resulting in new path creation or remaining in the same paradigm. The motivation and the characteristics of the actors making one or another choice lie partly beyond the scope of this paper and could be an interesting topic for future research. This paper limits this part of the analysis to assessing the impact of differences, with regard to the crucial knowledge base, on actors' perception of and response to institutional change.

Different knowledge bases as sources for innovation

As touched upon above, our assumption is that sub-sectoral differences with regard to the crucial knowledge base of actors can contribute to explaining differences in interpretation, adoption and combination of institutions. Thus, firms abilities to learn, change and innovate depend on the knowledge base underlying their activities (Asheim and Gertler, 2005). This study highlights how reliance on one knowledge base, or specific combinations of different knowledge bases, influences innovation activities which in turn lead to different responses to the incentives created by the institutional framework.

Activities drawing primarily on an analytical knowledge base aim at explaining and understanding processes of the natural world. Scientific knowledge is highly important, often based on deductive processes and formal models. Knowledge inputs and outputs are often codified due to documentation in patents and publications. Therefore, university research and university-industry links are of very high importance in innovation processes (Asheim et al., 2007; Coenen and Moodysson, 2009; Martin and Moodysson, 2012). In contrast, a synthetic knowledge base refers to knowledge required for activities involved in the design of something that works as a solution to a practical problem. Innovation activities take place through application and new combination of existing knowledge, know-how and skills. Firms with an underlying synthetic knowledge base might have some collaboration with

universities, but usually it is limited to concrete problem solving rather than understanding and explaining the basic rationale of the phenomenon (Asheim, 2007; Asheim et al., 2007).

The dominating knowledge base within the food sector as a whole must be classified as synthetic (see e.g. Martin and Moodysson, 2012; Martin et al., 2011). However, several knowledge bases can be identified at different stages of development and in different innovation processes (Manniche, 2012; Manniche and Testa, 2010). A well-known example is the development of functional food, which requires both analytical and synthetic knowledge. The inclusion of an analytical knowledge base in traditional (synthetic) activities is highlighted as crucial for the innovation process (Coenen and Moodysson, 2009; Moodysson et al., 2008a). On the other hand, the synthetic knowledge base is very broad, underlying many different industries and activities (Martin, 2012). Therefore, innovation may emerge while combining expertise from different industries, although all of them are ultimately based on synthetic knowledge – e.g. in the interface of packaging and distribution lines (see e.g. Coenen and Moodysson, 2009). Finally, the continuous trial and error processes (learning by doing), which are characteristic of synthetic knowledge base activities, lead to incremental improvements in the products within the same field of activities; according to some researchers this should not even be referred to as innovation, but rather incremental development (Beckeman, Forthcoming; Lagnevik et al., 2003). These three possible innovation processes are further analysed in the paper, mainly focusing on the role of institutions as triggers and hinderers of the activities.

Summary of the conceptual framework

The basic rationale of the conceptual framework applied in this paper is, thus, that institutions consisting of national and international regulations, consumer norms and habits, and organizational procedures create incentive structures for companies in the region. Due to the

knowledge base, or combination of knowledge bases underlying the firms' innovation activities, their responses to these incentives vary. More concretely, we expect that firms combining analytic and synthetic knowledge bases in innovation processes are more likely than others to start new path creation via radical innovation. They will respond to institutional incentives by collaborating with a university, bringing science into traditional industry and creating value-added products. Firms relying on a synthetic knowledge base from one field of expertise are most likely to remain within the established path and respond to the institutional incentives mainly through incremental innovations. Finally, firms combining synthetic knowledge bases from two fields of expertise are more likely to respond to institutional change via process innovation and product diversification. The relation between innovation activities and the institutional framework is obviously not a one-way relation but a mutual one. Innovation activities and actors' responses might change the institutional framework in the long run. Nevertheless, the main focus of this paper is on the impact of institutions as hindrances and triggers for innovation activities, while the analysis of potential reverse impulses is saved for future studies. Figure 1 summarizes the conceptual framework applied in the analysis of the data.

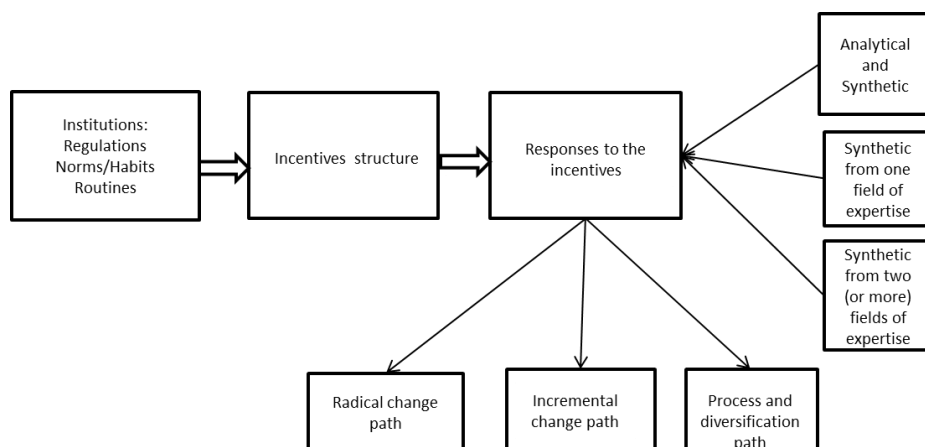


Figure 1: The Summary of the Conceptual Framework

Research design

This paper draws on an analysis of development paths within the food sector in Southern Sweden. The whole value chain of the food sector includes a broad range of actors – from farmers to retailers and consumers. Innovation processes are addressed from the manufacturers' perspective – the introduction of new products and processes. Other actors in the value chain are addressed indirectly, mainly through the influence they have on manufacturers. Furthermore, the manufacturers here belong to two main groups which are primarily addressed by the regional policy makers in their support programs – conventional food and special food innovation (i.e. functional food) firms (Cooke et al., 2007).

The main methods for data collection are text analysis and semi-structured interviews. Text analysis was used as a first step in the data collection. It included a review of previous academic studies on innovation processes within the food sector in Sweden and other countries, as well as non-academic texts such as reports regarding the development of the food sector in the region. In addition, websites of food companies and different policy initiatives regarding food were used as data sources. The primary goal of this desktop analysis was to understand how the food sector is described and presented when it comes to innovation processes, what actors are identified and what problems and opportunities are highlighted. In the next step of data collection, 14 semi-structured interviews were conducted with firms' representatives (CEOs, production managers or marketing directors), representatives of regional policy support programs, and other individuals with experience from and insights into the development of the food sector. Each interview lasted for about one hour, was recorded, transcribed and interpreted by both authors. The main thematic focus of the interviews was development of the food industry in general and in the region in particular.

Respondents were asked to describe how the sector had developed over the last few decades, how new products and processes were developed and how that changed over time, what the main triggers and hindrances were for innovation, and what the role of the region was in those processes.

The data was analyzed through the process of retrodution. The theoretical approach suggests that there might be several paths of development, depending on the underlying knowledge base, while the collected data enabled further specification of the concrete paths identified. Since the institutions that matter for each path are not entirely overlapping, the time dimension slightly differs in each path. These are not historical year by year accounts, but rather accounts of which institutions came into the path, when they did so, and how they influenced the activities and development possibilities of the actors.

Analysis

Overview of the food sector in Southern Sweden

Southern Sweden has a strong national position in food production. One quarter of the country's food industry is located in the region, employing about 25,000 people. The majority of companies are clustered in the western part of the region, with activities covering the whole food production value chain from primary production to storage, transport, packaging and processing. Traditionally, it was a highly regulated industry strongly geared towards the domestic market. The profits of the companies depended on negotiation with the national government rather than on market conditions. Global competition accelerated as a consequence of Sweden's entry into the European Union in 1995, which increased the pressure on the food industry to develop towards higher value added niche products involving greater knowledge content. An overview of consumer trends in the region, presented in an unpublished report by Lagnevik (2000) suggests that consumer trends are contradicting. On

the one hand, consumers are getting more and more interested in healthy food, implying growing market possibilities in this area. At the same time, however, consumption habits reveal an opposing trend; fast food and ready-made meals are becoming more and more popular and the intake of sugar is getting higher.

Skåne Food Innovation Network (SFIN) was created in the middle of the 1980s in order to increase the food sector's international competitiveness, mainly through connecting the food industry with other relevant industries such as packaging, machinery and logistics, as well as with academia. SFIN is involved in human capital and competence development in industry through presenting the food sector to students during career days, specially organized tours and internship programs. The initiative also assists in opening new innovative markets, supporting the development of innovations by facilitating connections with academia and to some extent providing financial support for R&D. It is also engaged in the design and development of higher education programs at Lund University, but the main focus of the initiative is networking and communication among the actors. It is running a ten-year development project called Food Innovation at Interfaces, funded by a consortium of state actors (primarily VINNOVA), Region Skåne, Lund University and some food companies in the region. The overall objective is to improve cooperation within the food industry and between food companies and academia, and thereby stimulate innovation and economic growth. Next to SFIN (the largest and most influential initiative in the region) are several smaller initiatives with slightly different focus. *Ideon Agrofood (IDAF)*, located in Lund, is a foundation that was established in 1986 with the primarily goal of increasing the interaction between academia and the food industry. *Centrum för livsmedelsutveckling i Karlshamn (CLUK)* is one of the youngest initiatives. It was established in 2011 and can be defined as a resource and information centre funded by the European Regional Development Fund and Region Blekinge. Most of the SFIN and IDAF activities are geared to innovation activities

requiring an analytical knowledge base, while the main focus of CLUK is on activities requiring synthetic knowledge (process development).

To sum up, the food industry in Southern Sweden is an old industry with deep traditions and involves many diverse actors in the region. It competes in the global market and is exposed to changing and contradicting consumer trends.

The path of radical change – food and health convergence

One example of the development of the food industry in Southern Sweden, which we here refer to as the path of radical change, is the emergence of high-value added products with health benefits. The best known examples of this change are such products as Proviva and Oatlyⁱⁱ. The development processes within this path take place through the combination of synthetic and analytical knowledge bases. The basic rationale is that a different kind of knowledge is used in the development process. Critical for the radical change in the path is the ability to add analytical knowledge to synthetic knowledge (Martin and Moodysson, 2012; Moodysson et al., 2008a). The analysis of how new products are created and the organization of the activities behind them are well documented in other works (see e.g. Asheim and Coenen, 2005; Lagnevik et al., 2003; Moodysson et al., 2008b). Therefore, it is not repeated here. Instead, focus in this segment is on the institutional triggers and hindrances to innovation and the development in obtaining new forms and introducing new products over time. In other words, focus is on the radical change in the path rather than on the individual innovation processes within the path.

Sweden's membership in the European Union had an impact on the overall Swedish economy and not least on the food sector. Among other aspects, it changed the regulations regarding the import and export of food products and opened up the previously highly regulated domestic market for international competition. The ability to develop high value added products

providing health benefits was perceived by regional support programs as one of the ways to stay competitive in a globalized market. This was to be achieved through combining different competences through collaboration, and most importantly bringing university research into the food industry, i.e. bridging the gap between industry and academia. Regional support programs (mainly SFIN) could gain influence through policy initiated at the national level – VINNVÄXT funded by VINNOVA (The Swedish Agency for Innovation Systems). The rationale behind VINNVÄXT is to stimulate regional development based on the strengths already existing in the region, while drawing on the collaboration activities between industry, university and the public sector (Triple Helix collaboration). One of the winning strategies of the first call (2001), which was developed by SFIN, highlighted the renewal of the food sector in Southern Sweden by exploring innovation at interfaces with other sectors and knowledge domains (Coenen and Moodysson, 2009).

In the formal institutional structure, this trend of bridging food and health-care sectors, as well as university research and industry, can be identified not only in the national, but also regional and global levels. Food security, health and wellbeing are among the challenges identified by Horizon 2020. The platform for Food Drink Europe indicates nutrition and health, as well as food safety and science, as their priorities for the development of the sector. The regional support program creates a platform for networking between university and industry, and provides meeting arenas for interdisciplinary collaboration where the relation between health-care and food is highlighted as an important example. Next to institutional triggers, technological breakthrough in biotechnology in the 1980s is identified as an important factor creating possibilities for innovations in the food industry. According to one of the interviewees, the 1990s was a time of possibilities with high expectations in terms of new technological advancements. Proviva and Oatly are examples of that development. However,

these are two success stories among many failed projects in attempts to develop functional food.

There are two main types of products developed in this area of functional food. The first type can be described as ‘traditional’ foods with health benefits. They are marketed as tasty and healthy products that can be used by any consumer who wants to be healthy, and are sold in ordinary supermarkets. The optimal goal for producers of these products is to reach large scale volumes in production. Therefore, it is important that the products are not perceived as only relevant to a small group of consumers who have milk allergies, are lactose intolerant or live according to vegetarian ethics. The representatives of the companies think of their products as a mass-niche product – positioned in a large health niche. The other type of product, which may be, for example, wild honey based products to prevent a hangover or reduce cold symptoms, has a stronger resemblance to medicine. These kinds of products are sold in pharmacies, health stores and through companies’ own websites. Regardless of the final goal, the initial practices for product development are very similar. These innovations start with researchers at university who want to work on practical issues and identify problems in society and/or in the food industry. The processes emerge from analytical knowledge base activities – raising questions about the functioning of the natural world (e.g. why wild honey is a healthy product). The initial aim of the company is to develop a new product at the intersection of science and industry. Synthetic knowledge becomes important in searching for the right consistency and taste for a healthy scientific invention.

This kind of development is an ongoing activity in the region and still a very important part of the innovation processes within the food sector. However, it cannot be identified as the main characteristic of the food industry in Southern Sweden. Only a few new companies working in this field were either identified by the interviewees or found in other publicly available channels, in addition to the known examples mentioned above. According to one of the

interviewees, there are fewer biotechnology based innovations (or innovation attempts) within the food sector now than in the 1990s. Now, companies are more aware of the risks related to such projects and less willing to try out new ideas. From an institutional perspective, it follows that organizational procedures (risk avoidance) become hindrances to innovation activities in the path combining synthetic and analytical knowledge bases, since those are high risks projects. Other organizational practices, such as employment strategies, were also identified as hindering this path of development. Companies are often unwilling to employ high-skilled university employees and therefore lack the absorptive capacity for collaboration with a university. Regardless of the fact that there are few actors working on these types of innovations, this path is by far the most supported and encouraged by regional policy initiatives (Coenen and Moodysson, 2009).

Although, in general, development at the intersection of food and health is perceived as positive at regional, national and EU levels, The European Food Safety Authority (EFSA) regulations (reviewed in 2006) made it very difficult for food companies to claim that their products had health benefits. Some of the younger and smaller companies do not have the resources needed for the process, and the more established firms that can afford the process find the allowed claims very complicated in their formulations and therefore of hardly any use for marketing. Informal institutions such as consumer norms and habits have a dual role in these processes. On the one hand, a majority of the informants perceive growing consumer concerns about health as an important trigger for innovation. However, several companies pointed out that there was a big difference between what consumers claim they want and what they actually buy. The health trend is still quite small and people are not ready to pay a lot for good quality value-added food. Obesity, diabetes II and other food-related diseases are increasing. It follows that there is a discrepancy between the widely expressed health concerns and actual shopping habits of consumers. For radically new products to succeed,

new shopping habits have to be created. However, the creation of new markets is a very slow process. Furthermore, existing markets for functional food are considered to be fragile (Cooke et al., 2007). This has led to two responses by the industry. First, there are few companies operating in this field because slow growth in consumption means slow growth in volumes and returns on investment. Those that are already in the field, instead of constantly introducing radically new products, tend to start offering small improvements of existing products (new taste of a drink etc). It means that the analytical knowledge used in these innovation activities is gradually reduced or disappears.

The path of incremental change – mainstream product development

The path of incremental change represents the mainstream development in the food industry in Sweden and in the region. It refers to minor advancements in existing products such as changes in taste, ingredients, and packages. The main challenge for being competitive in this development is finding the right ingredients to guarantee a long shelf life when a new taste is added to an existing product. Therefore, innovation processes are based on trial and error (synthetic knowledge) mainly from one field of competence (as opposed to the combinatorial “bridging” of knowledge bases identified in the radical change path).

Naturally, products within this path have to be developed in line with the formal regulations regarding quality, safety and information for consumers. To constantly offer some improvements of the products is a part of the routines and culture in the food industry. In contrast to the first path, there are no specialized formal institutions affecting this path of development, yet Swedish membership in the European Union in the mid-1990s had an impact on these kinds of developments as well. It became increasingly difficult to introduce new products on the market after Sweden entered the EU. Due to the open market, retailers now have access to a much larger variety of products and do not necessarily prioritize national

or regional brands. Although the companies continue to slightly change their products in order to remain interesting for retailers, the main strategy is price reduction. Next to new taste, packaging or ingredients, price margins are being continuously reduced.

The main trigger for innovation in this path is what marketing and/or communication departments perceive as consumer trends in the society identified through different ways of market scanning. New trends are signaled by products introduced in other markets, media coverage, and retailers' and consumers' feedback. ICT technologies (such as access to social media platforms) play a major role here since they become ways to listen to customers. They also provide consumers with the possibility of providing immediate feedback on products and services.

In recent decades, several new consumer trends have been identified by company representatives and other interviewees. The health trend mentioned in the first path of development also plays a role here. It leads to the introduction of products which in companies' own words are 'healthy in a natural way' rather than through some added qualities. Examples of such innovations are sugar-free (or reduced sugar) versions of juice, cereals, ketchup and other products. Part of the same trend is an innovation in ingredients when sugar is replaced with some other kind of sweetener with a low calorie intake. Closely related to the health trend (or a sub-trend within the health trend) is a clean label movement expressing consumer concerns about additives in food products – the so called “E numbers”. Environmental and social sustainability trends also lead to changes in raw materials, packaging, and organization of production. The most prominent example is the inclusion of ecological types (e.g. milk) of traditional products. The main innovation in this case is a new source of supply (e.g. ecological farms). However, it might also lead to adjustment in the process or ingredients in order to be able to label the product as ecological. This development is also influenced by formal institutions at national and EU levels, such as regulations regarding

CO2 emissions, or financial support via national or EU funds for the projects that improve environmental and social sustainability.

Diversification path – new processing technologies

The third path that we could identify in our study is the introduction of innovations due to new types of production technologies, enabling producers to process food in a new way. According to our interviewees, these kinds of innovations are very rare in the food sector, coming up once in 10-15 years. Some researchers even argue that this area is solely characterized by frozen and chilled food technologies introduced to Sweden in the 1940s and 1980s respectively (see e.g. Beckeman and Skjöldebrand, 2007)

According to the interviewees, the main reason for these innovations being very rare is a lack of financial resources. Although the companies would be interested in new process technologies, the food sector is described as a low margin sector. Therefore, there are little resources left to invest into such development. Nevertheless, the most prominent examples within this path are the technologies enabling the production of frozen and chilled food. The accounts of the introduction of frozen food in Scania, provided by our interviewees and previous studies, point out the importance of combining the expertise stemming from different fields (see e.g. Beckeman, 2008; Beckeman and Skjöldebrand, 2007). The idea of frozen food originated in the USA. In Sweden the adoption and further development of this technology (starting in Southern Sweden) was a result of the joint efforts of different types of actors with different types of capacities. It included expertise in actual food characteristics – selection of the varieties of food suitable for freezing, as well as engineering knowledge needed for the development of freezing equipment, storage, distribution and packaging. Both fields of expertise are primarily dominated by a synthetic knowledge base. They are both based mainly

on trial and error development in aiming to understand how a certain phenomenon functions rather than what mechanisms govern it.

Although technology largely enables innovation in this path, technology alone is not enough for the products to succeed in the market. There is also a need to change retailers' routines and consumers' habits. In the case of frozen and chilled food, this includes aspects such as making the retailers keep electricity on overnight to prevent defreezing of the products, which was not common practice in the past. The introduction of frozen/chilled products to the market is a radical innovation not comparable to other available products. Therefore, initially, actors have to educate consumers and create new consumption habits in order to stay competitive. This is closely related to other developments in society. Changing norms about women's role in the family has facilitated the creation of new consumption habits – frozen food. Up till now the sales of frozen food have been affected by changing family situations – the increase of single person households, fluctuating sizes of families from week to week (affected by divorce rate). In addition, there is a constant effort to persuade consumers that frozen food can be healthy, or in some cases even healthier than fresh products. Therefore, some of the marketing efforts are influenced by the same health trend as for the other two paths.

The technologies allowing chilled products instead of frozen were developed at the same time in different places around the world, and one of them was Scania. They are also associated with the health trend described above. According to the producers, consumers perceive chilled products as healthier compared to frozen products. In addition, chilled products are often additive-free, in this way including an additional aspect of the health trend. In one of the cases described by the interviewees, the driver for innovation was to create a process technology enabling a long shelf life of the product without additives, while at the same time preserving

the qualities of the fresh product. The need to chill the product was a ‘side effect’ while searching for the ways to preserve natural qualities.

The establishment of common standards in such processes as pumping of the material, recycling etc. is closely interrelated with this path of development, and creates an incentive for companies to collaborate in the development and help to overcome the hindrance of limited resources. The establishment of world-wide or nation-wide standards cannot take place at the regional level. However, regional support programs could create space for a more problem-oriented networking (establishment of informal common standards among firms within the region/several regions) rather than the creation of arenas for social interactions of the actors.

Summary of the three paths of development

From an institutional perspective there are thus two main reasons for multiple paths of development within the sector. First, depending on the knowledge base underlying the activities, the responses to the same incentive structures differ. Sweden’s membership in the European Union changed shopping habits and emerging health trends have an impact on actors representing all three paths. However, their responses vary from reduced prices and less sugar/less salt products to radical innovations in the creation of high value added products. Second, depending on the knowledge base underlying their activities, the actors respond to, or are influenced by, different incentives. Changes in EFSA regulations primarily influence the group combining synthetic and analytical knowledge (radical change path), since their marketing efforts are closely related to the right to make clearly communicated health claims. An environmental sustainability trend makes the largest impact on traditional food producers (incremental change path), since it leads to the ecological alternative of established products

(minor variation). Changing norms of family structures in the society have facilitated the emergence of convenience food (diversification path).

Since all actors in the food sector in Southern Sweden are embedded in the same territorial context, all of them are to some extent influenced by the same territorial institutions. The signs of environmental sustainability trends or changing family norms can be found in all groups. However, although they are critical for one path, they play minor roles in the other paths. An overview of the three paths and their main institutional determinants is provided in appendix 1.

The findings of this paper are in line with our theoretical expectations regarding knowledge bases and path dependence processes. The companies combining analytic and synthetic knowledge bases resemble the process of path creation via radical innovation as suggested by Trippel and Otto (2009). Companies relying on analytic and synthetic knowledge bases respond to the incentive of increased competition via value-added products. Some of the institutional conditions are favorable for the emergence of this path, e.g. support by regional authorities, and the tradition of medical and biotechnology research. However, other institutional incentives such as shopping habits and EFSA regulations are hindering the development. This finding supports the idea that location and path-specific conditions are not necessarily either enabling or hindering new path. Enabling and contradicting influences might be in place simultaneously. Companies drawing on a synthetic knowledge base from one field of expertise mainly follow the path of incremental change. Some of the institutions (i.e. shopping habits, industry culture) reinforce this behavior, while firms respond to contradicting institutions (i.e. increased competition) via reduced prices. Finally, companies combining synthetic knowledge bases from two fields of expertise innovate via changes in process and product diversification via process technologies. Similarly to the companies in the

second path, they are exposed to increased competition and often seek to reduce prices. However, this is often achieved by optimizing the process.

Discussions and conclusions

As discussed in the previous sections of this paper, food companies in Southern Sweden are embedded in a complex institutional framework consisting of formal regulations, norms and organizational routines. The development of formal institutions can be divided into two periods. The first period, before entrance into the EU, is characterized by a highly regulated domestic market. The second period starts with EU membership and the following increased global competition. Membership in the EU has led, on the one hand, not only to increased competition, but also to support for health trends in food production, and, on the other hand, to compliance with EFSA requirements, which make the marketing of such products very complicated. Normative institutions in this paper refer mainly to consumers' values and expectations regarding food. Those include increasing interest in health and environmental, changing family relations, shopping and consumption habits. Organizational routines refer to practices developed by food producers and range from procedures for initiating new products to avoidance of risk.

Such a complex and interrelated institutional framework provides harmonious and contradicting incentive structures. The health trend creates an incentive to develop healthy products. On the other hand, consumption habits often prevent companies from introducing or maintaining radically new products on the market. Therefore, incentives for minor improvements in existing products are created. Changing family relations (single households and varying number of family members) create incentives for developing convenience food, which might range from healthy alternatives (e.g. frozen vegetables) to fast food options (pizzas and lasagnas), highly valued by young consumers (Lagnevik, 2000). Depending on the

knowledge base underlying innovation activities, companies choose (consciously or not) which incentives to follow and which to disregard. The combination of analytical and synthetic knowledge allows the development of functional food and therefore requires compliance with EFSA regulations in order to make health claims. Synthetic knowledge in one field is more compatible with environmental sustainability trends, since it implies a variation within the existing product group.

Furthermore, the critical knowledge base(s) underlying different innovation activities may lead to a variety of responses to the same incentive. As revealed by our findings, EU membership, health trends, and shopping and consumption habits influence all three groups of innovation activities (in this paper referred to as different paths of development). For example, increasing consumer interest in health creates an incentive to develop healthy food alternatives. Companies innovating through a combination of analytical and synthetic knowledge respond to it by developing high value-added products in the interface with university research. Companies innovating through incremental improvements in one field of synthetic knowledge develop what could be classified as ‘not unhealthy food’ (Lagnevik et al., 2003) – e.g. adding less sugar, salt or fat. Finally, companies innovating through a synthetic knowledge base by combining different fields of expertise offer a product processed in a healthier way than before – e.g. through process technologies enabling the exclusion of additives, but still preserving qualityⁱⁱⁱ.

Institutions can obviously also serve as barriers for innovation. EFSA regulations (formal institutions) make the marketing process of value-added health products very complicated. The shopping habits of consumers often prevent companies from introducing or establishing new products in the market. Finally, organizational routines also hinder innovation processes because of a lack of absorptive capacity, unwillingness to employ high-skilled university graduates, and avoidance of risk.

Negative institutional lock-in might thus have an impact on both companies' behavior and consumers' habits. Companies tend to prefer to do things according to established practices. Consumers also have habits which change slowly, preventing the launch of new products. Regional policy support programs put lots of effort into changing routines and norms within companies – e.g. by spreading ideas of the importance of high value added products, highly skilled employees, collaboration and information sharing, and not least through promoting industry-university interaction. However, very little attention is paid to the change in consumers' habits in this respect. The growing number of people suffering obesity, diabetes II and other food-related diseases reveals that there is a discrepancy between claimed concerns and the actions of mass consumers. Therefore, for the high-value added innovations to succeed, there is a need not only to promote risk taking and a collaboration culture among companies, but also to support change in consumer behavior. Innovative products have to survive under market conditions in order to be successful, which means they have to be accepted and bought by the consumers. Otherwise, innovations will be limited to the second path of incremental changes within established products, while attempts to break with established routines through the first path of innovation will have little chance of success.

Three paths identified in this paper resemble path development via radical change (i.e. new path creation), incremental change and diversification via a relation to other established industries as suggested by previous studies in evolutionary economic geography (Trippel and Otto, 2009; Tödtling and Trippel, 2012). This paper also reveals the complexity of the path dependency process. Since variation can take place within one industry in the same region, it is not only regions and industries that vary in their development paths. The idea that place and path-specific characteristics matter for innovation activities (Martin and Sunley, 2006, 2010) is not rejected in this paper. However, it highlights that the way those characteristics are used depends on the firms and their dominant knowledge bases. Therefore, actors matter not only

when a new path is created, as suggested by Simmie (2012), but also when the existing one is preserved.

With regard to innovation policy, the path in which analytical and synthetic knowledge bases are combined (radical change path) attracts most attention and funding. However, the majority of innovation activities actually take place drawing on a synthetic knowledge base and often within one field of expertise (paths of incremental change and diversification). There is, thus, a need for more fine-tuned policy support programs taking this diversity into account. The dominating policy measures aiming for increased interaction between industry and academia will most likely have a limited impact on the innovative capacity of food companies in Sweden, while a broader approach aiming at innovation processes across all knowledge base combinations would contribute much more to the development of the sector. This is not to say that university-industry relations would have little effect in general, or that policy makers should support practices that are not sustainable in the long run (i.e. price based competition), but just that there is currently a mismatch between existing policy measures and actual needs and demands among the firms composing the target population of these policy measures. More concretely, support for process upgrading and optimization, facilitation of the establishment of joint standards, and help in bridging different fields of expertise with the same dominant knowledge base might be viable policy measures next to promotion of analytical knowledge base activities.

Reference list

- Asheim B, 2000, "Industrial Districts: The Contributions of Marshall and Beyond", in *The Oxford Handbook of Economic Geography* Eds G L Clark, M P Feldman, M S Gertler (Oxford University Press, Oxford New York) pp 413-431
- Asheim B, 2007, "Differentiated Knowledge Bases and Varieties of Regional Innovation Systems" *Innovation: The European Journal of Social Sciences* **20** 223-241
- Asheim B, 2012, "The Changing Role of Learning Regions in the Globalizing Knowledge Economy: A Theoretical Re-examination" *Regional Studies* **46** 993-1004

- Asheim B, Coenen L, Moodysson J, Vang J, 2007, "Constructing knowledge-based regional advantage: Implications for regional policy" *Int. J. Entrepreneurship and Innovation Management* **7** 28-43
- Asheim B, Gertler M S, 2005, "The Geography of Innovation: Regional Innovation Systems", in *The Oxford Handbook of Innovation* Eds J Fagerberg, D S Mowery, R R Nelson (Oxford University Press, Oxford New York) pp 291-317
- Asheim B T, Coenen L, 2005, "Knowledge bases and regional innovation systems: Comparing Nordic clusters" *Research Policy* **34** 1173-1190
- Barnes W, Gartland M, Stack M, 2004, "Old Habits Die Hard: Path Dependency and Behavioral Lock-in" *Journal of Economic Issues (Association for Evolutionary Economics)* **38** 371-377
- Beckeman M, 2008, "The 'Edisons' behind radical innovations" *International Journal of Management Practice* **3** 164-178
- Beckeman M, Forthcoming, "The role of manufacturers in food innovation in Sweden" *British Food Journal*
- Beckeman M, Skjöldebrand C, 2007, "Clusters/networks promote food innovations" *Journal of Food Engineering* **79** 1418-1425
- Boschma R, Frenken K, 2009, "Some Notes on Institutions in Evolutionary Economic Geography" *Economic Geography* **85** 151-158
- Boschma R, Frenken K, 2011, "The emerging empirics of evolutionary economic geography" *Journal of Economic Geography* **11** 295-307
- Boschma R, Iammarino S, 2009, "Related Variety, Trade Linkages, and Regional Growth in Italy" *Economic Geography* **85** 289-311
- Boschma R, Lambooy J, 1999, "The Prospects of an Adjustment Policy Based on Collective Learning in Old Industrial Regions" *GeoJournal* **49** 391-399
- Boschma R, Wenting R, 2007, "The spatial evolution of the British automobile industry: Does location matter?" *Industrial and Corporate Change* **16** 213-238
- Breschi S, Malerba F, 1997, "Sectoral Innovation Systems: Technological Regimes, Schumpeterian Dynamics, and Spatial Boundaries", in *Systems of Innovation: Technologies, Institutions and Organizations* Ed C Edquist (Pinter, London) pp 130-156
- Coenen L, Moodysson J, 2009, "Putting Constructed Regional Advantage into Swedish Practice" *European Planning Studies* **17** 587-604
- Cooke P, 2002, "Regional Innovation Systems: General Findings and Some New Evidence from Biotechnology Clusters" *The Journal of Technology Transfer* **27** 133-145
- Cooke P, Eickelpasch A, Williams I F-, Rangnes J, 2007, "Evaluation report by the VINNVÄXT international review team", in *VINNOVA Report VR 2007:11* (VINNOVA - Swedish Governmental Agency for Innovation Systems / Verket för Innovatonsystem)
- Cooke P, Uranga M G, Etxebarria G, 1997, "Regional Innovation Systems: Institutional and Organizational Dimensions" *Research Policy* **26** 475-491
- David P A, 1985, "Clio and the Economics of QWERTY" *The American Economic Review* **75** 332-337
- David P A, 1992, "Heroes, Herds and Hysteresis in Technological History: Thomas Edison and 'The Battle of the Systems' Reconsidered" *Industrial and Corporate Change* **1** 129-180
- Edquist C, Johnson B, 1997, "Institutions and Organizations in Systems of Innovations", in *Systems of Innovations: Technologies, Institutions and Organizations* Ed C Edquist (Pinter, London and Washington) pp 41-63
- Gellynck X, Vermeire B, 2009, "The contribution of regional networks to innovation and challenges for regional policy" *International Journal of Urban and Regional Research* **33** 719-737
- Gertler M S, 2004 *Manufacturing Culture: The Institutional Geography of Industrial Practice* (Oxford University Press, Oxford New York)
- Grabher G, 1993, "Rediscovering the social in the economics of interfirm relations", in *The Embedded Firm: On the Socioeconomic of Industrial Networks* Ed G Grabher (Routledge, London New York) pp 1-31
- Hassink R, 2010, "Locked in decline? On the role of regional lock-ins in old industrial areas", in *The Handbook of Evolutionary Economic Geography* Eds R Boschma, R Martin (Edward Elger, Cheltenham) pp 450-470

- Hodgson G M, 2003, "The Hidden Persuaders: Institutions and Individuals in Economic Theory" *Cambridge Journal of Economics* **27** 159-175
- Lagnevik M, Sjöholm I, Lareke A, Österberg J, 2003 *The Dynamics of Innovation Clusters: A Study of Food Industry* (Edward Elgar, Cheltenham)
- Laursen K, 2012, "Keep searching and you'll find: What do we know about variety creation through firms' search activities for innovation?" *Industrial and Corporate Change* **21** 1181-1220
- Leiponen A, Drejer I, 2007, "What exactly are technological regimes?: Intra-industry heterogeneity in the organization of innovation activities" *Research Policy* **36** 1221-1238
- Manniche J, 2012, "Combinatorial Knowledge Dynamics: On the Usefulness of the Differentiated Knowledge Bases Model" *European Planning Studies* **20** 1823-1841
- Manniche J, Testa S, 2010, "Knowledge Bases in the Worlds of Production: The Case of the Food Industry" *Industry & Innovation* **17** 263-284
- Martin R, 2012, "Measuring Knowledge Bases in Swedish Regions" *European Planning Studies* **20** 1569-1582
- Martin R, Moodysson J, 2012, "Comparing knowledge bases: On the geography and organization of knowledge sourcing in the regional innovation system of Scania, Sweden" *European Urban and Regional Studies*
- Martin R, Moodysson J, Zukauskaite E, 2011, "Regional Innovation Policy beyond 'Best Practice': Lessons from Sweden" *Journal of Knowledge Economy* **2** 550-568
- Martin R, Simmie J, 2008, "Path dependence and local innovation systems in city-regions" *Innovation: Policy, Management & Practice* **10** 183-196
- Martin R, Sunley P, 2006, "Path dependence and regional economic evolution" *Journal of Economic Geography* **6** 395-437
- Martin R, Sunley P, 2010, "The place of path dependence in an evolutionary perspective on the economic landscape", in *The Handbook of Evolutionary Economic Geography* Eds R Boschma, R Martin (Edward Elgar, Cheltenham) pp 62-92
- Moodysson J, Coenen L, Asheim B, 2008a, "Explaining spatial patterns of innovation: analytical and synthetic modes of knowledge creation in the Medicon Valley life-science cluster" *Environment and planning. A*
- Moodysson J, Coenen L, Asheim B, 2008b, "Explaining spatial patterns of innovation: analytical and synthetic modes of knowledge creation in the Medicon Valley life-science cluster" *Environment and planning. A* **40** 1040-1056
- North D C, 2010 *Understanding the Process of Economic Change* (Princeton University Press, Princeton)
- Simmie J, 2012, "Path Dependence and New Technological Path Creation in the Danish Wind Power Industry" *European Planning Studies* **20** 753-772
- Srholec M, Verspagen B, 2012, "The Voyage of the Beagle into innovation: explorations on heterogeneity, selection, and sectors" *Industrial and Corporate Change* **21** 1221-1253
- Storper M, 1997 *The Regional World* (The Guilford Press, New York London)
- Strambach S, 2010, "Path dependence and path plasticity: the co-evolution of institutions and innovation - the German customized business software industry", in *The Handbook of Evolutionary Economic Geography* Eds R Boschma, R Martin (Edward Elgar, Cheltenham, Northampton, MA) pp 406-431
- Tripl M, 2011, "Regional innovation systems and knowledge-sourcing activities in traditional industries: Evidence from the Vienna food sector" *Environment and Planning A* **43** 1599-1616
- Tripl M, Otto A, 2009, "How to turn the fate of old industrial areas: A comparison of cluster-based renewal process in Styria and the Saarland" *Environment and Planning A* **41** 1217-1233
- Tödtling F, Tripl M, 2012, "Transformation of regional innovation systems. From old legacies to new development paths", in *Re-framing Regional Development. Evolution, Innovation and Transition* Ed P Cooke (Routledge, London, New York)
- Whitley R, 2002, "Developing innovative competences: the role of institutional framework" *Industrial and Corporate Change* **11** 497-528
- Zysman J, 1994, "How institutions create historically rooted trajectories of growth" *Industrial and Corporate Change* **3** 243-283

Appendix 1: Summary of the three paths of development

Institution	Incentive	Responses (S+A)	Responses (S)	Responses (S+S)
EU membership	Competition	High value-added product	Reduced prices	Increased efficiency
Health trend	Development of healthy products	Functional food	Not unhealthy products	'Healthy' process
Shopping and consumption habits	Minor variation	Create new habit/slow diminishing of AKB	Slightly improved products	Create new habit/Improvements only in one field expertise (introduction of related products)
VINNVÄXT	Industry-university-public sector cooperation	Public-private cooperation in the establishment of regional support programs (SFIN)	-	-
Increased risk avoidance	Decrease the development of highly innovative products	Slow diminishing of analytical knowledge base/ few companies	-	-
Changing norms: woman and family	Convenience food	-	-	Initial trigger
Environmental sustainability	Ecological products	-	Adding new raw materials and/or packaging solutions	-

Source: own data

ⁱ We would like to note that the Tripl and Otto (2008) conceptualization was applied in regional path development. In their paper incremental change is defined as a minor variation within the region, diversification is achieved via attracting traditional industry which is new to the region and radical change is an outcome of an emergence of a new industry which is based on new knowledge and technologies. However, we believe that this typology can be useful for describing the paths within one industry in the region. It can develop incrementally, radically (via relation with new knowledge-intensive technologies) and diversify (via relation with new process technologies).

ⁱⁱ Proviva is the first probiotic functional food in Sweden. This product line consists of dairy and fruit drinks to which the bacterial strain *Lactobacillus plantarum* is added to improve the bacterial flora in the human bowel system. It has been developed through collaborative efforts of researchers at LU and Probi AB. Oatly is a dairy-like product line based on oats. All oats contain water-soluble dietary fibre, called beta-glucans. According to clinical studies, this fibre can contribute to lowering raised cholesterol levels. Thanks to a patented process, the beta-glucans in Oatly's products are retained intact and therefore those products can lower cholesterol value. This product has been developed through the collaboration of researchers at LU and industrial partners.

ⁱⁱⁱ Some of the respondents doubted that additive-free products are always healthier, but they all agreed that such products are considered healthier by a majority of the consumers.

Co-author declarations

Co-author declaration

Lund, 14th August 2013

To whom it may concern

The authors hereby certify that the paper entitled "Institutional Conditions and Innovation Systems: On the Impact of Regional Policy on Firms in Different Sectors", which is forthcoming in *Regional Studies* DOI:10.1080/00343404.2011.649004, is based on equal contribution by the respective authors Jerker Moodysson and Elena Zukauskaitė.



Jerker Moodysson



Elena Zukauskaitė

Co-author declaration

Lund, 14th August 2013

To whom it may concern

The authors hereby certify that the paper entitled "Regional Innovation Policy Beyond 'Best Practice': Lessons from Sweden", which is published in *Journal of Knowledge Economy* 2(4), pp. 550-568, is based on equal contribution by the respective authors Roman Martin, Jerker Moodysson, and Elena Zukauskaitė.



Roman Martin



Jerker Moodysson



Elena Zukauskaitė

Co-author declaration

Lund, 14th August 2013

To whom it may concern

The authors hereby certify that the paper entitled "Multiple Paths of Development: Knowledge Bases and Institutional Characteristics of the Swedish Food Sector", which is submitted to *Environment and Planning A*, is based on 70% / 30 % contribution by the respective authors Elena Zukauskaitė and Jerker Moodysson.



Jerker Moodysson



Elena Zukauskaitė

MEDDELANDE FRÅN LUNDS UNIVERSITETS
GEOGRAFISKA INSTITUTION.
AVHANDLINGAR

- I. *Herman Richter*: Skånes karta från mitten av 1500-talet till omkring 1700 : bidrag till en historisk-kartografisk undersökning. (1929)
- II. *Josef Westin*: Kulturgeografiska studier inom Nätra-, Näske- och Utbyåarnas flodområden samt angränsande kusttrakter. (1930)
- III. *Herman Richter och Wilhelm Norlind*: Orbis Arctoi Nova et Accurata Delineatio Auctore Andrea Bureo Sueco 1626. (1936)
- IV. *Sven Björnsson*: Sommen-Åsundenområdet : en geomorfologisk studie. (1937)
- V. *Arne Sandell*: Tektonik och morfologi inom dalformationen med omgivande urbergsterräng. (1941)
- VI. *Sven Dahl*: Torna och Bara : studier i Skånes bebyggelse- och näringsgeografi före 1860. (1942)
- VII. *Karl Erik Bergsten*: Isälvsfält kring norra Vättern : fysisk-geografiska studier. (1943)
- VIII. *Carl Erik Nordenskjöld*: Morfologiska studier inom övergångsområdet mellan Kalmarslätten och Tjust. (1944)
- IX. *Sven Björnsson*: Blekinge : en studie av det blekingska kulturlandskapet. (1946)
- X. *Karl Erik Bergsten*: Östergötlands bergslag : en geografisk studie. (1946)
- XI. *Tor Holmquist*: Den halländska vinterfiskehamnsfrågan. (1947)
- XII. *Olof Ångeby*: Landformerna i nordvästra Jämtland och angränsande delar av Nord-Trøndelag. (1947)
- XIII. *Axel Wennberg*: Lantbebyggelsen i nordöstra Östergötland 1600-1875. (1947)
- XIV. *Lars Bjerning*: Skånes jord- och stenindustri : dess utveckling, lokalisering och betydelse ur näringsgeografisk synvinkel. (1947)
- XV. *Allan Weinhausen*: Norbergs bergslag samt Gunnilbo och Ramnäs till omkring 1820 : studier i områdets närings- och bebyggelsegeografi. (1947)
- XVI. *Helge Stålberg*: Smålands skogs- och träförädlingsindustrier : en näringsgeografisk studie. (1947)
- XVII. *Folke Lägner*: Veteodlingen i södra och mellersta Sverige. (1949)
- XVIII. *Yngve Nilsson*: Bygd och näringsliv i norra Värmland : en kulturgeografisk studie. (1950)
- XIX. *Olof Ångeby*: Evorsionen i recenta vattenfall. (1951)
- XX. *Karl Erik Bergsten*: Sydsvenska födelseortsfält. (1951)
- XXI. *Folke Lägner*: Valmansåren på skånes landsbygd 1911-1948. (1952)
- XXII. *Olof Nordström*: Relationer mellan bruk och omland i östra Småland 1750-1900. (1952)
- XXIII. *Arvid Bergdahl*: Israndsbildningar i östra Syd- och Mellansverige med särskild hänsyn till åsarna. (1953)
- XXIV. *Sven E Behrens*: Morfometriska, morfogenetiska och tektoniska studier av de nordvästskånska urbergsåsarna, särskilt Kullaberg. (1953)
- XXV. *Torsten Hägerstrand*: Innovationsförloppet ur korologisk synpunkt. (1953)

- XXVI. *Gunhild Weimarck*: Studier över landskapets förändring inom Lönsboda, Örkeneds socken, nordöstra Skåne. (1953)
- XXVII. *Ingemar Larsson*: Structure and landscape in western Blekinge, southeast Sweden. (1954)
- XXVIII. *Sven Godlund*: Busstrafikens framväxt och funktion i de urbana influensfälten. (1954)
- XXIX. *Folke Lågnert*: Syd- och mellansvenska växtföljder. Del I : de äldre bruknings-systemens upplösning under 1800-talet. (1955)
- XXX. *Olof Ångeby*: Toppkonstans, erosionsytor och passdalar i Jämtland och Tröndelag. (1955)
- XXXI. *Gunnar Johnsson*: Glacialmorfologiska studier i södra Sverige. (1956)
- XXXII. *Folke Lågnert*: Syd- och mellansvenska växtföljder. Del II : 1900-talet. (1956)
- XXXIII. *Olof Nordström*: Befolkningsutveckling och arbetskraftsproblem i östra Småland 1800-1955. (1957)
- XXXIV. *Sven Godlund*: Befolkning - regionsjukhus - resmöjligheter - regioner. (1958)
- XXXV. *Elis Pålsson*: Gymnasiers rekrytering och lokalisering. (1958)
- XXXVI. *Harald Svensson*: Glaciation och morfologi : en glacialgeografisk studie i ett tvärsnitt genom Skanderna mellan södra Helgelandskusten och Kultsjödalen. (1959)
- XXXVII. *Erik Ljungner*: Nahuel Huapi : ein geographischer Querschnitt durch die Anden in Patagonien. (1959)
- XXXVIII. *Nils Lewan*: Om pendling mellan bostad och arbetsplats : en undersökning med material från sydvästra Skåne. (1960)
- XXXIX. *Åke Mattsson*: Morphologische Studien in Südschweden und auf Bornholm über die nichtglaziale Formenwelt der Felsenskulptur. (1962)
- XL. *Stig Nordbeck*: Framställning av kartor med hjälp av siffermaskiner. (1964)
- XLI. *Olof Nordström*: Svensk glasindustri 1550-1960. (1962)
- XLII. *Jan Davidsson*: Littoral processes and morphology on scandian flatcoasts. (1963)
- XLIII. *Martin Markgren*: Detaljmorfologiska studier i fast berg och blockmaterial : geomorfologisk studie inom Fennoscandia med Skåne. (1962-1963)
- XLIV. *Martin Markgren*: Geomorphological studies in Fennoscandia. II : chute slopes in northern Fennoscandia. A : regional studies. (1964)
- XLV. *Martin Markgren*: Geomorphological studies in Fennoscandia. II : chute slopes in northern Fennoscandia. B : systematic studies. (1964)
- XLVI. *Lennart Améen*: Stadsbebyggelse och domänstruktur. (1964)
- XLVII. *Arvid Bergdahl*: Det glaciala landskapet. (1961)
- XLVIII. *Olof Nordström - Solveig Mårtensson*: Turism på Öland (1966)
- XLIX. *Jan O Mattsson*: The temperature climate of potato crops. (1966)
- L. *Nils Lewan*: Landsbebyggelse i förvandling. (1967)
- LI. *Gösta Nordholm*: Skånes äldre ekonomiska geografi. (1967)
- LII. *Sven Godlund - Torsten Hägerstrand - Bengt Svanström*: Samhälls-utvecklingen och samhällsplaneringen. (1967)
- LIII. *Tor Fr Rasmussen*: Storbyutvikling og arbeidsreiser. (1966)
- LIV. *Erik Fagerlund - Harald Svensson - Sven Lindqvist m fl*: Infrarödtermografi : principer och naturgeografiska tillämpningar. (1967)
- LV. *Lars Eldblom*: Structure foncière, organisation et structure sociale. (1968)

- LVI. *Knut Norborg*: Jordbruksbefolkningen i Sverige. (1968)
- LVII. *Gunhild Weimarck*: Ulfshult (1968)
- LVIII. *Rune Järvenstedt - Sven Lindqvist - Jan O Mattsson m.fl.*: Televisionssystem i naturgeografisk forskning. (1968)
- LIX. *Arne Jakobsson*: Omflyttningen i Sverige 1950-1960. (1969)
- LX. *Åke Hillefors*: Västsveriges glaciala historia och morfologi. (1969)
- LXI. *Sven Lindqvist*: Bebyggelseklimatiska studier. (1970)
- LXII. *Torsten Hägerstrand, Gunnar Törnqvist m.fl.*: Urbaniseringen i Sverige. (SOU 1970:14)
- LXIII. *Bengt Sahlberg*: Interregionala kontaktmönster : personkontakter inom svenskt näringsliv – en flygpassagerarstudie. (1970)
- LXIV. *Björn Hedberg*: Kontaktsystem inom svenskt näringsliv : en studie av organisationers externa personkontakter. (1970)
- LXV. *Mats G Engström*: Regional arbetsfördelning : nya drag i förvärsarbetets geografiska organisation i Sverige. (1970)
- LXVI. *Torsten Persson*: Geomorphological studies in the south-Swedish highlands. (1972)
- LXVII. *Dewitt Davis Jr.*: A factorial ecology of Malmö 1965 : the social geography of a city. (1972)
- LXVIII. *Zoltan Petery*: Studier i svensk regionplanering : regionplanering enligt byggnadslagen i mindre regioner. (1972)
- LXIX. *Tommy Book*: Stadsplan och järnväg i Norden. (1974)
- LXX. *Hans Abrahamson*: Studier i jordbrukets omstrukturering. (1974)
- LXXI. *Christer Persson*: Kontaktarbete och framtida lokaliseringförändringar. (1974)
- LXXII. *Ulf Helldén*: Karst : en studie av Artfjällets karstområde samt jämförande korrosionsanalyser från Västspetsbergen och Tjeckoslovakien. (1974)
- LXXIII. *János Szegő*: Befolkningstäthet, markanvändning, planering (vol 1 o 2). (1974)
- LXXIV. *Raul Nino Guerrero*: Rural to urban drift of the unemployed in Colombia. (1975)
- LXXV. *Ulf Erlandsson*: Företagsutveckling och utrymmesbehov. (1975)
- LXXVI. *Sture Öberg*: Methods of describing physical access to supply points. (1976)
- LXXVII. *Bo Lenntorp*: Paths in space-time environments : a time-geographic study of movement possibilities of individuals. (1976)
- LXXVIII. *Richard Åhman*: Palsar i Nordnorge : en studie av palsars morfologi, utbredning och klimatiska förutsättningar i Finnmarks och Troms fylke. (1977)
- LXXIX. *Björn Gyllström*: The organization of production as a space-modelling mechanism in underdeveloped countries. (1977)
- LXXX. *Anders Järnegren - Fosco Ventura*: Tre samhällens förändringshistoria : exploateringen av den fysiska miljön i historisk belysning. (1977)
- LXXXI. *Tommy Book*: Stadsplan och järnväg i Storbritannien och Tyskland. (1978)
- LXXXII. *Jan O Mattsson - Leif Börjesson*: Lokalklimatiska temperaturstudier inom ett skånskt fruktodlingsdistrikt med särskilt beaktande av frostillätheten. (1978)
- LXXXIII. *Bjørn Terje Asheim*: Regionale ulikheter i levekår. (1979)
- LXXXIV. *Solveig Mårtensson*: On the formation of biographies in space-time environments. (1979)
- LXXXV. *Erik Wallin*: Vardagslivets generativa grammatik - vid gränsen mellan natur och kultur. (1980)

- LXXXVI. *Reinhold Castensson*: Välja för framtid - om markanvändningsval och förtroendemännainflytande i kommunal planering. (1980)
- LXXXVII. *Kerstin Montal*: Industri och vatten : den vattenförorenande industrins lokaliseringsproblem i Malmöhus län. (1980)
- LXXXVIII. *Tommy Carlstein*: Time resources, society and ecology : on the capacity for human interaction in space and time in preindustrial societies. (1980)
- LXXXIX. *Jonas Åkerman*: Studies on periglacial geomorphology in west Spitsbergen. (1980)
- XC. *Leif Engh*: Karstområdet vid Lummelunds bruk, Gotland, med speciell hänsyn till Lummelundagrottan. (1980)
- XCI. *Karna Lidmar-Bergström*: Pre-quaternaly geomorphological evolution in southern Fennoscandia. (1982)
- XCII. *Lars-Olof Olander*: Staten, kommunerna och servicen : tiden kring kommunreformen i ett ekonomiskt – geografiskt perspektiv. (1984)
- XCIII. *Bo Malmström* och *Owe Palmér*: Glacial och periglacial geomorfologi på Varangerhalvön, Nordnorge : geomorfologisk kartering med analys av glaciala former och blockhav. (1984)
- XCIV. *Franz-Michael Rundquist*: Hybrid maize diffusion in Kenya : policies, diffusion patterns and consequences. (1984)
- XCv. *Girma Yadeta*: Dynamic processes of development in marginal areas : a case study from the pokot of north west Kenya. (1985)
- XCVI. *Anders Sporrek*: Food marketing and urban growth in Dar Es Salaam. (1985)
- XCvII. *Rolf Nyberg*: Debris flows and slush avalanches in northern Swedish Lapland : distribution and geomorphological significance. (1985)
- XCvIII. *Lennart Olsson*: An integrated study of desertification - applications of remote sensing, GIS and spatial models in semi-arid Sudan. (1985)
- XCIX. *Mikael Stern*: Census from heaven? : population estimates with remote sensing techniques. (1985)
- C. *Katarina Olsson*: Remote sensing for fuelwood resources and land degradation studies in Kordofan, the Sudan. (1985)
- CI. *Göran Loman*: The climate of a sugar beet stand - dynamics, impact on the crop and possibilities of improvement. (1986)
- CI. *Eric Clark*: The rent gap and urban change : case studies in Malmö 1860-1985. (1987)
- CII. *Karin Hall-Könyves*: Remote sensing of cultivated lands in the south of Sweden. (1988)
- CIII. *Eva Ahlcróna*: The impact of climate and man on land transformation in central Sudan : applications of remote sensing. (1988)
- CIV. *Kerstin Cederlund*: Offentlig verksamhet : sysselsättning territoriellt och funktionellt. (1988)
- CV. *Per Olof Hallin*: Tid för omställning : om hushålls anpassningsstrategier vid en förändrad energisituation. (1989)
- CVI. *Jens Möller*: Godsen och den agrara revolutionen : arbetsorganisation, domänstruktur och kulturlandskap på skånska gods under 1800-talet. (1989)
- CVII. *Juha Uitto*: The Kenyan conundrum : a regional analysis of population growth and primary education in Kenya. (1989)

- CVIII. *Ola Jonsson*: Informationsteknologi och arbete : fallstudier inom svensk sjukvård. (1989)
- CIX. *Tora Friberg*: Kvinnors vardag. Kvinnors arbete och liv : anpassnings-strategier i tid och rum. (1990)
- CX. *Tomas Nihlén*: Eolian processes in southern Scandinavia and the Mediterranean area. (1990)
- CXI. *Anders Löfgren*: Att flytta hemifrån : boendets roll i ungdomars vuxenblivande ur ett situationsanalytiskt perspektiv. (1990)
- CXII. *Irma Guillén*: Ciudad Guayana – en stad, två världar : en studie av ett regionalt utvecklingsprojekts lokala effekter. (1991)
- CXIII. *Hans Holmén*: Building organizations for rural development : state and cooperatives in Egypt. (1991)
- CXIV. *Petter Pilesjö*: GIS and remote sensing for soil erosion studies in semi-arid environments : estimation of soil erosion parameters at different scales. (1992)
- CXV. *Ann-Cathrine Åquist*: Tidsgeografi i samspel med samhällsteori. (1992)
- CXVI. *José da Cruz*: Disaster and society : the 1985 Mexican earthquakes. (1993)
- CXVII. *Tomas Germundsson*: Landsbygdens egnahem : egnahemsrörelsen, småbruket och landskapet i sydsvenskt perspektiv. (1993)
- CXVIII. *Ann-Katrin Bäcklund*: JUST-IN-TIME : hur industriella rationaliseringsstrategier formar arbetsdelning och kompetens. (1994)
- CXIX. *Jon Knudsen*: Kulturspredning i et strukturelt perspektiv : eksemplifisert ved politisk og religiøs endring under moderniseringen av det norske samfunn. (1994)
- CXX. *Tone Haraldsen*: Teknologi, økonomi og rom : en teoretisk analyse av relasjoner mellom industrielle og territorielle endringsprosesser. (1994)
- CXXI. *Peter Jönsson*: Wind climate during the instrumental period and recent wind erosion in southern Scandinavia. (1994)
- CXXII. *Peter Schlyter*: Palaeo-wind abrasion in southern Scandinavia : field and laboratory studies. (1995)
- CXXIII. *Jun Yamashita*: Spatial interaction and spatial structure : a study of public facility location. (1995)
- CXXIV. *Mats Riddersporre*: Bymarker i backspegel : odlingslandskapet före kartornas tid. (1995)
- CXXV. *Anders Schærström*: Pathogenic paths? : a time geographical approach in medical geography. (1996)
- CXXVI. *Lars Eklundh*: AVHRR NDVI for monitoring and mapping of vegetation and drought in east African environments. (1996)
- CXXVII. *Magnus Jirström*: In the wake of the green revolution : environmental and socio-economic consequences of intensive rice agriculture – the problem of weeds in Muda, Malaysia. (1996)
- CXXVIII. *Stefan Anderberg*: Flödesanalys i den hållbara utvecklingens tjänst : reflektioner kring en ”metabolism” – studie av Rhenområdets utveckling. (1996)
- CXXIX. *Karl-Johan Lundquist*: Företag, regioner och internationell konkurrens : om regionala resursers betydelse. (1996)
- CXXX. *Badr-Eldin Taha Osman*: GIS-hydrological modelling in aridlands : a geographical synthesis of surface waters for the African Red Sea region in the Sudan. (1996)

- CXXXI. *Marie Stenseke*: Bonden och landskapet : ägares och brukares relationer till markerna och förutsättningarna för en uthållig markanvändning. (1997)
- CXXXII. *Kristina Blennow*: Spatial variation in near-ground radiation and low temperature – interactions with forest vegetation. (1997)
- CXXXIII. *Lennart Runesson*: Tomträtt : ett markpolitiskt instrument i upplösning. (1997)
- CXXXIV. *Johan Hultman*: The eco-ghost in the machine : reflexions on space, place and time in environmental geography. (1998)
- CXXXV. *Jonas Ardö*: Remote sensing of forest decline in the Czech Republic. (1998)
- CXXXVI. *Per Hillbur*: The knowledge arena : approaching agroforestry and competing knowledge systems – a challenge for agricultural extensionl (1998)
- CXXXVII. *Tom Mels*: Wild landscapes : the cultural nature of Swedish national parks. (1999)
- CXXXVIII. *Carolyn Hannan-Andersson*: Promoting equality between women and men in bilateral development cooperation : concepts, goals, rationales and institu-tional arrangements. (2000)
- CXXXIX. *Nikolaus Solakius*: The parnassus zone, central Greece. (2000)
- CXL. *Jonathan Seaquist*: Mapping primary production for the west African Sahel using satellite data. (2001)
- CXLI. *Karin Book och Lena Eskilsson*: Stadens struktur : varför och hur? (2001)
- CXLII. *Maria Wikhall*: Universiteten och kompetenslandskapet : effekter av den högre utbildningens tillväxt och regionala spridning i Sverige. (2001)
- CXLIII. *Rannveig Olafsdottir*: Land degradation and climate in Iceland : a spatial and temporal assessment. (2002)
- CXLIV. *Marie Ekström*: Relationships between atmospheric circulation and wind erosion in southern Sweden and Australia. (2002)
- CXLV. *Maj-Lena Finnander Linderson*: The spatial distribution of precipitation in Scania, southern Sweden : observations, model simulations and statistical downscaling. (2002)
- CXLVI. *Richard Ek*: Öresundsregion - bli till! : de geografiska visionernas diskursiva ryt. (2003)
- CXLVII. *Olivia Louw*: Exploring the culture of non-payment in the post-apartheid South Africa. (2003)
- CXLVIII. *Cecilia Kjellman*: Ta plats eller få plats? : studier av marginaliserade människors förändrade vardagsliv (2003)
- CXLIX. *Christina Scholten*: Kvinnors försörjningsrum : hegemonins förvaltare och murbräckor (2003)
- CL. *Micael Runnström*: Land degradation and mitigation in northern China : evaluated from the biological production (2003)
- CLI. *Sara Brogaard*: Recent changes in land use and productivity in agro-pastoral Inner Mongolia, China (2003)
- CLII. *Jan_Henrik Nilsson*: Östersjöområdet : studier av interaktion och barriärer (2003)
- CLIII. *Thomas Hickler*: Towards an integrated ecology through mechanistic modelling of ecosystem structure and functioning (2004)
- CLIV. *Andreas Persson*: Hydrological modelling, topographical influence and yield mapping in precision agriculture (2004)
- CLV. *Maria Olsrud*: Mechanisms of below-ground carbon cycling in subarctic ecosystems (2004)

- CLVI. *Sandra C. Fernández*: Farewell to the peasantry? : (Post)modernising rural Mexico : the case of the ejido peasants in the Isthmus of Tehuantepec (2004)
- CLVII. *Andrés P. Leskó*: To own the phone : spatial diffusion, ownership and regulation of telephone service in Argentina, 1878-1990 (2004)
- CLVIII. *Henrik Svensson*: Öppna och slutna rum : enskiftet och de utsattas geografi : husmän, bönder och gods på den skånska landsbygden under 1800-talets första hälft (2005)
- CLIX. *Pablo Morales*: Modeling carbon and water fluxes in European terrestrial ecosystems (2006)
- CLX. *Emmanuel S. Gritti*: Global changes and European terrestrial ecosystems (2006)
- CLXI. *Ola Thufvesson*: Kreativitetens yttre villkor : miljöer, rörlighet och nobelpristagare (2006)
- CLXII. *Deniz Koca*: Impacts of regional climate change on Swedish forests : an evaluation using process-based regional ecosystem modelling approach (2006)
- CLXIII. *Bodil Elmqvist*: Livelihood diversification and land use change in the Sahel : an interdisciplinary analysis of gum arabic in Sudan (2006)
- CLXIV. *Jan Vang-Lauridsen*: Industrial dynamics and the spatial organization of industries (2006)
- CLXV. *Heidi Wiig Aslesen*: Innovation in an urban context (2006)
- CLXVI. *Torbjörn Johansson*: Temporal and spatial variability of carbon cycling in a subarctic landscape (2006)
- CLXVII. *Anders Lund Hansen*: Space wars and the new urban imperialism (2006)
- CLXVIII. *Lars Coenen*: Faraway, so close! : the changing geographies of regional innovation (2006)
- CLXIX. *Pontus Olofsson*: Remote sensing of carbon balance across Scandinavian forests (2007)
- CLXX. *Margareta Rämgård*: The power of place : existential crises and place security in the context of pregnancy (2006)
- CLXXI. *Helena Eriksson*: Leaf area index of Scandinavian forests : methods using in situ and remotely sensed data (2007)
- CLXXII. *Ransom Lekunze*: Corporate social responsibility and development : the case of the Chad Cameroon Oil Pipeline Project (2007)
- CLXXIII. *Alla Yurova*: Hydrological aspects of the carbon balance in a boreal catchment : a model study (2007)
- CLXXIV. *Jerker Moodysson*: Sites and modes of knowledge creation : on the spatial organization of biotechnology innovation (2007)
- CLXXV. *Yahia Mohamed-Mahmood*: Chinese development assistance and West African agriculture : a shifting approach to foreign aid? (2007)
- CLXXVI. *Høgni Kalsø Hansen*: The urban turn and the location of economic activities (2008)
- CLXXVII. *Helene Bogren*: Flytta eller stanna? : betydelsen av plats och platsförankring för den kvalificerade arbetskraftens internationella migration (2008)
- CLXXVIII. *Lotten Jönsson Johansson*: Semi-natural grasslands : landscape, history and plant species diversity : a spatio-temporal study of an agricultural landscape on Öland, Sweden (2008)
- CLXXIX. *Carin Nilsson*: Windstorms in Sweden : variations and impacts (2008)

- CLXXX. *Margareta Johansson*: Changing lowland permafrost in northern Sweden : multiple drivers of past and future trends (2008)
- CLXXXI. *Martin Svensson Henning*: Industrial dynamics and regional structural change : geographical perspectives on economic evolution (2009)
- CLXXXII. *Brynhildur Bjarnadóttir*: Carbon stocks and fluxes in a young Siberian larch (*Larix sibirica*) plantation in Iceland (2009)
- CLXXXIII. *Magnus Lund*: Peatlands at a threshold : greenhouse gas dynamics in a changing climate (2009)
- CLXXXIV. *Marcin Jackowicz-Korczyński*: Land-atmosphere interactions of a subarctic palsamire (2009)
- CLXXXV. *Nicklas Guldåker*: Krishantering, hushåll och stormen Gudrun : att analysera hushålls krishanteringsförmåga och sårbarheter (2009)
- CLXXXVI. *Nicodemus Mandere*: Alternative agriculture and rural development: a case study of sugar beet cultivation in Kenya (2009)
- CLXXXVII. *Anna Wramneby*: The role of vegetation-climate feedbacks in regional earth system dynamics (2010)
- CLXXXVIII. *Mikhail Mastepanov*: Towards a changed view on greenhouse gas exchange in the Arctic : new findings and improved techniques (2010)
- CLXXXIX. *Evelin Urbel-Piirsalu*: The Estonian forest sector in transition to sustainability? : capturing sustainability with the help of integrated assessment (2010)
- CXC. *Marie Vandewalle*: Effects of past and current land use on biodiversity : from a semi-natural grassland on Öland (Sweden) to a European perspective (2010)
- CXCI. *Maria Andrea Nardi*: Rural development and territorial dynamics in the province of Misiones, Argentina (2011)
- CXCII. *Torbern Tagesson*: Land-atmosphere exchange of carbon in a high-Arctic wet tundra ecosystem (2011)
- CXCIII. *Per Schubert*: Model development for estimating carbon dioxide exchange in Nordic forests and peatlands with MODIS time series data (2011)
- CXCIV. *Mabel Ndakaripa Munyuki-Hungwe*: In search of 'community' in Zimbabwe's fast track resettlement area of Mazowe district (2011)
- CXCV. *Oliver Porschke*: Plant community assembly and biodiversity : a spatio-temporal perspective (2011)

MEDDELANDEN FRÅN INSTITUTIONEN FÖR KULTURGEOGRAFI OCH
EKONOMISK GEOGRAFI.
AVHANDLINGAR

- I. *Johanna Bergman Lodin*: Engendered promises, gendered challenges. Changing patterns of labor, control and benefits among smallholder households growing NERICA in Uganda (2012)
- II. *Dobloug Tore Anstein*: Høyvekstbedrifter og regionale finansieringssystemer (2012)
- III. *Patrik Olsson*: Ömse sidor om vägen; Allén och landskapet i Skåne 1700-1900 (2012)
- IV. *Ingrid Helene Garmann Johnsen*: Social Capital and Regional Innovation Systems – Bridging approaches and broadening understanding of knowledge sharing and innovation (2012)
- V. *Roman Martin*: Knowledge Bases and the Geography of Innovation (2012)
- VI. *Monica Plechero*: The changing geography of innovation – Chinese and Indian regions and the global flows of innovation (2012)
- VII. *Erik Jönsson*: Fields of Green and Gold: Territorial hunger, rural planning, and the political ecologies of high-end golf (2013)
- VIII. *Elena Zukauskaitė*: Institutions and the Geography of Innovation: A Regional Perspective. (2013)

