OECD Reviews of Regional Innovation

CENTRAL AND SOUTHERN DENMARK

OECD

OECD Reviews of Regional Innovation: Central and Southern Denmark 2012

OECD
BETTER POLICIES FOR BETTER LIVES

This work is published on the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of the Organisation or of the governments of its member countries.

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Please cite this publication as:
OECD (2012), *OECD Reviews of Regional Innovation: Central and Southern Denmark 2012*, OECD Publishing.
http://dx.doi.org/10.1787/9789264178748-en

ISBN 978-92-64-17873-1 (print)
ISBN 978-92-64-17874-8 (PDF)

Series: OECD Reviews of Regional Innovation
ISSN 1997-6577 (print)
ISSN 1997-6585 (online)

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Corrigenda to OECD publications may be found on line at: *www.oecd.org/publishing/corrigenda*.

© OECD 2012

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgement of OECD as source and copyright owner is given. All requests for public or commercial use and translation rights should be submitted to *rights@oecd.org*. Requests for permission to photocopy portions of this material for public or commercial use shall be addressed directly to the Copyright Clearance Center (CCC) at *info@copyright.com* or the Centre français d'exploitation du droit de copie (CFC) at *contact@cfcopies.com*.

Foreword

Strong dynamics of innovation generation in regions are crucial for achieving national innovation policy objectives. In addition, innovation performance can contribute to improving the overall economic competitiveness of individual regions. Policy recommendations are therefore being sought by national science and technology and regional policy actors, as well as by the regions themselves.

OECD member countries and regions are nevertheless struggling with how to best promote regional innovation. How should national innovation policies take into account this regional dimension (i.e. the importance of "place")? How can regional actors support innovation that is relevant for their specific regional context? This role-sharing in a multi-level governance context for innovation is a new area for OECD member countries.

In 2007, the OECD launched the series *OECD Reviews of Regional Innovation* to address this demand by national and regional governments for greater clarity on how to strengthen the innovation capacity of regions. These reviews are part of a wider project on competitive and innovative regions through the OECD Territorial Development Policy Committee. This work also supports the OECD Innovation Strategy. The series includes both thematic reports and reviews of specific regions. Previous thematic reports include: *Competitive Regional Clusters: National Policy Approaches*; *Globalisation and Regional Economies: Can OECD Regions Compete in Global Industries?*; and *Regions and Innovation Policy*. Previous reviews of regions include: North of England (United Kingdom); Piedmont (Italy); 15 Mexican States; Catalonia (Spain); Basque Country (Spain); and Wallonia (Belgium).

Acknowledgements

Numerous national and regional stakeholders provided valuable insights during missions and in the form of comments. The OECD would like to thank them for their active participation. From the Region of Central Denmark, we acknowledge in particular: Lars Vildbrad, Regional Deputy Director, Regional Development; Bent Mikkelsen, Head of Department, Business and Competence Development; Ina Drejer, Senior Advisor, Regional Development; and Niels Dahl Christensen, Special Advisor, Regional Development. From the Southern Denmark Region, we acknowledge in particular: Mikkel Hemmingsen, Regional Director; Dorthe Kusk, Head of Department, Growth Forum and Business Development; Rune Stig Mortensen, Head of Department, Strategy and Analysis; and Jacob Sonne, Special Advisor, Regional Development. From the Danish Business Authority, we thank Anders Hoffman, Deputy Director General; Preben Gergersen, Director for Regional Policy; and Kirstine Halken, Special Advisor. From the Danish Agency for Science, Technology and Innovation, we thank Thomas Alslev Christensen, Head of Department and Morten Solgaard Thomsen, Senior Adviser. Lotte Longkilde, Head of Centre REGX-The Danish Cluster Academy, University of Southern Denmark played a key role in co-ordinating the study, along with Rikke Blæsbjerg Lund (formerly project manager at REGX).

This publication was co-ordinated and drafted by Karen Maguire (OECD) with additional written contributions from Giulia Ajmone Marsan (OECD), Claire Nauwelaers (innovation policy expert), Henrik Halkier (Head of Department, Culture and Global Studies, Aalborg University), Jens Bjerg (Partner, IRIS Group), and Patrick Dubarle (innovation policy expert). Peer reviewers from Norway and the United Kingdom participated in the review process: Morten Gulsrud (Specialist Director, Ministry of Local Government and Regional Development, Norway) and Jonathan Blackie (regional development expert, formerly public official at national and regional levels). Erin Byrne supervised the publication process. Jennifer Allain prepared the manuscript for publication. This work is supervised by Joaquim Oliveira Martins, Head, Regional Development Policy Division.

Table of contents

Acronyms 9

Assessment and recommendations 13

Introduction 35

Chapter 1 **Innovation and the economies of Central and Southern Denmark** 43

Introduction 44
Denmark: global positioning and within-country dynamics 44
Socio-economic profile of Central and Southern Denmark 49
Innovation profiles of Central and Southern Denmark 61
Innovation and entrepreneurship 74
Conclusion 79
Notes 81
Bibliography 84

Chapter 2 **Danish governance and policy context for regional strategies** 87

Introduction 88
The regional development mandate: national and regional roles 88
Financing of regional level strategies: multiple sources 99
Danish national policy context for innovation and entrepreneurship 105
Co-ordination mechanisms for achieving each region's innovation and growth goals 115
Conclusion 136
Key recommendations 137
Notes 138
Bibliography 141
Annex 2.A1 146

Chapter 3 **Regional strategies for innovation-driven growth** 157

Introduction 158
Regional business development strategies 159
The innovation system actors 169
Prioritised sectors and clusters for regional action 178

Addressing other bottlenecks and opportunities 204
Policy intelligence, monitoring and evaluation to improve impact 213
Conclusion 217
Recommendations for regional strategies 219
Notes 221
Bibliography 224
Annex 3.A1 230

Tables

Table 0.1. SWOT of the Central and Southern Denmark regional innovation systems 25
Table 1.1. Population net flows in Central and Southern Denmark 53
Table 2.1. Partnership agreements: Central and Southern Denmark (2010) 125
Table 2.A1.1. Danish STI policies and regional dimensions 146
Table 3.1. SWOT of the Central and Southern Denmark regional innovation systems 159
Table 3.2. Regional business development strategies of Central and Southern Denmark 161
Table 3.3. Universities in study regions: role in innovation system 174
Table 3.4. Regional innovation agencies: new approaches 177
Table 3.5. Regional goals for energy and environment/sustainable energy 186
Table 3.6. Energy – sector overview by region 187
Table 3.7. Regional goals for welfare innovation/health and social innovation 191
Table 3.8. Welfare technology – sector overview by region 192
Table 3.9. Regional goals for tourism and the experience economy 196
Table 3.10. Regional development plans: Central and Southern Denmark 205
Table 3.A1.1. Innovation-related instruments used in Central and Southern Denmark 230
Table 3.A1.2. Types of innovation system actors 232

Figures

Figure 0.1. Central and Southern Denmark 15
Figure 0.2. National shares by Danish region 16
Figure 0.3. Innovation snapshot: Central and Southern Denmark 19
Figure 1.1. Denmark's strong STI performance in OECD context 46

Figure 1.2. Inter-regional household income disparities low in Denmark ... 47
Figure 1.3. National shares by Danish region ... 48
Figure 1.4. Share of national activity in the economic centre ... 48
Figure 1.5. Share of GDP growth by Danish TL3 region ... 49
Figure 1.6. Maps of Danish regions, including Central and Southern Denmark ... 50
Figure 1.7. Unemployment rates: recent trends ... 54
Figure 1.8. GDP per capita levels and growth rates ... 55
Figure 1.9. Gross value added per worker in Danish regions ... 56
Figure 1.10. Gross value added per hour worked ... 56
Figure 1.11. Sectoral productivity and employment: Central Denmark ... 58
Figure 1.12. Sectoral productivity and employment: Southern Denmark ... 58
Figure 1.13. Similar employment composition in Central and Southern Denmark (2009) ... 59
Figure 1.14. Employment location quotients in Central and Southern Denmark (2009) ... 60
Figure 1.15. Exports in Danish regions: % of GDP ... 61
Figure 1.16. Innovation snapshot: Central and Southern Denmark ... 62
Figure 1.17. OECD peer regions for innovation-related characteristics ... 64
Figure 1.18. Peer group variation ... 65
Figure 1.19. Educational attainment of the labour force ... 67
Figure 1.20. R&D personnel (2007) ... 68
Figure 1.21. R&D expenditure by type of actor (2007) ... 69
Figure 1.22. European Patent Office patent applications per capita ... 71
Figure 1.23. Domestic/foreign patent ownership ... 72
Figure 1.24. Geography of Patent Co-operation Treaty co-patent collaborations: Southern Denmark (2005-2007) ... 73
Figure 1.25. Geography of Patent Co-operation Treaty co-patent collaborations: Central Denmark (2005-2007) ... 74
Figure 1.26. Number of growth firms by region ... 75
Figure 1.27. Firm demographics ... 77
Figure 1.28. Share of innovative firms in Danish regions (2009) ... 78
Figure 1.29. Share of revenue coming from new products and services ... 78
Figure 2.1. Areas of lagging development ... 93
Figure 2.2. Regional development policy actors in Denmark ... 96

Figure 2.3. Regional development budget 2011: Central and Southern Denmark 100
Figure 2.4. Multi-level governance sources of financing for growth forum projects: estimations 2007-2013 100
Figure 2.5. Major funding bodies and budgets for STI policy in Denmark 107
Figure 2.6. Regional distribution of Denmark's 22 national innovation networks..... 111
Figure 2.7. Alignment of national and regional prioritised technologies and industries..... 113
Figure 2.8. Services to entrepreneurs by type of firm need: example of Central Denmark..... 114
Figure 3.1. Central and Southern Denmark: funding by business development priority area 163
Figure 3.2. Business and innovation support system in Denmark, by level of government 170
Figure 3.3. Distribution of private sector employment by resource area (2008)..... 179
Figure 3.4. Employment and value added in prioritised sectors 180
Figure 3.5. Danish areas of employment specialisation in an EU context..... 181
Figure 3.6. Central and Southern Denmark Regions among top 20 in renewable energy patents..... 185
Figure 3.7. Welfare technology niche by Danish region..... 190
Figure 3.8. Specialisations by region: creative and experience industries..... 195
Figure 3.A1.1. Southern Denmark: innovation system approach..... 233
Figure 3.A1.2. Central Denmark: innovation system approach 234

Acronyms

AU	Aarhus University
BSSP	Business Support Simplification Programme
CoE	Centers of Expertise
CPER	National-Regional Contracts (France) *Contrats de Projet État-Region*
DASTI	Danish Agency for Science, Technology and Innovation
DEA	Danish Energy Agency
DEACA	Danish Enterprise and Construction Authority (now Danish Business Authority)
DFF	Danish Council for Independent Research
DG Regio	Directorate General Regional Policy
DKK	Danish Crown
DNK	Denmark
DUI	Doing, Using and Interacting
EC	European Commission
EHR	Electronic health records
ELY	Centres for Economic Development, Transport and the Environment (Finland)
EPO	European Patent Office
EPRC	European Policies Research Centre
ERDF	European Regional Development Funds
ESF	European Social Funds
EU	European Union

EUR	Euro
EXPLORE	EXPeriencing LOcal food REsources in the Nordic countries
FDI	Foreign direct investments
FTH	Food Tech Holland
GBP	Great Britain Pound
GDP	Gross domestic product
GTS	Technological service institutes
GVA	Gross value added
HE	Higher education
HEI	Higher education institutions
HITECH	Information Technology for Economic and Clinical Health Act
HTM	High-technology manufacturing
ICREA	Catalan Institution for Research and Advanced Studies (*Institució Catalabna de Recerca I Estudi Avançats*)
ICT	Information and communication technologies
IT	Information technologies
KIS	Knowledge-intensive services
KKR	Local government regional councils (*kommunekontaktråd*)
MTIC	MedTech Innovation Center
OECD	Organisation for Economic Co-operation and Development
PCT	Patent Co-operation Treaty
POWIS	Prince of Wales Innovation Scholarships
RDA	Regional development agencies
R&D	Research and development
RDTI	Research, development, technology and innovation
RGF	Regional growth forum (fora)
RUP	Regional development plan
SDU	University of Southern Denmark

SME	Small and medium-sized enterprise
SSTI	State Science and Technology Institute
S&T	Science and technology
STI	Science, technology and innovation
SWOT	Strengths, weaknesses, opportunities and threats
TEKES	Funding Agency for Technology and Innovation (Finland)
TI	Technology institutions
TL2/3	Territorial Level 2/3
UK	United Kingdom
USD	United States Dollar
VRI	Programme for Regional R&D and Innovation (Norway)

Assessment and recommendations

Review context

National growth goals require effective contributions from all regions in Denmark.

The *OECD Regional Outlook* (2011) highlights that while often policies support growth in the large hub regions of a country, more of aggregate OECD growth comes from the other regions collectively (approximately two-thirds). For example, Central and Southern Denmark combined contributed more to Denmark's GDP growth (1998-2008) than did the Capital Region (42.7% versus 37.3%). In the context of Denmark's slowed productivity growth, spatially blind policies may not address the complementarities of the different growth drivers in each region. Therefore efforts to strengthen both the capacity for national policies to facilitate these complementarities, as well as the ability of the regions themselves to support strengths and remove bottlenecks, contribute to national growth goals.

There is an important regional dimension to the innovation policy trends outlined in the recent OECD Innovation Strategy.

OECD countries and regions look towards innovation as a driving force for growth. Policies to support innovation are increasingly recognising the importance of an economic and social return to these investments, which requires strong links between knowledge generation and industrial production as well as public services. The rise of collaboration in creating and diffusing knowledge is facilitated by physical proximity in some cases, especially for SMEs. Innovation beyond R&D is growing, where the importance of human capital and new working methods becomes more prominent. Many of the inter-disciplinary innovations require the presence of different combinations of research or industrial expertise, which can contribute to the competitive advantages of different places.

Central and Southern Denmark have a mandate to promote innovation-driven regional growth in light of globalisation challenges.

Lagging productivity growth is a problem in Central and Southern Denmark, as well as in Denmark overall. Future growth will need to come from innovation in the context of a knowledge-intensive economy with an ageing population, minimal population increases, and already high labour market participation rates. But the levers at the regional level are somewhat limited in their scope for dealing with the changes brought by globalisation, as accentuated by the recent crisis. The mandate of the regions, and the new public-private regional growth fora, is to address these future growth drivers.

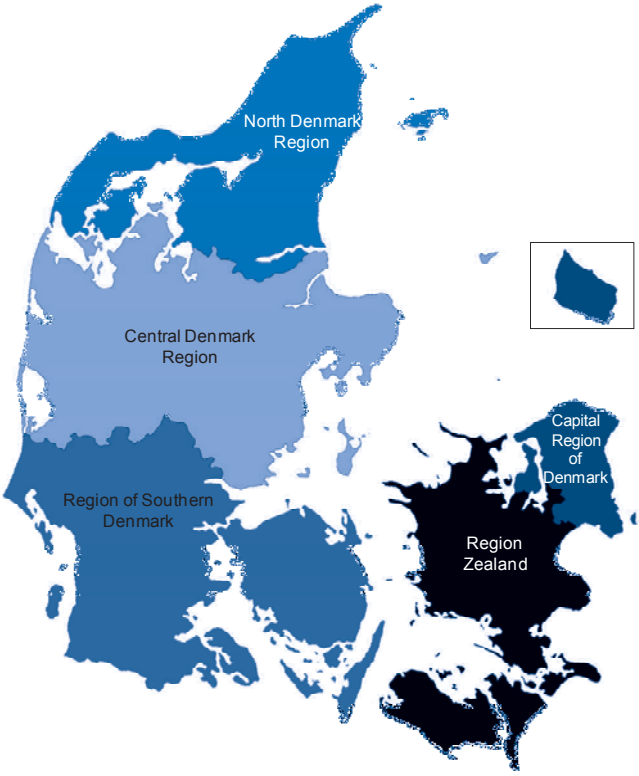
Danish context

Central and Southern Denmark are in a knowledge-intensive country with a high quality of life but slowed productivity growth.

Denmark maintains generally high wealth levels and ranks high on quality-of-life measures; being, for example, at the top in the OECD for work-life balance. There exist generally strong framework conditions for firms, with the exception of one of the highest taxation rates in the OECD. The stagnant labour productivity growth has contributed to a declining advantage relative to other advanced OECD economies. With respect to the sample average of the wealthiest 17 OECD countries, the gap in GDP per hours worked has widened over the last 15 years, declining from around the average (-0.6%) in 1996 to -11% of that average in 2010.

Denmark is a knowledge-intensive country with generally strong performance on indicators of science, technology and innovation. It performs above OECD averages on virtually all commonly used indicators of intensity, such as R&D intensity (2.7% of GDP versus an OECD average of 2.3%), scientific publications, venture capital, and human resources in S&T. The firm demographics, given the share of employment in SMEs, explain in part the lower investments in science-based or breakthrough innovations than several peer countries. Furthermore, there are many firms in more medium-tech, as opposed to high-tech, sectors.

Figure 0.1. **Central and Southern Denmark**



Central Denmark		**Southern Denmark**	
Population (2011):	1 253 000 inhabitants	Population (2011):	1 200 000 inhabitants
Surface:	13 000 km²	Surface:	12 000 km²
GDP per capita (2009):	EUR 38 000	GDP per capita (2009):	EUR 36 000
Largest municipality (of 19):	Aarhus (315 000)	Largest municipalities (of 22):	Odense (188 000)
			Esbjerg (115 000)
			Vejle (105 000)
			Kolding (88 000)

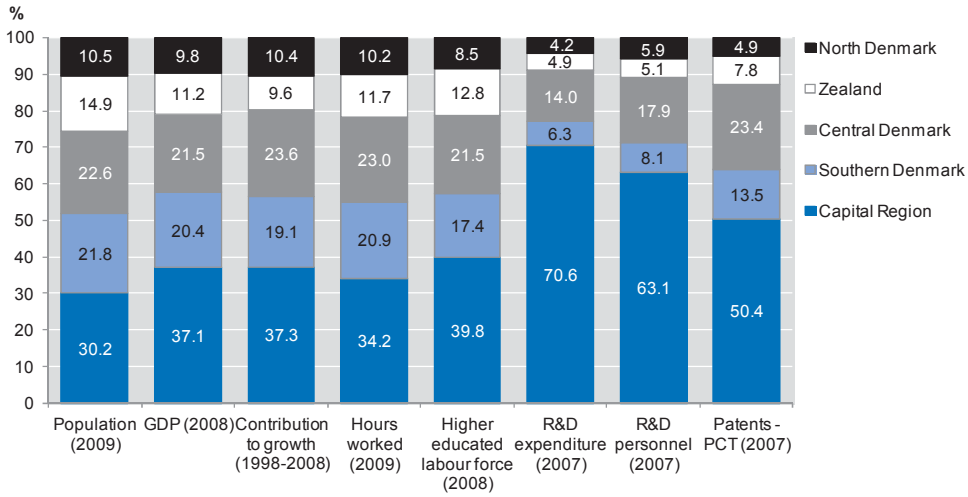
Note: This map is for illustrative purposes and is without prejudice to the status of or sovereignty over any territory covered by this map.

Source: Based on Wikimedia Commons (2007), "Regions of Denmark".

Low inter-regional wealth disparities, but regional concentration of STI resources.

Denmark displays the lowest income disparities across regions, as compared to other OECD economies. The Capital Region contains 30% of Denmark's population and is responsible for around 37% of GDP and GDP growth 1998-2008. However, it also contains 40% of the country's labour force with tertiary education, 63% of its R&D personnel and 71% of R&D expenditure (Figure 0.2). The concentration of R&D-related resources around Copenhagen, in part due to higher R&D-intensive sectors, raises questions about the innovation modes that need to be supported in Central and Southern Denmark and the types of future growth paths.

Figure 0.2. **National shares by Danish region**



Source: *OECD Regional Database*.

Central and Southern Denmark

The crisis has revealed weaknesses in the economies of both regions, particularly for the low-skilled, albeit less than in other OECD regions.

Denmark traditionally had low unemployment for the OECD area pre-crisis (2008); 3.4% versus an OECD average of 6.1%. Unemployment more than doubled in the following year per Danish Statistics, with Central and Southern Denmark reaching the same higher levels of the Capital

Region. Furthermore, before the crisis, the unskilled population had limited incentives for completing secondary education or pursuing tertiary education (lowest returns to tertiary education among OECD countries). Since the crisis, the availability of low-skilled jobs has diminished. Relative to the national goal of 95% of an age cohort having completed secondary education, the percentage of youth (25-34 year olds) with at least one secondary education diploma is lower in both Southern Denmark (80%) and Central Denmark (84%).

A projected shrinking labour force adds further challenges for growth prospects, particularly in "peripheral" areas.

Denmark is facing a shrinking labour force, with a projected decline from around 2.7 million in 2010 to 2.5 million in 2040. The relatively high fertility rates in an OECD context do not compensate for population ageing as well as low levels of immigration. While both regions have positive net immigration, domestic migration for both regions shows a negative balance, much more so for Southern Denmark than Central Denmark. In both regions, much of the domestic net outflow is to the Capital Region. And over a third of the outflow from Southern Denmark is to neighbouring Central Denmark. Within Southern Denmark, 8 of the 22 municipalities are projected to be stable or decline in population through 2020, mainly in selected western and southern coastal municipalities. In Central Denmark, 7 out of 19 municipalities are expected to be stable or decline, also mainly on the western coast. More than half of the population growth expected in the region is in Aarhus municipality.

Southern Denmark: a region with a complex settlement pattern hard hit by the crisis due to a relatively lower-skilled labour force and a less technology-intensive industrial structure within Denmark

Located in the southern part of the Jutland Peninsula, bordering Germany and including several islands, Southern Denmark accounts for 21.8% of national population and 20.4% of GDP. Its 1.2 million inhabitants are spread across 22 municipalities, of which the top three (Odense, Esbjerg and Vejle) make up one-third of the regional population. Regional analyses note that while productivity per sector is above average, the sectoral specialisation of the region overall is in relatively lower value-added sectors than some other Danish regions. The region exports around 53% of its GDP of EUR 43 billion. Southern Denmark is also home to the world-famous

Lego System (toys), which at one point tried to offshore and ultimately retained production in the region. The recent crisis resulted in layoffs from major regional employers such as Danfoss (global producer of refrigeration, heating, and water management products), Lindø (ship building, but shipyard being closed) and LM Wind Power (manufacturing of fiberglass blades for wind turbines).

Central Denmark has several science-based assets and a second-city growth engine but lower levels of regional productivity growth.

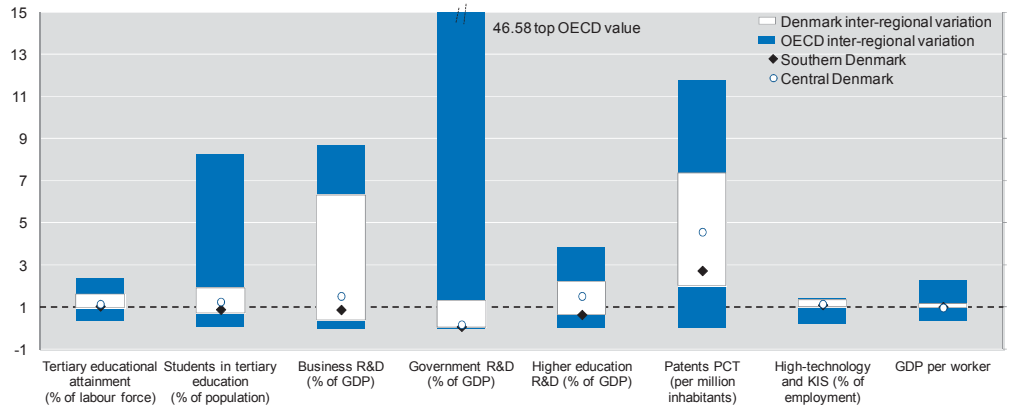
Central Denmark is home to Aarhus, Denmark's second city, a growth pole in this region of 1.25 million inhabitants. The region is located in the middle of the Jutland Peninsula. It accounts for 22.6% of Denmark's population and 21.5% of its GDP for a total of EUR 107 billion. It exports around 60% of its GDP. Major employers in the region, beyond public administrations and hospitals, include Vestas (wind turbines), Dansk Supermarked (retail), Danish Crown (pork and beef products) and Arla Foods (dairy products). Aarhus University serves as a magnet for students, young workers and public R&D funds. The region performs better than Southern Denmark on innovation-related indicators such as R&D intensity and patenting. Nevertheless, the region has suffered from the lowest productivity growth levels among Danish regions in recent years.

Peer regions with similar innovation system profiles tend to be second-tier regions in knowledge-intensive countries.

Among OECD regions, Central and Southern Denmark are part of the "industrial production zones" macro category and the peer group "service and natural resource regions in knowledge-intensive countries". Other regions in this category are mainly in Nordic countries (Denmark, Finland, and Sweden) as well as Canada, the Netherlands, and the United Kingdom (Scotland). These regions are not the top hubs in their respective countries, but generally belong to knowledge-intensive countries of small geographic scale and/or are less densely populated. Central and Southern Denmark show values generally at or above average values in the peer group, but lower than that of a more advanced group of world-leading "knowledge and technology hubs" like Denmark's Capital Region, Baden-Württemberg, Massachusetts, or Stockholm. The regions are generally at or above OECD regional medians on innovation-related variables (Figure 0.3).

Figure 0.3. **Innovation snapshot: Central and Southern Denmark**

2007 or latest available year



Notes: Values are normalised to 1 for the OECD regional median for available regions. Information on all OECD regions is not available for each indicator.

Source: Calculations based on the *OECD Regional Database*.

The national policy and multi-level governance context

Sub-national reforms in 2007 changed the geographic configuration of regions to rationalise health care, and added regional development.

Successive sub-national reforms have sought to consolidate and rationalise the size of sub-national units for more effective service delivery. Today, Denmark is organised into 5 regions and 98 municipalities. Health care dominates the regional agenda in terms of expenditure, personnel and political attention. The drawing of regional borders sought mainly to develop equally sized (in terms of population) regions that each include a major university and research hospital. The second-most important activity of the new regions was a statutory requirement to pursue regional development. The approach is a new partnership-based institutional configuration. As the geography of the new regions was not developed using functional economic areas, each region has a mix of development areas. A greater understanding of these functional areas, which may cross regional boundaries, could support regional and national policy making.

Regional growth fora, focused on growth and public-private horizontal co-ordination, complement elected regional councils.

The elected regional councils must approve all expenditures in the separate budgets for health care and regional development. The new regional growth fora (RGF), appointed by the regional council (with stakeholder consultation), are tasked to: monitor regional development, elaborate strategies to facilitate growth, and recommend projects and activities to the regional councils and for use of EU Structural Funds. The composition of these public-private RGF of 20 members includes: regional and municipal public officials, business persons (6 of 20), representatives of the higher education and research community, and trade unions. They meet approximately four to six times a year depending on the region. The presidents of the RGF are also members of the Danish Growth Council. The growth fora secretariats in each region, part of the regional government, also play an important role in building partnerships across the region as well through project development and meeting preparations in co-operation with the RGF (and an RGF advisory group with members of organisations similar to the formal RGF). They also serve to co-ordinate with municipalities in the region. The existence of sub-regional units in Southern Denmark, corresponding generally to the four former counties, attests to a different "politics of place" than other Danish regions, rendering horizontal co-ordination efforts across the entire region more challenging.

EU funding is critical for innovation-driven regional spending, but spending rules may limit the effectiveness of regional efforts.

Denmark is the EU country with the highest share of Structural Funds dedicated to innovation. Regions have no revenue-raising authority but receive inter-governmental transfers (mainly from the state, less than one-third from municipalities) and EU funds. EU spending rules thus frame the nature of regional spending on innovation. The share of total regional development spending coming from EU Structural Funds is projected by the regions to be 17% in Central Denmark (2007-2013) and was 26% in Southern Denmark (2009-2011). However, much of the other funding from regional sources and project-based contributions (from the state, municipalities and private sector) are used to leverage those EU funds.

The consequences of EU spending rules raise perceived constraints for innovation-related project participants. They include: *i*) an administrative burden that can result in disincentives for private-sector engagement; *ii*) project-based funding, which limits longer-term commitments (such as

work contracts, thus impeding the recruitment of qualified staff); *iii*) an incentive to take an audit-oriented approach to project monitoring (focused on funds absorption); and *iv*) more limited policy learning from project reports due to fear by project managers of audit problems. Similar concerns are raised in studies of other EU regions. Denmark nevertheless continues to strive for greater project impact within the framework of EU rules and the national interpretation of such rules. A joint project including all regions and the central government is underway to assess and improve impact of that spending. Efforts to identify opportunities for administrative simplification and flexibility would also be helpful.

STI policy favours national platforms given the small country context, but has actively sought regional partnerships in the national interest.

Given Denmark's small scale in a global marketplace, national science, technology and innovation (STI) policy focuses on the country overall, but several programmes have a *de facto* or explicit regional approach. More than half of spending is for basic funding to the universities. Therefore regions with stronger universities capture a larger share of these significant funds. Other programmes that have a *de facto* regional impact tend to be focused on particular sectors or technologies. Regions with relevant knowledge or industry assets would be better able to obtain these national funds in competitive procedures. A few other programmes with much smaller budgets have no specific regional dimension, such as the Industry PhD, Knowledge Voucher and Knowledge Pilot Programmes, but do support actors in regional innovation systems. There are several programmes that have a more regional or spatial focus, including special funds for commercialisation and innovation incubators, a Business Innovation Fund to support economic transition, and the Danish innovation networks. The latter, while building on regionally embedded firms and institutions, have been consolidated and incorporated into this programme to become national platforms. Central Denmark is able to capture STI policy funds in a share commensurate with its GDP, while Southern Denmark generally captures less than its GDP share.

Entrepreneurship policy has an active local dimension via local business development councils as well as regional Growth Houses.

Denmark has been prioritising entrepreneurship policy in its efforts to boost productivity. Previous policy approaches have emphasised framework conditions, which have been evaluated as positive in an OECD context, with

the exception of taxation. More active entrepreneurship policies have been put in place to support start-ups and high-growth firms in the last decade, culminating in more prominence and funding via Denmark's Globalisation Strategy. The delivery of entrepreneurship services is performed by nationally established, and municipally owned, Growth Houses (one per region) as well as municipal business development units. The municipal level is charged with business development services, supported by local business development councils, and offers less advanced services than the Growth Houses that are supposed to target high-growth businesses. In some cases, such as in Southern Denmark, certain business development services are managed by cluster initiatives.

Cross-regional and cross-border type arrangements may make sense for building critical mass in certain cases.

Given the transaction costs associated with cross-regional collaboration, this should be undertaken when there is a clear rationale for working together. These rationales may include: a functional area split by administrative boundaries, common challenges, or shared strengths, among others. In the case of Central and Southern Denmark, several of these collaboration rationales exist (among themselves and with other domestic and international partners). A recent mapping of cross-regional collaboration among RGF by the Danish Regions Association notes there is cross-regional collaboration in Denmark (mainly in nationally prominent priorities such as welfare technology and energy). There exist a few incentives from national level to promote inter-regional collaboration. One example is the 10% of EU Structural Funds allocated by the Danish Growth Council for cross-regional initiatives: the Competitiveness Pool. In other national competitive STI programmes, there are often explicit requirements to involve more than one region as a condition for applying to competitive programmes.

The same general principles for cross-regional collaboration within Denmark apply to international settings, albeit the barriers to co-operation tend to be greater. Many of the existing international collaborations for Central and Southern Denmark fall in the context of EU-funded INTERREG programmes of different types of territorial co-operation. However, the regions need to go beyond the EU-funded programmes to better integrate international networks of firm relationships and knowledge flows.

Gaps in inter-departmental co-ordination at national level proves challenging for regional action.

The study regions report that one of their main governance-related challenges is overcoming gaps in inter-ministerial co-ordination at central level. It is viewed by regional actors to result in some duplication and complexity in the public offer of programmes. Previous attempts in Denmark at inter-ministerial co-ordination for regional development have been limited. There are several OECD examples for either top-down or bottom-up approaches to such co-ordination. The partnership agreements, discussed below, are another tool that could help address this challenge.

Mechanisms for vertical co-ordination, such as the new and evolving partnership agreements, could be expanded.

The institution of partnership agreements as a co-ordination tool between individual regions and national government accompanied the 2007 sub-national reform. After several rounds of agreements, national and regional governments now share common principles regarding the importance of innovation and other drivers of growth. The use of the instrument has evolved from an initially bureaucratic exchange of a regional "wish list" and a national government response to one increasingly based on dialogue. This positive evolution is managed by the Ministry of Business and Growth, and increasingly involves other ministries. However, there are only political commitments on specific projects within existing administrative and economic arrangements. There are no dedicated funds associated with the agreements. Other OECD countries use inter-governmental contracting tools for longer-term funding commitments, such as in France and Italy. The agreements can also be extended to serve an inter-ministerial co-ordination role at national level. Agreements for business development strategies, and possibly for regional development strategies, could more clearly tackle growth bottlenecks identified by the region but are outside of the regional policy mandate.

Other vertical co-ordination mechanisms between regions and central government for STI policy could be reviewed. Many efforts are in place now, through the partnership agreements, working groups and consultation processes. A number of interesting models across the OECD exist to inspire Denmark, including from Norway where they developed regionalised research council funds and joint ownership of institutions, albeit in Denmark regions may not own institutions.

Regional strategies

Greater clarity is needed with respect to the type of growth regions seek to pursue.

There remains some ambiguity in the regions regarding the nature of growth goals to be addressed by the business development strategies: growth or growth everywhere. This is a matter of political choice that needs to be addressed, in part with national policy makers. Other OECD countries have struggled with this question, some choosing to maintain population settlements in peripheral areas, others identifying growth opportunities that may, nevertheless, involve population decline. If economic growth is desired in the peripheral areas, more creative forms than tourism should be explored. Additional attention is also needed for urban-rural linkages and partnerships as well as more proactive efforts by those municipalities for attracting firms and residents. Furthermore, innovation in public services may in part address certain growth bottlenecks in peripheral municipalities as well as in the regions more generally; such as preventing high school dropouts or creating a greater sense of "accessibility" for these peripheral areas. These matters are also a consideration in the broader regional development strategies (to which regional business development strategies contribute), that in both regions seek balance and cohesiveness in addition to growth.

Improvements noted in the transition from first to second generation regional business development strategies

The core task of a RGF is to design a regional business development strategy focused on growth through documented growth drivers. A striking feature of the first round of business development strategies developed in Denmark is the extent to which they resemble each other on the surface. The same is true of regions in many OECD countries that prioritise similar sectors in their strategies.

The second generation of strategies better reflects the aspirations of the regional partnerships embodied in the concept of the RGF, addressing many of the regions' strengths, weaknesses, opportunities and threats (Table 0.1). The "headlines" of the second generation of strategies remain very similar in the two study regions. The overall broad visions are that both regions be among the most innovative in Europe. Generally, the horizontal priorities are shared and concern the framework conditions for businesses to be innovative. The regional horizontal priorities differ in the sense that Southern Denmark prioritises cluster organisations as a tool for promoting

growth. That region also places a bit more explicit emphasis on design. In both regions, it is not clear whether strategy quantitative targets are achievable or simply aspirational. The sectoral priorities share several commonalities but there are clear areas of distinctive specialisation within each region.

Table 0.1. **SWOT of the Central and Southern Denmark regional innovation systems**

Strengths	Weaknesses
– High wealth levels in OECD regional context – Favourable conditions for entrepreneurship – New public-private regional growth forum in each region to guide strategy – Increasing regional engagement of universities – Central: growth pole of Denmark's second city, Aarhus; Aarhus University a magnet for students and public R&D funds – Southern: strong inter-municipal collaboration efforts	– Lagging productivity growth – Firm demographics less favourable (SMEs) – Industrial specialisation in low to medium-tech sectors – High-skilled labour shortages relative to industry needs – Prominence of EU spending rules in regional spending for innovation – Central: lowest levels of GVA per worker growth in country – Southern: complex geography and settlement patterns with lesser critical mass in growth poles – Southern: below median levels of public and private R&D intensity (R&D as a share of GDP)
Opportunities	**Threats**
– Increasing STI policy recognition of many forms of innovation (user-driven, public sector, design, etc.) – Attracting high-skilled talent (domestic and international) – Building on Danish branding in several sectors – Greater inter-regional collaboration within Denmark to build critical mass in global competition – Southern: stronger international cross-border arrangements with Germany – Central: building on increasing technology and science-based success, public and private	– Projected labour shortages and population ageing – Off-shoring trends continue due to high labour costs – Long-term unemployment for low-skilled workers – Population decline in peripheral areas of both regions – Increases in technological sophistication in emerging economies

Strategies embody the smart specialisation approach (as promoted by the European Commission), but greater efforts needed to be "best in class" on different steps (e.g. international positioning, quadruple helix).

Danish regions have achieved significant progress since their 2007 creation, supported by the new public-private RGF, towards smart specialisation-type strategies. While the steps currently outlined by the European Commission for such strategies are taken in both regions, further

actions are needed to achieve "best in class" with respect to each step. Principally, this includes greater scanning of their international positioning in prioritised sectors; and greater communication and branding to national and international audiences of such niches (the result of unique combinations across clusters in the region). It also requires a strategy development and project selection process that is even more private sector-driven and that involves greater civil society outreach to achieve the so-called quadruple helix.

Greater clarity with respect to the functions of actors in each regional innovation system can support system efficiency and effectiveness.

It is a challenge for OECD regions to fully understand the functional role of different actors in their innovation systems. New roles for actors are created or supported by private efforts as well as public efforts of different ministries and levels of government. The various measures to make each system more understandable would be facilitated by greater clarity on the functional role of different innovation system actors and the regional variations of such. Any efforts, also in co-operation with the national level, to replace one-problem, one-instrument approaches with more flexible multi-purpose instruments would help reduce the complexity of public offer. Regional clusters can provide guidance on the unique combination of policy measures most relevant for their advancement, particularly where specialised services are relevant.

Differences in the regional innovation systems, by default and design, drive the degree of centralisation in Growth Houses (versus clusters)…

Central Denmark has chosen to centralise the regionally funded business services within its Growth House (more so than Southern Denmark). A centralised model is perhaps easier to achieve in Central Denmark given the region's configuration. The Growth House has been a strong asset in the region's innovation system due to the RGF's use of the Growth House as a lead partner in several funded projects, as well as the Growth House's own proactive efforts to run programmes on behalf of other Danish ministries. While a more centralised model may seem more appealing, several factors should be considered in such an assessment, beyond firm satisfaction. A recent evaluation of Denmark's Growth Houses noted some general challenges across the country, including a lack of industry specificity in consulting services.

Southern Denmark had a pre-existing base of cluster organisations, tied to the promotion efforts of the prior four counties that comprise the new region. For the implementation of its business development strategy, these existing groups with specialised knowledge were deemed by the region a more effective delivery mechanism of targeted business development services. The logic of specialised service providers could be achieved by existing structures or through experts employed by a Growth House, but in either case, the effectiveness can only be determined by in-depth evaluation.

… and the role of universities differ, but in both cases more engagement is possible.

Universities contribute to regional development through three channels: teaching, research and, increasingly, economic development. In terms of the primary mission of teaching, firms in the region reported that universities could do a lot more to develop curricula tailored for local industry needs. For example, in the energy sector, there are shortages of high-skilled engineers. University colleges could also be more forward looking, as with increasing budget pressure on public spending, future demand for some public sector jobs may decline. But there is no incentive for these institutions to adjust their approach today to teach skills needed for the future. In terms of the research mission, Aarhus University attracts notable research resources to its region and has higher quality scientific output (as measured by publication citations) relative to the less research-intensive University of Southern Denmark. The third mission of universities is not regulated but rather at the initiative of the individual university. Both research universities contribute in multiple ways to the regional innovation systems via science parks, technology transfer, and entrepreneurship education, among others. They are also now strong partners as members of the RGF. Their role as both a node within the regional innovation system, and as a global gateway (through joint research and publications, attraction of foreign students and researchers) are further areas to be strengthened.

The policy mix includes similar horizontal priorities, but a notable variation in the share of resources for sectoral priorities.

Central Denmark has allocated a greater relative share to horizontal priorities, while Southern Denmark has placed a greater emphasis on sectoral priorities. Approximately 33% of Central Denmark's Growth Forum funding was focused exclusively on the four strategic areas, 59% for general framework conditions and 3% for rural development (projected spending for the period 2007-2013). In contrast, Southern Denmark devoted

two-thirds (67%) of funding to sectoral priorities while 21% was used for horizontal priorities, in addition to 12% in rural development (2009-2011). The differences may be a bit less stark in reality as actors in sectoral priorities may also access horizontal funding.

There is no one right allocation for each region. However, the policy mix promoted in each region should address the sectors' absorption capacity, particularly given the early stages of the welfare technology clusters, as well as needs for commercialisation and, in general, non-STI forms of innovation. Another question concerns the ability of the regions to address the innovation needs of the bulk of the economy outside of the priority sectors. And while internationalisation is a cross-cutting theme for both plans generally, this is an area that appears less developed than it should be. In terms of innovation policy tools, there are fewer used at regional level in Denmark than in other OECD countries.

The energy focus of each region builds on internationally recognised strengths.

Denmark is the biggest energy technology exporter, in relative terms, within the EU-15. In 2010, 9.5% of total Danish exports were energy goods. Approximately 55 000 people were working in the energy and environment resource area in Denmark, 62% of them in Central and Southern Denmark. The sector has been growing (jobs and value added). In terms of renewable energy patenting, both perform well on the global scene, with Central Denmark the third-ranked region globally in terms of volume of renewable energy patents, and Southern Denmark ranked 14th. There are both linkages across regions for wind energy and distinctly different niches. Central Denmark is specialised in wind, biomass and district heating, including large firms such as Vestas, Siemens Wind Power and Grundfos. Southern Denmark is strong in energy efficiency and offshore energy, including large firms such as Danfoss, Dong Energy and LM Wind Power. Barriers to further development in both regions include, among other factors, an insufficient supply of skilled engineers.

The welfare technology focus seeks to build critical mass through innovation-driven public procurement, although absorption capacity and global competition need to be assessed.

All regions in Denmark have prioritised the welfare technology sector, in line with subsequent recommendations of the Danish Growth Council. Regions are particularly keen to do so also to reduce health care expenses in

hospitals, for which they are also responsible. In this broader domain of health and welfare technology, the focus in Southern Denmark is on telemedicine, automation (robotics), intelligent assistive technology and IT system development. In Central Denmark, the reported strengths are ICT-related health care, biotech/medtech firms, and IT system development. One area for possible joint work is telemedicine. Southern Denmark distinguishes itself for its active efforts to address public procurement and capacity barriers for the adoption of welfare technologies in hospitals, as well as application to the social sector. Central Denmark has been very active in supporting commercialisation of new products, particularly through MedTech, and its public-private co-operation with hospitals.

As definitions of the sector and the assets in each region are explored through different studies, two questions arise. A first question, given the relative share of regional spending in this area, particularly by Southern Denmark, is the absorption capacity of the limited number of local firms. A second question concerns the relative national and global positioning of these sectoral niches, as they are being pursued by other OECD regions as well. A range of other conditions beyond the sector itself is needed to support this sector. As the initial focus of efforts has been on hospitals, there exist many other welfare technology applications (education, social, labour fields) that could be explored in the future. In Southern Denmark, there has been some application to other social service needs, such as elderly assisted living.

Tourism, in some cases under the label of "experience industries", is viewed as the strategy to address peripheral areas and the unskilled.

Tourism in Central and Southern Denmark relies on a variety of natural and cultural assets which can be categorised into three main types of touristic experiences. They include: coastal leisure, business, and city breaks. In 2008, the sector accounted for 3.8% of private employment in Central Denmark and for 2.1% in Southern Denmark, albeit the vast majority of its workers are low skilled. While Central Denmark has experienced a long-term decrease in international visitors like Denmark in general, Southern Denmark has experienced growth in leisure tourism and a performance in business tourism above the Danish average. Both regions are promoting a series of similar measures; however, Central Denmark appears to focus more on sector professionalisation and geographic prioritisation, while Southern Denmark has made experience development more prominent, and is also pursuing other niches such as food and tourism.

Around 85 000 people are employed in creative industries in Denmark, or 6% of total jobs in the private business sector. Creative jobs represent an important source of innovation and productivity for companies: the top 25% of Danish firms (in terms of GVA per worker) have a higher proportion of employees with creative education and functions. Moreover, on average, creative jobs have higher salaries (37% higher than the Danish average) thus contributing more to the Danish economy. The creative industry (design, fashion, architecture, etc.) is an important component of the wider experience industry sector but has a separate set of issues for regional support. Some of the leading Danish firms in fashion, design or leisure are located in the two regions: the global toy company Lego is located in Southern Denmark, and Central Denmark hosts one of the leading Danish firms in fashion and design: Bestseller. Other regional assets in this area include the Kolding School of Design and the Design2Innovate platform in Southern Denmark, while Central Denmark hosts a related innovation network (Innonet Lifestyle – Interior and Clothing).

While the food sector is prioritised in Central Denmark, Southern Denmark's food industry has not proven a growth sector.

The food sector is prioritised in Central Denmark, which accounts for 55% of Danish food exports. The resource area accounts for a considerable share of regional employment and GVA (both around 16%), but has experienced notable job losses. The region contains some of the biggest food-related activities and firms in Denmark (Arla Food, Danish Crown and Dansk Supermarked) along with several scientific and research actors. However, the sector needs modernisation and diversification to build on current strengths in large manufacturing as well as processing and distribution companies. The region supports the development of clusters and networks in the food sector, and promotes knowledge transfer, training, research and innovation activities in food-related areas through the Smart Food Initiative, including the Future Food Innovation efforts. International examples regarding food sector development in a knowledge-intensive context include the Netherlands and Sweden.

For Southern Denmark, while previously prioritised and still a large share of employment, the food sector's growth prospects were deemed limited, with few innovation-related assets. Support for the sector is now integrated into the experience economy and tourism projects. While the potential for integration of food and tourism is not a solution to addressing the sector overall, there are some OECD examples in this area for creating useful linkages.

With projected labour shortages and existing gaps in key sectors, a skilled workforce remains a key development challenge.

In a context of high labour costs, there are few alternatives to skills upgrading. Problems which are visible at primary education level become bigger challenges at secondary level (including high school dropout rates). The tertiary level faces difficulties to supply the skilled manpower adapted to company needs, as already observed in priority sectors like energy. Innovations in education provision could address problems early in student education careers, such as bridges to vocational and technical training or the integration of young immigrants. For attraction and retention of high-skilled workers, universities must move faster at adapting curricula to regional needs, without neglecting cutting-edge international research activities in selected relevant areas, perhaps with national and regional support. Municipalities and regions need to continue to promote attractiveness. Regional instruments may consider support to international recruitment of students, research talent and employees, with inspiration from numerous OECD region examples.

Policy intelligence for strategy development as well as monitoring and evaluation for project implementation can be taken to the next level.

Both regions demonstrate a political willingness to move from a fragmented and input-oriented approach towards a more result-oriented, strategic and integrated policy. They are also seeking to upgrade an audit-oriented approach based on funds use to one that considers project milestones and impact. Several initiatives with national actors to develop joint evaluations (such as for business services in Growth Houses or the impact of EU Structural Funds use) are excellent examples. Harmonised data approaches across regions when appropriate, including budgeting and project data, will only facilitate such cross-regional efforts warranted in a small country context. Policy-oriented regional scoreboards are not systematically available, notably at the level of clusters or priority domains. The question of strategic policy intelligence could receive growing attention, by upgrading data descriptions to more targeted reports. Given the relatively recent establishment of regions in charge of innovation-based growth policies within the OECD, progress on this front is nevertheless remarkable. The appetite for measurement and impact evaluation found in regional bodies needs to be nurtured by international practices and training opportunities.

Summary of recommendations

Key recommendations (national context)

- Build on the progress thus far of national-regional partnership agreements to:
  - promote greater inter-ministerial co-ordination at national level with respect to place-based policies for supporting growth, also seeking to reduce programme proliferation in the innovation system when possible;
  - consider establishing more concrete and longer-term commitments with associated funding;
  - address bottlenecks to growth outside of the regional mandate for action.
- For development and implementation of the new national Innovation Strategy as well as entrepreneurship policies, and in collaboration with the regions:
  - generate commonly accepted mappings and studies of research and industrial competencies to match the localisation of research with industrial competences when possible and identify the contribution of each region to national goals in an international context;
  - make greater use of bottom-up cross-regional opportunities to build critical mass and support specialisation of clusters in national and international networks;
  - continue to support shared policy intelligence and data analysis between national and regional governments.
- Given the prominence of EU-funding rules for regional growth forum spending:
  - identify with regions and the EU opportunities for administrative simplification and flexibility in EU spending rules and/or the Danish interpretation of those rules;
  - use the joint national-regional impact evaluation of Structural Funds to develop best practices for project monitoring and impact.

Key recommendations (regional strategies)

- Achieve greater clarity on the growth bottlenecks and growth expectations in different settings:
  - use more creative approaches than tourism if economic growth is desired in peripheral areas;
  - capitalise on innovation in public services to address other growth barriers (social services; education, e.g. high school dropouts; labour market, e.g. to promote living in peripheral areas).
- To achieve the level of international best practices for smart specialisation as currently defined, adjustments include efforts to:
  - promote next generation cluster policy approaches (cross-border and cross-cluster), with greater communication and branding on international positioning of prioritised niches (including through peer reviews);
  - cultivate a strategy and project development process that helps trigger new ideas with greater private and civil society engagement (e.g. *ad hoc* working groups including "unusual" suspects, openness to good ideas in non-prioritised sectors);
  - build critical mass through greater linkages with other Danish regions and national priorities as well as international firm and research connections;
  - ensure that the policy mix promoted in each region: matches the absorption capacity of the prioritised sectors; pays sufficient attention to commercialisation; and addresses non-STI forms of innovation.
- Strengthen the most relevant innovation system actors and system relations:
  - seek with national government to prevent actor or programme proliferation as is common with "one-problem, one-solution" instruments;
  - develop functional mappings of innovation actors relevant for regional (and national) systems, highlighting the areas for improvement by actor, including universities.

- Develop and attract regionally needed skills to meet current and future labour shortages:
  - low-skilled workers: improving bridges to vocational and technical training and integration of immigrants;
  - high-skilled workers: through attractiveness, international recruitment, and more tailored university programmes.
- Use policy intelligence and learning to complement existing project selection and evaluation mechanisms (including with national government, which is facilitated by greater harmonisation of programme data across regions).

Introduction

The contribution of different types of regions to national growth

In the context of crisis recovery, countries and regions seek to boost growth with increasingly limited public spending. They are also seeking to promote sustainable development, taking into consideration new approaches to economic challenges. Many countries and regions strive to promote not only economic efficiency, but also social issues so as to not exacerbate inequalities, as well as environmental factors to ensure resources for the future. Conditions for a better life vary within the same country. Regions are therefore the "places" where policies come together. Place-based approaches, such as those promoted by regional development policy and regions themselves, can bring out the complementarities that mutually reinforce these three goals. Place-based approaches are a complement to, not a substitute for, economy-wide and people-centred policies.

The *OECD Regional Outlook* (2011a) highlights that while often policies support growth in the large hub regions of a country, more of aggregate OECD growth comes from the other regions collectively (approximately two-thirds). It is not simply regional growth rates that matter – where growth occurs is also critical. Within any given country, both high-income and lagging regions can grow faster or slower than the national average. While predominantly urban regions often have higher levels of productivity and GDP per capita, they do not enjoy any advantage in terms of growth performance. Indeed, although predominantly rural regions are over-represented among the slowest growing regions in the OECD, they are also over-represented among the fastest growing. "Rural" is by no means synonymous with "decline". Opportunities for growth exist in all types of regions. Large and fast-growing regions will make the greatest contribution to overall growth, while small regions with low rates will have the least impact. In summary, the data reveal that:

- a few big regional hubs are main drivers of growth, and if they falter, their impact on overall growth will be significant;

- many big cities are making little or no growth contribution, yet given their size, helping these regions grow could have big impacts;
- most growth occurs outside the hubs, as many of the fastest growing regions are second-tier cities and intermediate regions with urban and rural areas; and
- the notion of an "average region" is meaningless, as hardly any regions are clustered close to the "average".

For example, Central and Southern Denmark combined contributed more to Denmark's GDP growth (1998-2008) than did the Capital Region (42.7% versus 37.3%). In the context of Denmark's slowed productivity growth, spatially blind policies may not address the complementarities of the different growth drivers in each region. Therefore efforts to strengthen both the capacity for national policies to facilitate these complementarities, as well as the ability of the regions themselves to support strengths and remove bottlenecks, contribute to national growth and sustainable development goals.

Innovation is viewed as a driver of growth, but innovation dynamics are changing…

Over the past decade, the notion of innovation in OECD member countries has broadened, reflecting important changes in the dynamics, scope and patterns of innovative activities. The OECD Innovation Strategy highlights some of these evolving innovation dynamics (OECD, 2010a).

- **Intangible assets:** innovation results from a range of complementary assets beyond R&D, such as software, human capital and new organisational structures. Investments in these intangible assets is rising and overtaking investment in physical capital (machinery and equipment) in several OECD countries.
- **Innovation goes beyond R&D:** innovation embraces a range of complementary assets that go beyond R&D, such as software, human capital and new organisational structures. Firms may introduce new products on the market without engaging in R&D, and in some OECD countries the propensity to introduce new-to-market product innovation is similar whether or not the firm performs R&D.
- **Mixed modes of innovation:** firm-level innovation data reveal complementary strategies. Most innovative firms introduce both product and process (technological) innovations, as well as marketing or organisational innovations (non-technological). There are differences by

sector and firm size. For instance, a larger share of firms in services than in manufacturing introduce only marketing or organisational innovation.

- **Collaboration and networks are essential:** firms that collaborate on innovation spend more on innovation than those that do not. This suggests that collaboration is likely to be undertaken to extend the scope of a project or to complement firms' competences more than to save on costs. In most countries, collaboration with foreign partners is at least as important as domestic co-operation. Collaboration is used in innovation processes whether firms perform a lot of R&D, little R&D, or no R&D at all. Furthermore, production of scientific knowledge is increasingly shifting from individuals to groups, from single to multiple institutions, and from national to international arenas.

- **Convergence of scientific fields and multi-disciplinary/ interdisciplinary research:** increasingly, innovations are achieved through the convergence of scientific fields and technologies. For example, nanoscience research has arisen from the interaction of physics and chemistry and is interdisciplinary in character. Environmental research is one example of multi-disciplinary research.

- The availability of **skilled human capital** has always been a pre-requisite for the successful development of innovative activities. However, given the global competition for talent, its importance is on the rise. Human capital needs go beyond the mere supply of skilled personnel in science and engineering to encompass the variety of skills that are increasingly required to foster the absorptive capacity of firms, the management of innovation or the brokerage of knowledge.

…implying needed changes in innovation policy approaches

OECD studies of innovation policy at national and regional level highlight the specifics of these policy trends to respond to the changing nature of innovation (see for example OECD, 2010c; 2011b).

Adapted governance structures are needed that move towards a whole-of-government approach to policy making, which includes tighter co-ordination mechanisms. The widening nature of innovation, its central role in the pursuit of economic and social objectives, and the broader scope of actors involved should be reflected in such structures. The co-ordination mechanisms concern different levels of government, ministerial departments, implementation agencies, and non-governmental stakeholders. Such new governance approaches may require institutional reform and new ways of working together.

The policy mix of financial and qualitative instruments in support of S&T and innovation must be progressively adapted to the new innovation trends. Taking into account initial conditions that characterise a country's or region's prevailing policy framework, as well as its institutional and structural specificities, the policy mix should foster the emergence of lasting dynamic interactions among stakeholders for the production, diffusion and valorisation of knowledge in firms. Institutional reforms associated with improved governance structures should facilitate the development of new policy mixes.

The scope of innovation policy targets has also broadened. On the one hand, it encompasses non-technological sectors that are either the source of innovation in a firm from within or through outsourced services (e.g. organisation, design and training). On the other hand, it must respond to new social challenges. These trends result in an increased recognition of demand-driven innovation, with a role for public procurement in innovation policies, notably through regulatory frameworks and the incentives given to the formation of public-private partnerships for the provision of collective goods and services. Many of the social challenges in the health, environment and well-being areas concern not only market opportunities but also changes in publicly financed infrastructure and the delivery of public services.

Therefore regions have a key role to play

A double policy paradigm shift has contributed to a greater role for regions with respect to innovation policy (OECD, 2011c). Regional development policy approaches in OECD countries are increasingly focused on competitiveness and innovation. They have evolved into a much broader family of longer-term development policies designed to enhance regional competitiveness. At the same time, new demands on national innovation policy imply a greater role for regions. Furthermore, innovation policy is increasingly called upon to improve social well-being and environmental sustainability in addition to economic impacts. Regions are the places where the complementarities among these factors can materialise. OECD member countries are therefore exploring different strategies for incorporating a regional dimension in their science, technology and innovation (STI) strategies. National policies can promote regional capacity for better strategies but also benefit from regional examples to inspire national approaches.

A region's task is to develop an innovation-driven vision for regional development based on solid analysis of regional assets and relevant global trends. In addition to providing the right framework conditions, the region needs to mobilise actors around this vision and develop the corresponding

mix of policies. The scope for regional action depends on several factors. Too often these factors are considered independently, instead of simultaneously. They include*: i)* the institutional position; *ii)* the type of regional innovation system; and *iii)* the strategic choices for the region.

The institutional position, or margin of manoeuvre for regional institutions, is framed by the national governance set-up and the degree of devolution of STI competences to the region. In the case of Central and Southern Denmark, their role is more of strategy development and promotion of a stronger regional innovation system through targeted projects, as innovation policy instruments in Denmark are generally the mandate of national policy.

Regional innovation systems can be assessed by their strengths and weaknesses for innovative activities and system relationships. The variety in the innovation potential of regions derives notably from different production structures and development paths. The regional innovation system concept is a way of describing these factors. It is composed of different types of firms (small or large, domestic or multi-national), universities, public research facilities, technology centres, and cluster associations, among others. The RIS lens highlights the variety of regions within countries, the different dynamics of innovation, and the interactions across institutions in a given system. Policies or brokering institutions can reinforce those systemic relations. In both Central and Southern Denmark, there are some areas where innovation system actors could be working more together, and other areas of distinctiveness that require specific regional efforts.

Strategic choices need to be taken by regions for supporting the transition towards an innovation- and knowledge-driven path. Some regions can build on current advantages through an emphasis on scientific research, technology, or a mix. Others need to support socio-economic transformation: reconversion or identification of a new frontier in lower or medium-technology industries. And some regions simply need to begin catching up by building knowledge-based capabilities so as to absorb new knowledge developed elsewhere. Both Central and Southern Denmark have sectors of internationally recognised strength, such as in wind energy, but also have sectors needing modernisation and diversification through related variety, such as food, as well as sectors where more radical innovations are required, such as in welfare technologies.

How do policy makers ensure that they both "do the right things" and "do things right"? To implement their role of change agent, regions need to:

- **Develop a shared vision** and strategic framework based on sound analysis to encourage innovation in the context of a regional development strategy. A variety of public, private and civil society

actors are relevant given the importance of innovation and its increasingly wide application.

- **Design a smart policy mix** that mobilises relevant assets drawing from different policy fields. The new generation of innovation policy instruments tends to reflect a more systemic approach to innovation. They also seek to minimise boundaries between knowledge generation, diffusion and exploitation in firms by offering a bundle of instruments for all three phases.
- Establish multi-level, open and **networked governance structures** that include public and private actors.
- **Foster policy learning** through better metrics, evaluation and experimentation, as well as policy capacity.

There are several common pitfalls observed in regional innovation strategies in OECD regions. They include: a "one-size-fits-all" approach to developing such a strategy (not all regions can be biotech hubs or Silicon Valley), a lack of sufficient private sector involvement, poorly analysed global trends that influence regional industries, a focus limited to administrative boundaries thus not serving economic functional areas, and a lack of measurement and evaluation of progress.

Conclusion

This study of Central and Southern Denmark takes place in the context of several national and international agendas. The EU has developed its Europe 2020 strategy, including the Innovation Union Initiative. The EU is also preparing for the next programming period for EU Structural Funds, calling on regions to develop "smart specialisation strategies" as a prerequisite for spending funds. Within Denmark, a new national Innovation Strategy is also being developed that will need to take into account the role of regions and their contributions to national goals. In this report, the strategies of Central and Southern Denmark are therefore assessed given the types of innovation system potential, the regions' institutional position, and the nature of their strategic choices in this political context.

Bibliography

OECD (2010a), *Measuring Innovation: A New Perspective*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264059474-en*.

OECD (2010b), *The OECD Innovation Strategy: Getting a Head Start on Tomorrow*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264083479-en*.

OECD (2010c), *OECD Science, Technology and Industry Outlook 2010*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/sti_outlook-2010-en*.

OECD (2011a), *OECD Regional Outlook 2011: Building Resilient Regions for Stronger Economies*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264120983-en*.

OECD (2011b), *OECD Reviews of Regional Innovation: Basque Country, Spain 2011*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264097377-en*.

OECD (2011c), *Regions and Innovation Policy*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264097803-en*.

Chapter 1

Innovation and the economies of Central and Southern Denmark

Central and Southern Denmark Regions are in a knowledge-intensive country suffering from lagging productivity growth. This chapter first considers the national context for regional performance. It then reviews the demographic and economic trends of each region. Their economic and innovation performance is assessed within an OECD context and with respect to relevant peer groups. The chapter concludes with a discussion of areas of potential for innovation.

Introduction

Denmark is a knowledge-intensive OECD country with low inequality and high standards of living. Within the regions, there are important variations in the economic development potential between the more developed eastern part of the Jutland Peninsula relative to the less densely populated western side. Regional business development strategies for Central and Southern Denmark must address a context of stalled productivity growth, an ageing population, future labour shortages, and increasing global competition for its firm base of SMEs often in medium-tech sectors. In this respect, innovation support will require an integrated approach that addresses high-technology as well as the more traditional sectors of the economy and the public administration. Strong growth outside the capital is vital to Denmark's national goals.

Denmark: global positioning and within-country dynamics

Knowledge-intensive innovation leader suffering from stalled labour productivity growth

The most recent *OECD Economic Survey* notes that while fiscal, labour market and well-being indicators display better scores in Denmark than in many other OECD countries, its stagnant labour productivity has contributed to a growing gap with other advanced OECD economies. With respect to the sample average of the 17 wealthiest OECD countries, the gap in GDP per hours worked has widened over the last 15 years, declining from -0.6% in 1996 to -11% of that average in 2010. The country's ability to maintain high labour force participation rates, albeit with a lower than average number of hours per worker, has contributed to GDP growth but not necessarily labour productivity. The inclusion of less-productive workers into the labour force does not fully explain the phenomenon. In general, across sectors, the capital/labour ratio has been slow to grow with the increasing labour contribution. In terms of sectors, manufacturing, and more recently construction, have shown higher labour productivity growth than other sectors, possibly due to employment losses in those sectors.[1] Other sectors with labour productivity growth (through 2010) include information and communication technology, business services, and finance and insurance.[2] Denmark's public sector is the third highest in the OECD as a percent of the total employment in the country and by far the highest in terms of public wage as a percent of GDP in 2010, complicating measures of productivity growth and making innovation in this sector a crucial aspect to be addressed. Denmark's economy has nevertheless weathered the crisis better than some of its neighbours and has otherwise many strong framework conditions for growth (OECD, 2009a; 2012).

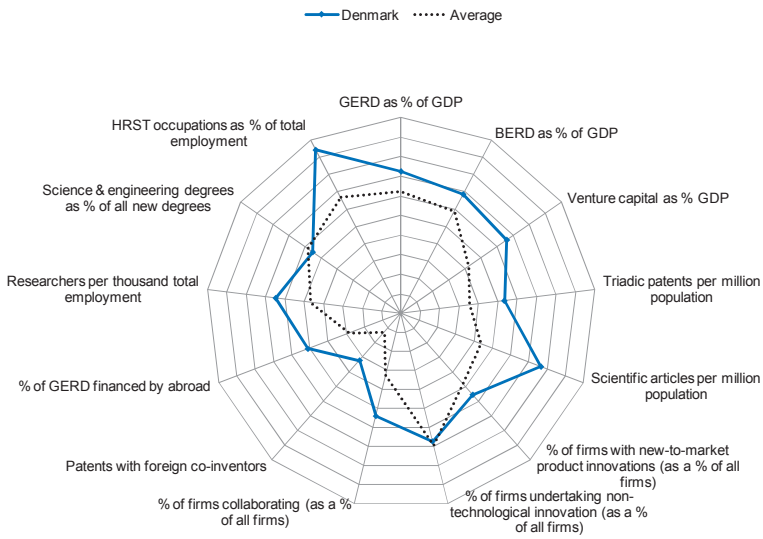
Denmark is known as a knowledge-intensive country with generally strong performance on indicators of science, technology and innovation (Maskell, 2004; Park and Lee, 2005). It performs above OECD averages on virtually all variables (see Figure 1.1). Its overall R&D intensity of 2.7% is notably above the OECD average of 2.3% in 2008. Firms were responsible for financing 61% of that R&D. Business expenditure on R&D as a share of industry value added was nearly twice that of the OECD average. Denmark ranks fifth in the OECD with respect to the share of researchers in employment (10 per 1 000), and third for the share of employment in human resources for science and technology (39%). Venture capital intensity is also high at 0.16% of GDP. The results of such innovation-related investments are therefore above average (60 triadic patents and 1 359 scientific articles per million inhabitants). In terms of innovation survey results for firms, 16% introduced new-to-market products, 47% undertook non-technological innovation, 16% collaborated on innovation activities, and 19% of co-patents involved foreign inventors (OECD, 2010a). However, investments in intangible assets, namely those assets that go beyond R&D such as software, human capital and new organisational structures, are rising slower than in other innovation-intensive OECD countries like Finland, Sweden, the United Kingdom or the United States (OECD, 2010b). In addition, as noted above, productivity growth remains lacklustre.

Within the European context, Denmark's performance compares even more favourably. It is in the "innovation leader" category, ranking second after Sweden (and before Finland and Germany) on the Innovation Union Scoreboard 2010. It has strengths in categories of "open, excellent and attractive research systems", "linkages and entrepreneurship" and "intellectual assets". It performs somewhat less well in the areas of "finance and support", "innovators" and "outputs". Yet Denmark, like Sweden, is also in the "slow growers" category for innovation. In contrast, Germany and Finland are in both the growth leaders as well as innovation leaders categories (European Commission, 2011).

Different forms of investment in human capital, entrepreneurship and innovation could help improve regional and national productivity. Areas in the education system that could support a more skilled labour force to boost labour productivity include: stronger performance of basic education, minimising high school drop-out rates and reducing the time to complete tertiary education. It should be noted that in Denmark, students take longer than the required years to finish their studies, delaying entry into the labour market. This is due to "sabbatical" periods of one or more years between upper secondary and tertiary education, as well as longer periods than required to complete coursework. As innovation has a lower impact on firm productivity in Denmark than other countries, supporting more efficient

forms of innovation investment have been recommended. Other framework conditions that could be improved to support growth include addressing: investment in the capital stock of key infrastructure, a focus on high-growth potential firms (not necessarily start-ups), increased entrepreneurial education, and expansion of venture capital through Danish pension fund investment, among other factors (OECD, 2009a).

Figure 1.1. **Denmark's strong STI performance in OECD context**



Notes: For each indicator in the radar graph, the OECD country with the maximum value is set at 100 (with a position on the outer ring of the radar). The average is calculated by taking into account all OECD countries with available data.

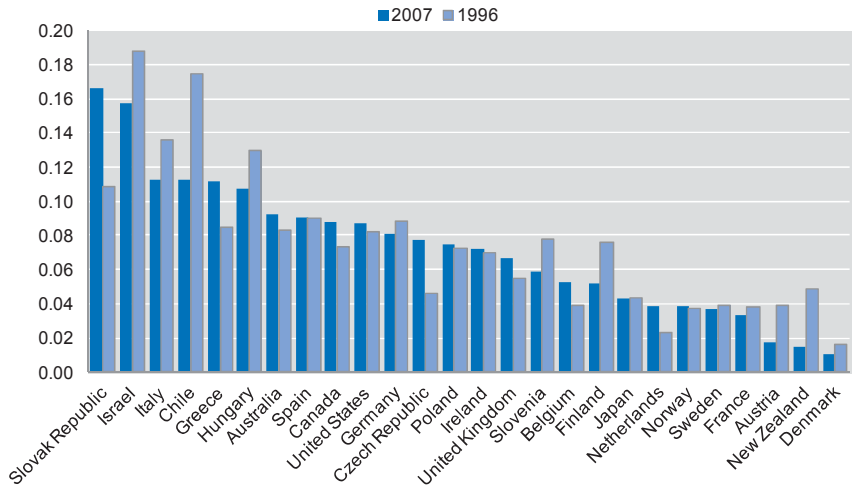
Source: OECD (2010), *OECD Science, Technology and Industry Outlook 2010*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/sti_outlook-2010-en*.

Low inter-regional wealth disparities but regional concentration of resources

Denmark displays low household (adjusted) disposable income[3] disparities across regions. Denmark's value on a Gini[4] index of this indicator is the lowest of all OECD countries, even displaying a decrease between 1996 and 2007 (see Figure 1.2). Denmark also displays the lowest disparities across regions with respect to regional annual GDP growth rates, as compared to OECD and selected emerging economies (OECD, 2009b; 2011a).

Figure 1.2. **Inter-regional household income disparities low in Denmark**

Gini coefficients for 1996 and 2007 based on adjusted household disposable income

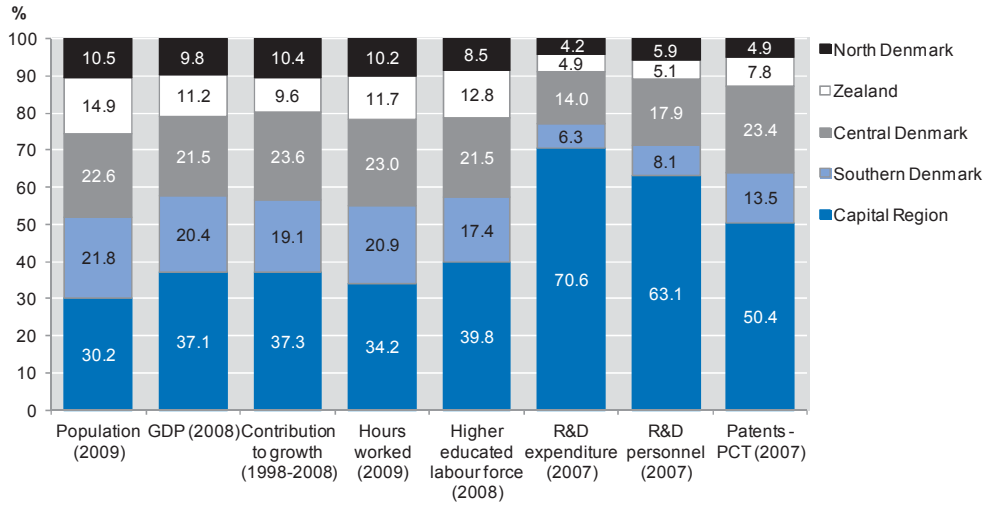


Note: The data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Source: OECD (2011), *OECD Regions at a Glance 2011*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/reg_glance-2011-en*. Calculations based on the *OECD Regional Database*.

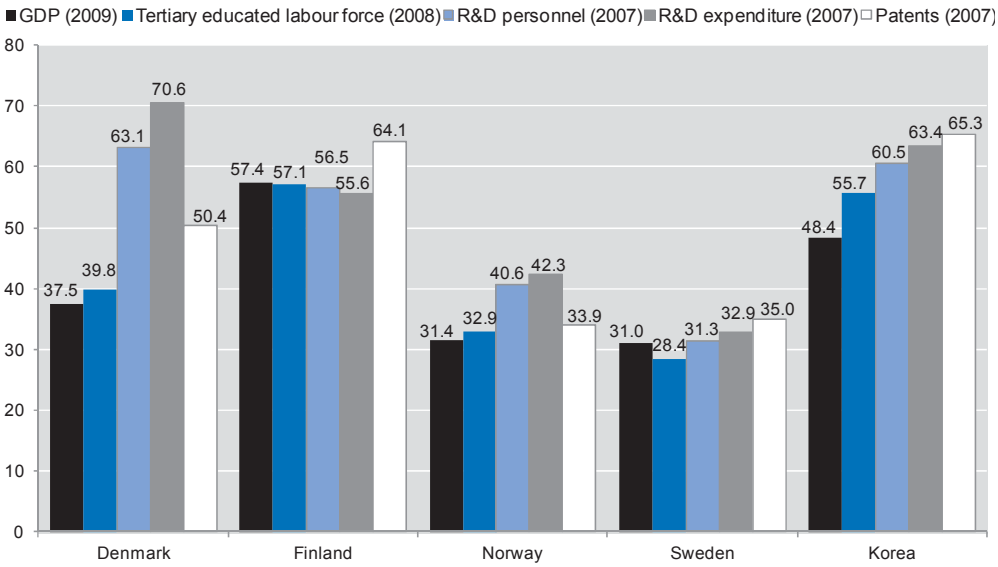
While the Capital Region (which includes Copenhagen) accounts for a high share of national population and economic output, it has an even greater share of knowledge-intensive resources (see Figure 1.3).[5] It contains 30% of Denmark's population and is responsible for around 37% of GDP and GDP growth over the last several years, pre-crises. However, it also contains 40% of the country's labour force with tertiary education, 63% of its R&D personnel and almost 71% of overall R&D expenditure (and a similar share of private R&D expenditure). In an international context, Denmark stands out for a notable level of concentration of R&D much higher than its share of economic activity (see Figure 1.4). Central and Southern Denmark each account for around 22% of national population, and around 21% of GDP. However, Central Denmark contains a much larger share of R&D personnel, R&D investment and national patents than Southern Denmark.

Figure 1.3. **National shares by Danish region**



Source: *OECD Regional Database*.

Figure 1.4. **Share of national activity in the economic centre**

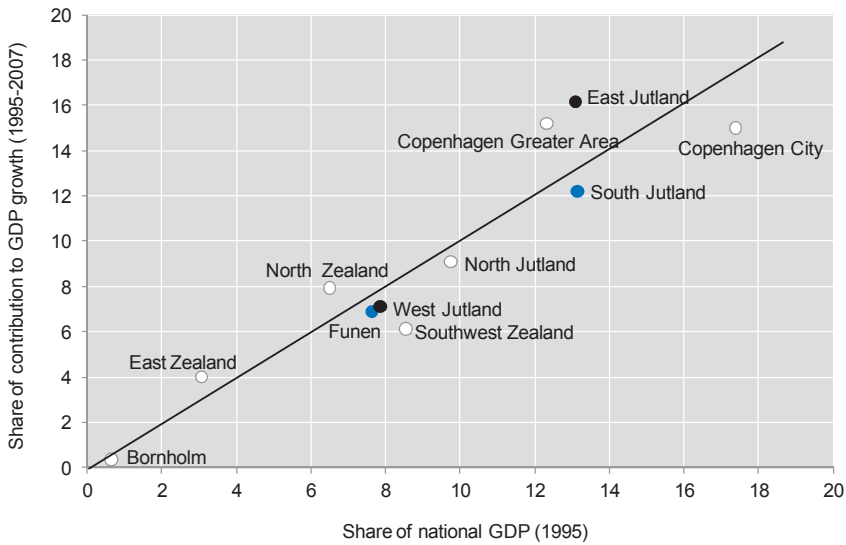


Source: *OECD Regional Database.*

Central Denmark's contribution to national growth exceeds its share of the population and economy, while that of Southern Denmark is slightly under its share. At the scale of TL3 regions, Central and Southern Denmark generally display levels of contribution to national GDP growth, over the period 1995-2007, close but slightly lower than the respective shares of GDP in the beginning year of the considered period. The eastern part of Central Denmark (East Jutland, that includes Aarhus) is an exception, displaying the highest levels of growth at the TL3 level of the whole country (see Figure 1.5).

Figure 1.5. **Share of GDP growth by Danish TL3 region**

Contribution to GDP growth from 1995-2007



Notes: Blue: Southern Denmark TL3 regions; black: Central Denmark TL3 regions; white: other Danish TL3 regions.

Source: OECD calculations using the *OECD Regional Database*.

Socio-economic profile of Central and Southern Denmark

Minimal regional population growth with denser settlement and growth on the eastern coast

Central and Southern Denmark are located on the Jutland Peninsula and Funen Island (see Figure 1.6). Central Denmark contains around 1.3 million inhabitants (out of a country total of 5.6 million) in 19 municipalities. The

regional capital is Viborg, whereas the main city is Aarhus. Southern Denmark contains over 1.2 million in 22 municipalities. The region's political capital is Vejle, and its main city is Odense on the Island of Funen (Fyn in Danish). Central (22.6%) and Southern (21.8%) Denmark are, respectively, the second and third most populated regions in Denmark, after the Capital Region. Overall population density across both regions is just under 100 persons per square kilometre, or more than six times less than the Capital Region at 643. In both study regions, however, there is quite an uneven settlement pattern. Population density and growth are highest on the Eastern coast of the Jutland Peninsula, where municipalities like Odense (600 inhabitants per km²) and Aarhus (654) are located.[6]

Figure 1.6. **Maps of Danish regions, including Central and Southern Denmark**

A. Danish regions

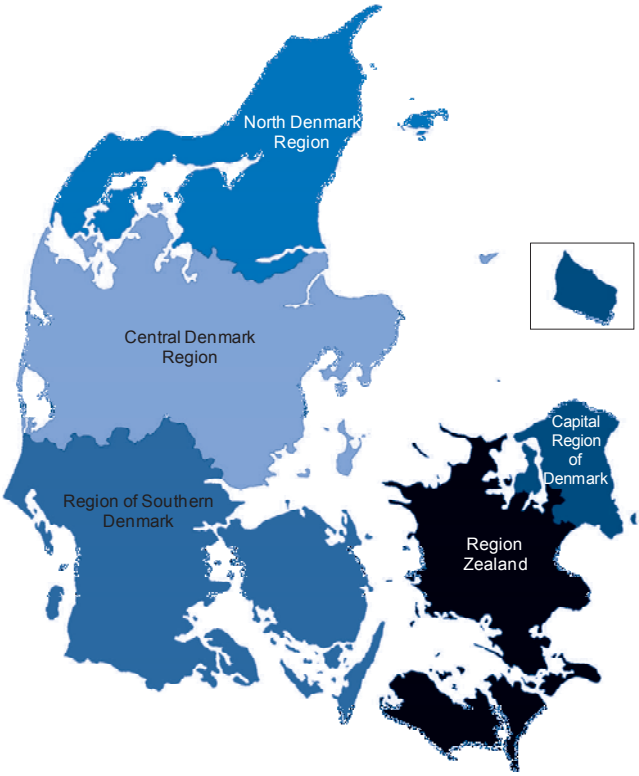
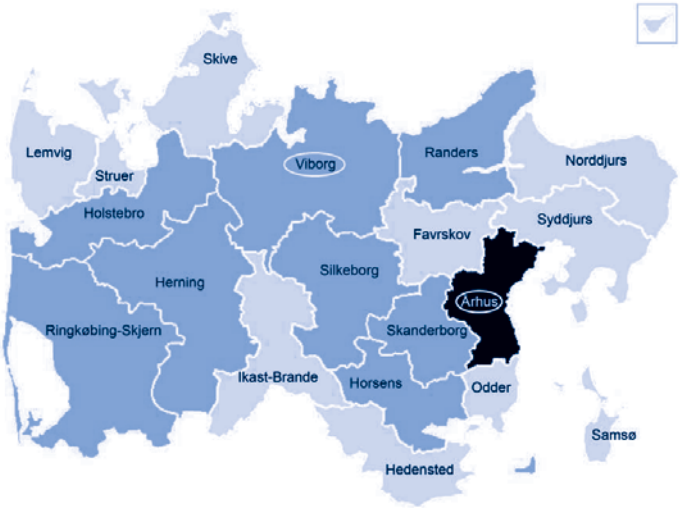
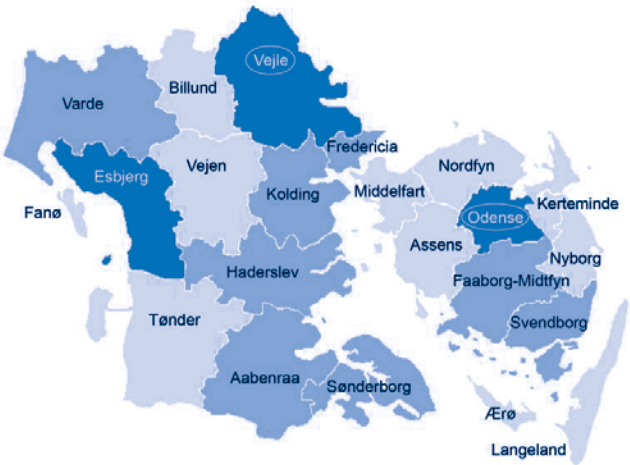


Figure 1.6. **Maps of Danish regions, including Central and Southern Denmark** (*cont.*)

B. Municipalities in Central Denmark



C. Municipalities in Southern Denmark



Population is colour coded as follows:

> 300 000 | > 300 000 x > 100 000 | > 100 000 x > 50 000 | < 50 000

Note: These maps are for illustrative purposes and are without prejudice to the status of or sovereignty over any territory covered by these maps.

Source: Map A based on Wikimedia Commons (2007), "Regions of Denmark", Maps B and C from the Regions of Central and Southern Denmark respectively. Population data is from Statistics Denmark.

Danish population growth has been below OECD averages, with an ageing population despite strong fertility rates by Western European standards. Between 1998 and 2008, OECD regions experienced a 7% population increase on average, higher than the Danish rates both at the national level (3.4%) and in the study regions (around 2% in Southern Denmark and 5% in Central Denmark). The population over 65 is evenly distributed across Danish regions and above the OECD regional average (12.9%): from 14.6% in Central Denmark and 16.5% in Southern Denmark to 16.7% in North Denmark, but that figure varies considerably by municipality.[7] The share of 0-15 year-olds is highest in Central and Southern Denmark and Zealand (around 20%). Central and Southern Denmark are therefore slightly above the OECD regional average of 18%.

While the total regional population remained stable or slightly increased over the period 2006-2010, net internal migration flows display negative trends for both regions (in 2009 and 2010). The intensity of flows is considerably higher in Southern Denmark, where people tend to leave for other Danish regions in a higher proportion than in Central Denmark. Net immigration (from abroad) is positive and increasing over time. Central Denmark is able to attract people from Southern Denmark, whereas Southern Denmark loses population to its neighbour. The net flow of people from and to the Capital Region is negative for both regions (from 2008 to 2010): it doubled for Central Denmark and also shows a significant negative trend for Southern Denmark (from +110 people in 2006 to -2 291 in 2010) (see Table 1.1).

Within both the Central and Southern Denmark regions, intra-regional migration from the more rural western coast towards the more populated eastern coasts of the Jutland Peninsula contributes to these population dynamics. Projections in the change in labour force in Central Denmark show that by 2020 there will be a major increase in certain municipalities in the east, and a significant decline in the west. And despite the relatively small distances between urban cores and more peripheral areas in Denmark, it has been argued that the high female labour force participation rate in Denmark has the side effect of making labour markets more sticky (Halkier, 2006).

By 2020, Denmark will face a severe increase in the average age of the population and that population will be concentrated in metropolitan areas: notably in Aarhus area in Central Denmark and in Odense, Kolding and Vejle in Southern Denmark. Several less-urbanised municipalities will face a decrease in population especially in Central Denmark. On average, the population aged under 50 will decrease and population aged ranging from 70-79 will increase considerably. The only young group that will increase are those aged 20-29, probably due to the displacement of students to the

two regions, thanks to the presence of universities. Despite high labour force participation rates, projections through 2040 indicate significant future labour shortages with an ageing population (OECD/LEED, 2011).

Table 1.1. **Population net flows in Central and Southern Denmark**

	2006	2007	2008	2009	2010
Central Denmark					
Regional population	1 219 725	1 227 428	1 237 041	1 247 732	1 253 998
Net immigration (number)	3 011	6 019	6 364	4 846	5 088
Net internal migration within Denmark (number)	623	758	700	-136	-282
Net migration to/from Capital Region	-1 110	-981	-1 733	-2 356	-2 085
Net migration to/from Southern Denmark Region	1 056	1 080	1 228	1 316	1 187
Southern Denmark					
Regional population	1 185 851	1 189 817	1 194 659	1 199 667	1 200 277
Net immigration (number)	2 947	4 660	5 822	n.a.	n.a.
Net internal migration within Denmark (number)	64	-363	-1 815	-3 050	-3 287
Net migration to/from Capital Region	110	250	-971	-1 839	-2 291
Net migration to/from Central Denmark Region	-1 056	-1 080	-1 228	-1 316	-1 187

Note: Immigration data not available for Southern Denmark in 2009 and 2010.

Source: Statistics Denmark.

The number of foreign immigrants almost doubled from 1993 to 2009, as did the share of immigrants in the population. That share grew from 2.4% in 1993 to 4.9% in 2009 in Southern Denmark and from 2.6% to 5% in Central Denmark. Immigration flows mainly to a few municipalities. In Southern Denmark, it is to Odense, Sonderborg and Abenraa with around 7% of the population being foreign born. In Central Denmark, the highest shares are found in Horsens (6%) and Aarhus (7%). However, these values are low with respect to Capital Region municipalities, which in some cases have up to 18% of its population foreign born (one-third of which are western immigrants and two-thirds non-western).

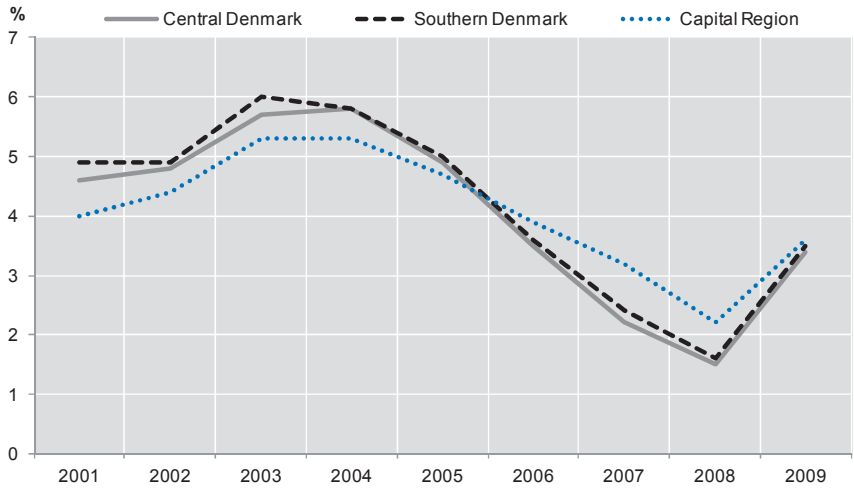
High labour utilisation with comparatively lower unemployment despite the crisis

Participation rates in Denmark are very high in the OECD context, albeit the number of hours per worker is much lower. Among Danish regions, the highest rate in 2009 was in the Capital Region (83.4%), with Central Denmark (81.9%) and Southern Denmark (79.5%) all above the OECD

average (70.4%).[8] Denmark suffers from only minor gender differences in employment opportunities, ranking the lowest OECD country for regional level differences between female and male participation rates. In addition, it is among the OECD economies with the highest correlation between the female employment rate and higher educational attainment. Central and Southern Denmark display the same amount of hours worked per worker in 2009 (1 533), lower than the national value (1 559) and the OECD average (1 741). In short, more Danes work, but they tend to work fewer hours than elsewhere in the OECD area.

Central and Southern Denmark have fared much better than OECD regions generally with respect to unemployment due to the recent crisis. Unemployment increased in the OECD from 5.6% in 2007 to 8.3% in 2009. Moreover, in 2009, regional differences in unemployment rates within OECD member economies were almost two times higher than the differences at the national level. However, Denmark, both at the national and at the regional level, displayed low unemployment increases with respect to the aforementioned OECD averages (see Figure 1.7). The inter-regional variation in the youth unemployment rate in Denmark for 2009 was the lowest among OECD countries, and the inter-regional variation in long-term unemployment was the second lowest after the Netherlands.

Figure 1.7. **Unemployment rates: recent trends**



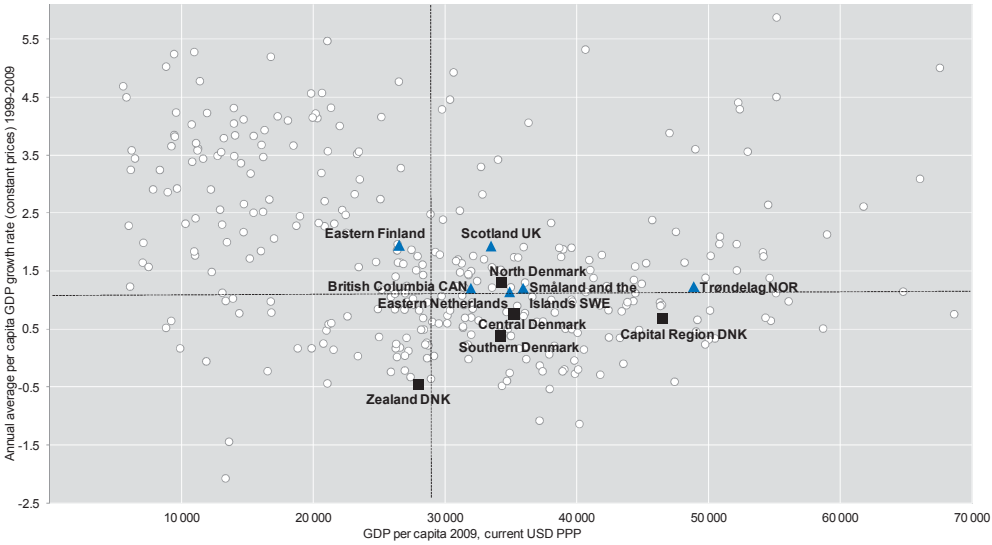
Note: Unemployment rates are defined according to the Danish net unemployment definition.

Source: Statistics Denmark.

Above average wealth levels but lower than average growth

In terms of GDP per capita and GDP per worker, Danish regions are performing at or above OECD averages. However, like many of their peers, Central and Southern Denmark are growing at a rate slower than the median of OECD regions 1999-2009 (see Figure 1.8). In terms of GDP per worker, both regions are at OECD regional average levels. A stable and important gap between the Capital Region and the rest of the country can be observed. These trends are confirmed by data on GVA per worker, that also reveal a decline in the productivity of all Danish regions from 2007-2009 (Figure 1.9). For GVA per hour worked, the variations relative to the national average post-crisis for Central Denmark are more pronounced than for Southern Denmark (Figure 1.10). The productivity gap with respect to the Capital Region had also declined during the crisis.

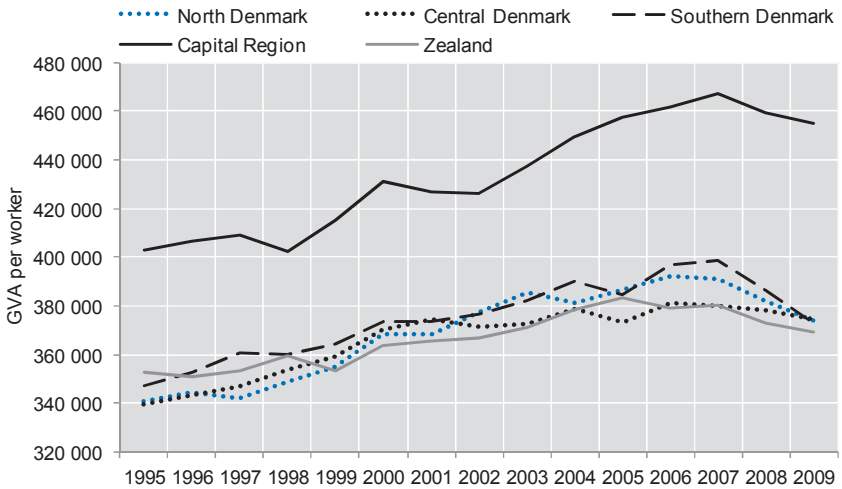
Figure 1.8. **GDP per capita levels and growth rates**



Notes: The gray lines correspond to OECD median regional values. Highlighted regions are from Denmark or a peer group based on structural and innovation-related variables. Regions from Iceland, Israel, New Zealand and Switzerland are excluded due to data unavailability. The following outlier regions in terms of GDP per capita or GDP per capita growth are excluded: Brussels Capital Region (Belgium); Luxembourg; Tabasco and Campeche (Mexico), Oslo and Akershus (Norway); District of Columbia (United States). Data for regions in Greece and Turkey are from the period 1998-2008. Data for regions in Norway are for the period 1997-2007.

Source: *OECD Regional Database*.

Figure 1.9. **Gross value added per worker in Danish regions**

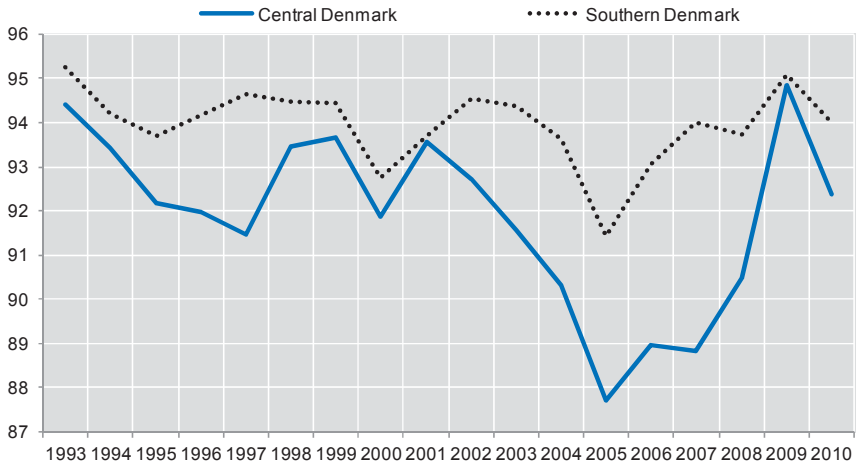


Note: GVA expressed in millions DKK, 2000 prices. Scale modified for readability.

Source: Statistics Denmark.

Figure 1.10. **Gross value added per hour worked**

National values = 100



Source: Statistics Denmark.

Sectoral mix generally similar across both regions

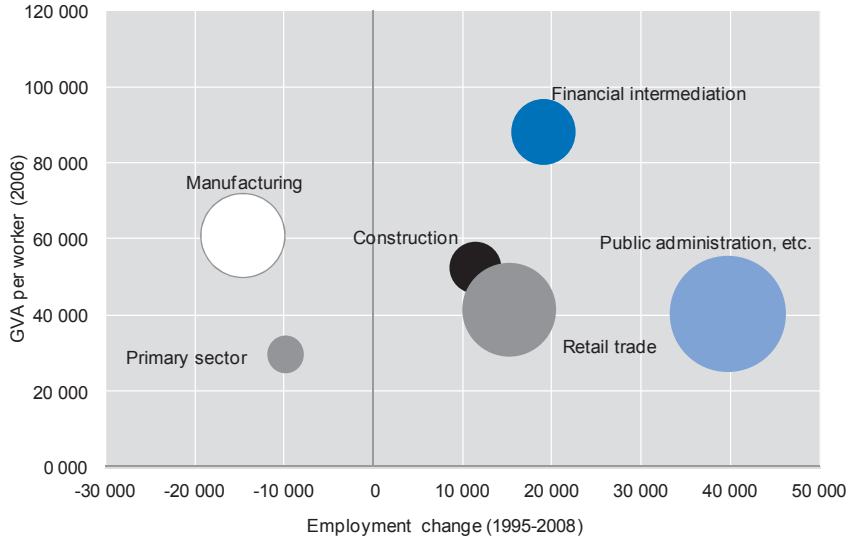
The sectoral employment composition is very similar in the two regions. The highest share of employment is in the public administration (Southern 33% and Central 34%), followed by retail trade (26% and 24%), manufacturing (18% for both regions), financial intermediation (11% and 13%), construction (8% and 7%), and the primary sector (4% for both regions) (Figures 1.11 and 1.12). The primary sector was the only sector experiencing a decrease in productivity pre-crisis.

As has occurred in other developed economies, Central and Southern Denmark display a decrease over time of employment in both the primary and the manufacturing sectors. From 1993 to 2009, Southern Denmark and Central Denmark experienced, respectively, a 21% and 20% decrease in employment in industry, just below the national average loss of 22%. While in Central Denmark these losses are concentrated evenly between the eastern and western parts of the Jutland Peninsula (-22% and -18%), in Southern Denmark employment losses are concentrated in Funen Island (-32%), where the employment losses are double that of the region overall (-16%).

Even when considering detailed employment decompositions, Central and Southern Denmark display very similar percentages of workers in the same sectors (Figures 1.13 and 1.14).[9] In both regions, the leading sectors in terms of employment are wholesale and retail trade (around 16.5% for both regions), residential care (12%), education (7.5%) and construction (6.5%). Similar considerations apply to the location quotient[10] of the sectors in question, for which significant differences in the relative employment specialisation in Central and Southern Denmark can be observed only in sectors representing very small shares of the total employment (less than 2.5%).

Several manufacturing sectors were hit by notable job losses between 2006 and 2009. They include pharmaceuticals (-60%); manufacture of electronic components (-43%); telecommunications (-17%); and manufacture of food products, beverages and tobacco (-12%) in Southern Denmark. In Central Denmark, the biggest losses are recorded in: pharmaceuticals (-69%); textiles and leather products (-24%); publishing, television and radio broadcasting (-23%); telecommunications (-18%); and manufacture of furniture and other manufacturing (-18.6%). On average these sectors faced job losses also at the national level even if in a less pronounced way. Looking ahead, projections for Central Denmark indicate that food-related industries, which recorded severe drops in employment from 1996 to 2008, are expected to decline from 2008 to 2020 by one out of four workplaces in the primary-related sector. The same projections related to the furniture/clothing sector forecast a decrease of 28%.[11]

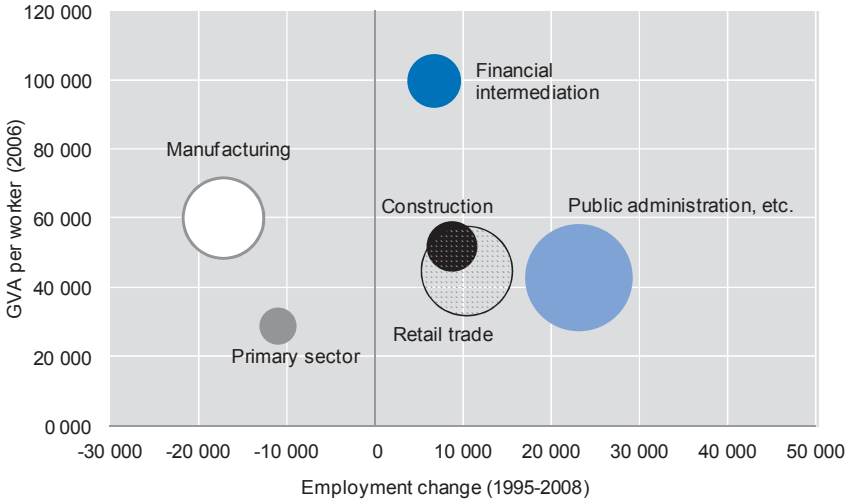
Figure 1.11. **Sectoral productivity and employment: Central Denmark**



Note: The size of the bubble corresponds to 2008 total employment in the sector.

Source: *OECD Regional Database*.

Figure 1.12. **Sectoral productivity and employment: Southern Denmark**

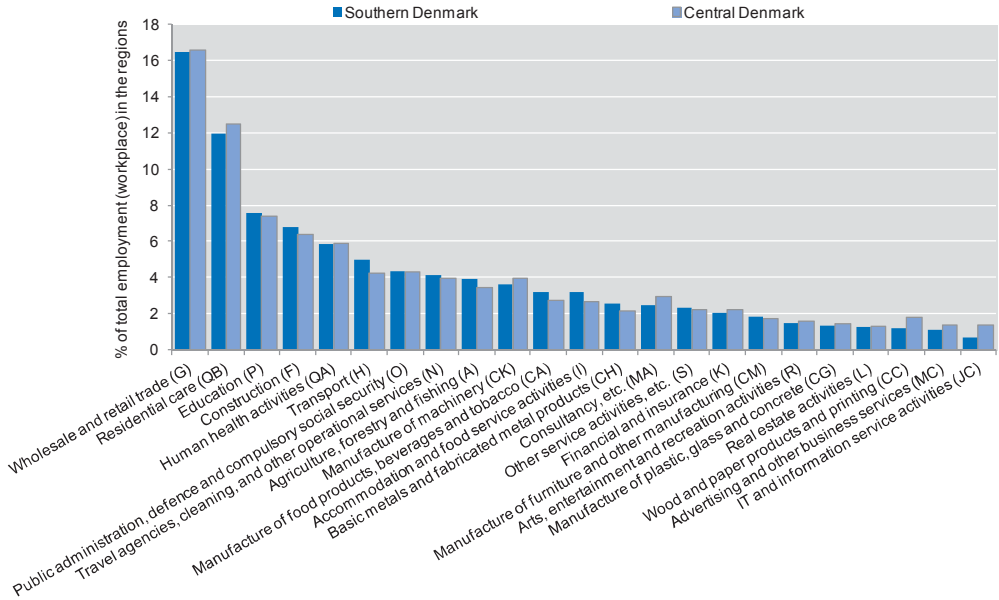


Note: The size of the bubble corresponds to 2008 total employment in the sector.

Source: *OECD Regional Database*.

Figure 1.13. **Similar employment composition in Central and Southern Denmark (2009)**

% of regional employment

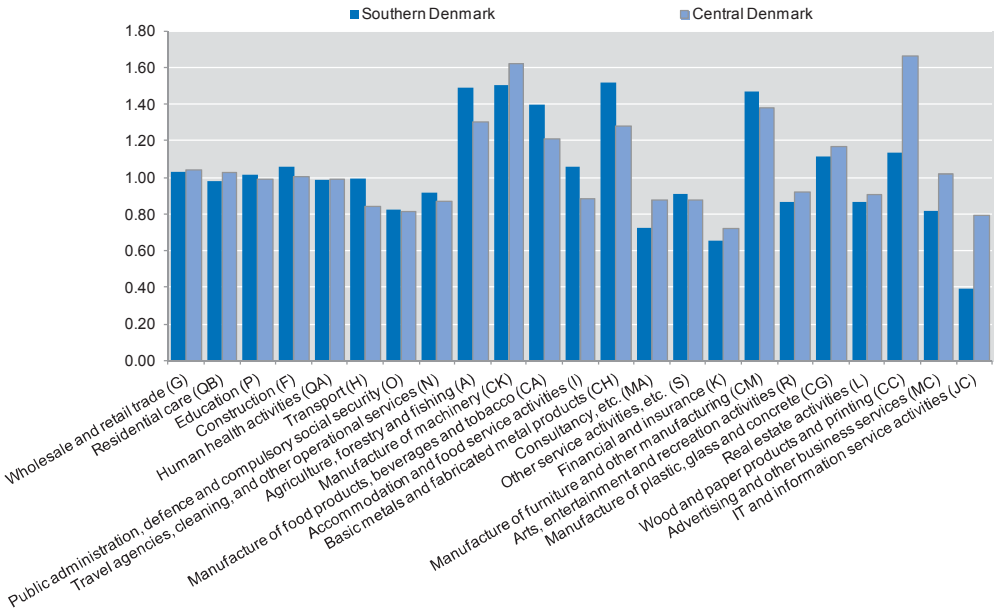


Note: Only sectors representing more than 1% of the total regional employment are displayed, covering around 94% of the total employment, except for IT and information service activities in Southern Denmark: this sector was included in order to allow the comparison between the two regions.

Source: Statistics Denmark.

However, over the same period several sectors have gained jobs. They include: scientific research and development (+8.7% in Southern and +174% in Central Denmark); manufacture of machinery (+12.6% in Southern and +12% in Central Denmark); IT and other information service activities (+16% in Southern and +20% in Central Denmark). Sectors linked to energy showed a considerable increase as well, for: *i)* electricity, gas, steam and air conditioning supply and mining and quarrying; and *ii)* oil refinery (+12% and 25% in Southern Denmark, +37% and +233% – albeit from a small base – in Central Denmark). In Southern Denmark, electrical equipment production displayed an increase in employment of 37%. These sectors, on average, show an increase in employment similar or even higher with respect to national values. Projections for Central Denmark indicate increases in construction and housing (+18% by 2020); tourism (+15%); and medico/health (+14%).[12]

Figure 1.14. **Employment location quotients in Central and Southern Denmark (2009)**



Note: Only sectors representing more than 1% of the total regional employment are displayed, covering around 94% of the total employment, except for IT and information service activities in Southern Denmark: this sector was included in order to allow the comparison between the two regions.

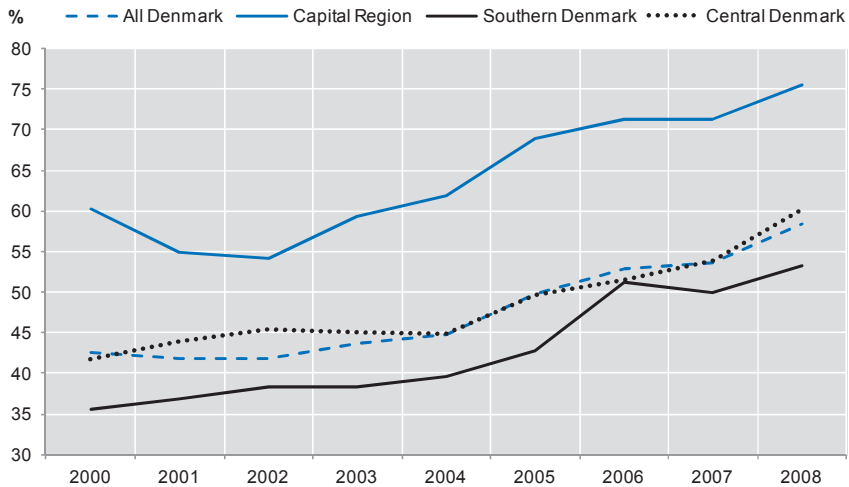
Source: Statistics Denmark.

Open regional economies given small domestic market

Exports as a share of GDP for Southern and Central Denmark display very similar patterns, and maintain a stable gap with respect to the Capital Region in the period 2000-2008 (see Figure 1.15). Central and Southern Denmark export mainly manufacturing goods (around 70% and 60% respectively). The second highest category of exports is trade- and transport-related goods (around 25% and 35% respectively). Both regions display around the same composition of exports in 2000-2008, albeit with modest increases in trade- and transport-related goods (three percentage points over the period) relative to all other goods. In 2008, the share of exporting firms was around 8% in Denmark. At the regional level, Southern Denmark shows similar values (7.9%), whereas Central Denmark displays shares slightly below the average (6.9%). The study regions may also produce goods and services purchased in the Capital Region that are then traded internationally, figures that are not reflected in the statistics.

Figure 1.15. **Exports in Danish regions: % of GDP**

2000-2008



Note: Exports include both goods and services.

Source: Statistics Denmark.

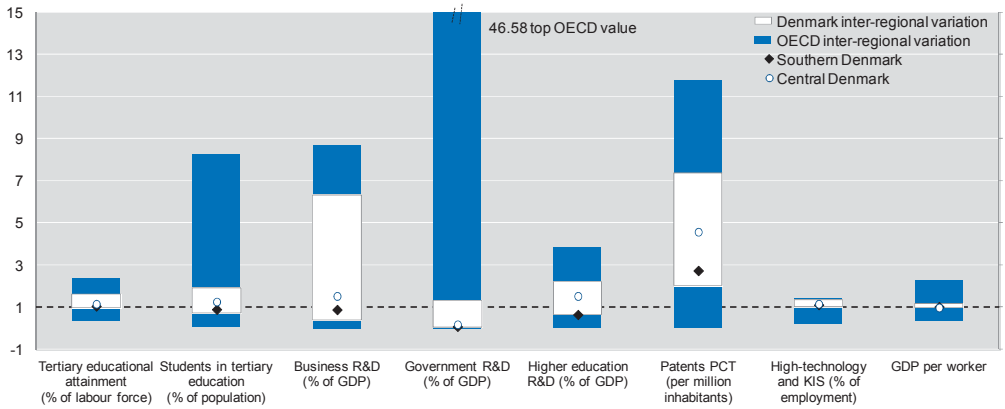
Innovation profiles of Central and Southern Denmark

Overview of study regions and peers

An innovation "snapshot" shows that Central and Southern Denmark are generally performing above OECD regional averages (Figure 1.16). Within Denmark, these regions are never at the top of the range, though there is very low inter-regional variation in GDP per worker and high technology employment across the country. Variables such as business R&D intensity and patents show a much higher national variation with similar performances of Central and Southern Denmark for R&D and a notably stronger performance of Central Denmark relative to Southern Denmark with respect to patents. The same snapshot for nearby Nordic countries like Finland and Sweden shows very similar ranges, except for patenting intensities, which are similar in Finland but higher in Sweden. Norway, on the other hand, displays a much more homogeneous range across the same variables at the national level.

Figure 1.16. **Innovation snapshot: Central and Southern Denmark**

2007 or latest available year



Notes: Values are normalised to 1 for the OECD regional median for available regions. Information on all OECD regions is not available for each indicator.

Source: Calculations based on the *OECD Regional Database*.

To position Central and Southern Denmark at the international level, a comparison with regions of similar characteristics in different countries is necessary. A recent OECD analysis grouped together regions with similar characteristics according to their productive structure and innovation-related indicators (see Box 1.1). The results of the analysis were eight groups of peer regions, across OECD member countries grouped into three macro categories. Central and Southern Denmark are part of the **industrial production zones** macro category and the peer group **service and natural resource regions in knowledge-intensive countries**. Other regions in this category include North Denmark and Zealand (Denmark), four Canadian regions, Eastern Finland, two Korean regions, all Norwegian regions, Scotland (United Kingdom), three regions in the Netherlands and four Swedish regions (see Figure 1.17). These regions are not the top hubs in their respective countries but generally belong to knowledge-intensive countries that are of small geographic scale and/or are less densely populated. They may derive their levels of wealth from the high share of employment in knowledge-intensive sectors (or in some cases natural resources), in addition to traditional manufacturing sectors.

Box 1.1. **A categorisation of OECD regions using innovation-related variables**

To advance the OECD quantitative research on regions and innovation, a categorisation of regions was developed using socio-demographic, economic, and innovation-related variables, in order to highlight the diversity of regional profiles across OECD regions. A cluster analysis methodology was chosen to develop this analysis. Cluster analysis is a statistical method that uses a group of variables to obtain groups (or clusters) of regions that are most similar based on their likeness on variables. Such an analysis thus facilitates the development of peer groups and benchmarks among regions with the greatest degree of commonality. It overcomes a drawback of scoreboards, which imply a universal standard for all regions.

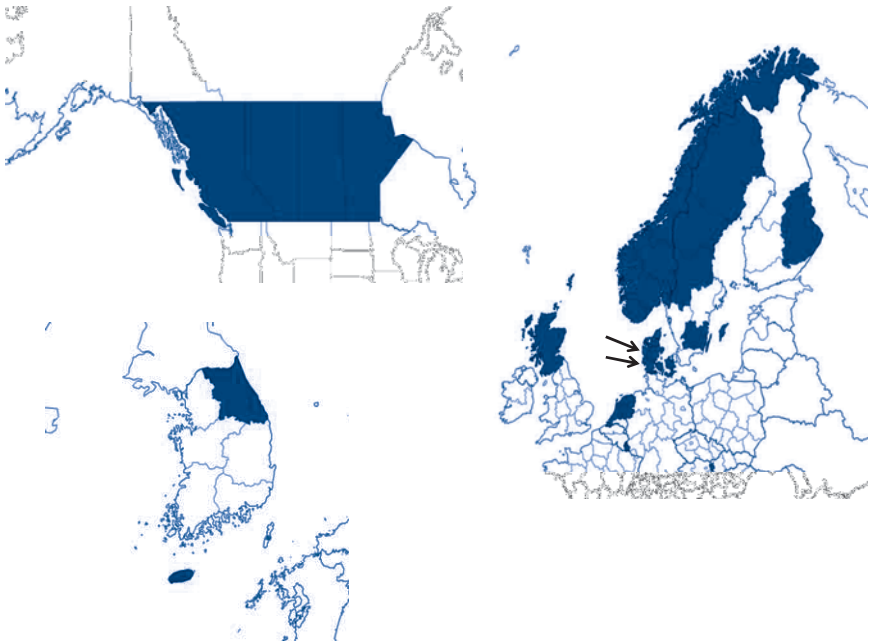
The analysis is based on 12 variables for 23 OECD countries covering 240 regions, which together account for 78% of total OECD GDP and 71% of OECD population. The list of variables used is the following: GDP per capita, population density, unemployment rate, percentage of the labour force with tertiary education, R&D expenditure as a share of GDP, business R&D expenditure as a share of total R&D expenditure, PCT patent applications per million inhabitants, share of employment in the primary sector, share of employment in the public sector, share of employment in manufacturing, high and medium-high technology manufacturing as a percent of total manufacturing, and knowledge-intensive services as a percentage of total services. Using the aforementioned variables and methodology, a set of eight regional groupings was obtained. These eight clusters were grouped together into the following three macro-categories based on relevance for policy recommendations:

- The **knowledge hubs** account for around 30% of the total sample GDP and 25% of population and contain the following two groups: knowledge-intensive city/capital districts and knowledge and technology hubs.
- The **industrial production zones** cover 60% of sample GDP and population and contains four groups: US states with average S&T performance, service and natural resource regions in knowledge-intensive countries, and medium-tech manufacturing and service providers and traditional manufacturing regions.
- The **non-S&T-driven regions** account for 14% of sample population, but only 8% of sample GDP and contains two groups: the structural inertia or de-industrialising regions and the primary sector-intensive regions.

Source: Ajmone Marsan, G. and K. Maguire (2011), "Categorisation of OECD regions using innovation-related variables", *OECD Regional Development Working Papers*, 2011/3, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5kg8bf42qv7k-en*; and OECD (2011), *Regions and Innovation Policy*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264097803-en*.

Figure 1.17. **OECD peer regions for innovation-related characteristics**

Industrial production zones category: service and natural resource regions in knowledge-intensive countries group



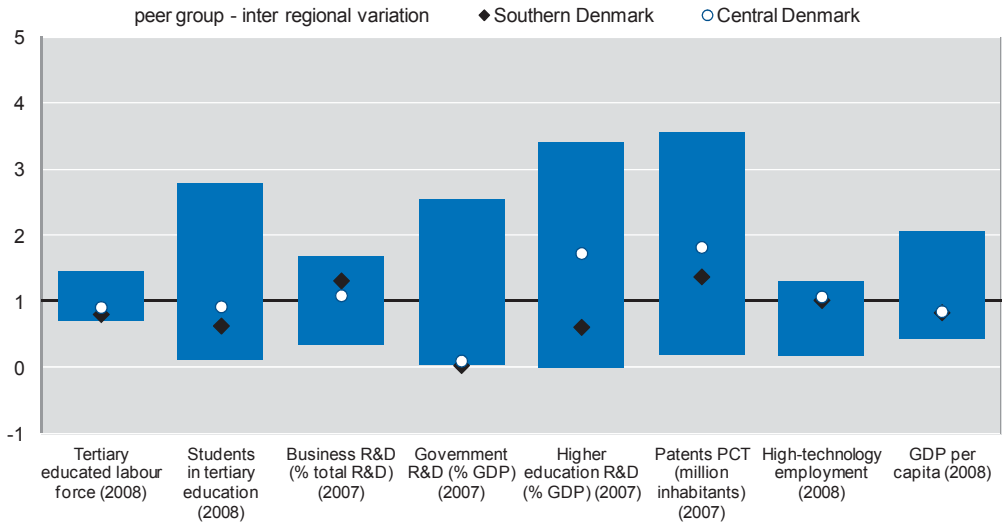
Note: This map is for illustrative purposes and is without prejudice to the status of or sovereignty over any territory covered by this map. Images may be cropped for display.

Source: Ajmone Marsan, G. and K. Maguire (2011), "Categorisation of OECD regions using innovation-related variables", *OECD Regional Development Working Papers,* 2011/3, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5kg8bf42qv7k-en.*

Central and Southern Denmark show values generally at or above average values in their peer group (Figure 1.18). However, Southern Denmark has the lowest R&D intensity of its peers, while that of Central Denmark is above the average. Both regions are far from the average of the knowledge and technology hubs group and from the top performer in their group, Trøndelag (Norway). Southern Denmark has a higher share of its R&D performed by firms relative to Central Denmark but both are above the peer average. With respect to patents and HTM employment, both Central and Southern Denmark perform above the peer group average, but significantly below the strong knowledge and technology hub regions. Regarding the employment in KIS, and the share of labour force with tertiary education, Central and Southern Denmark have shares closer to the average.

Figure 1.18. **Peer group variation**

Peer group average = 1



Note: Peer regions are obtained per a statistical technique grouping together regions with similar variable values. The peer regions of Central and Southern Denmark are 4 Canadian regions, 2 other Danish regions, 1 Finnish region, 2 Korean regions, Luxembourg, all Norwegian regions, 3 regions in the Netherland, 4 Swedish regions, 1 Slovakian region and 1 UK region. When computing the group average values, the latest year of data available per region were used.

Source: *OECD Regional Database* based on the categorisation in Ajmone Marsan, G. and K. Maguire (2011), "Categorisation of OECD regions using innovation-related variables", *OECD Regional Development Working Papers,* 2011/3, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5kg8bf42qv7k-en.*

Human capital for innovation

High skill levels for OECD but lagging with respect to the Capital Region

Central and Southern Denmark have a generally highly skilled labour force by OECD standards, but notably less so than the Danish Capital Region. Southern Denmark has the lowest share of 24-35 year-olds having completed secondary education in Denmark (79%), with Central Denmark (83%) as well as the Capital Region (84%) being several percentage points higher. With respect to higher education, Denmark classifies its system into short (two years), medium (four years, Bachelor's degree level), and long (advanced degree level) categories.[13] Central Denmark has a greater share of the young higher educated population

(24-35 years old). For advanced degrees, the share for Central Denmark is 20.4% of the total 24-35 population with short higher education, and in Southern Denmark 18% (versus 23% in the Capital Region). For long higher education, that share is 8.6% in Central Denmark and 5.3% in Southern Denmark against 17% in the Capital Region.

The existing labour force is also re-skilling at rates much higher than other European regions. Denmark is one of the European countries with the highest share of the active population enrolled in lifelong learning (education and training). That rate is 31.6% for Denmark overall, 31% in Central Denmark, and a somewhat lower 29% in Southern Denmark for 2009. All these rates are significantly above the EU-27 average of 9.3%.[14]

Continued efforts are needed to raise the skill level of the labour force

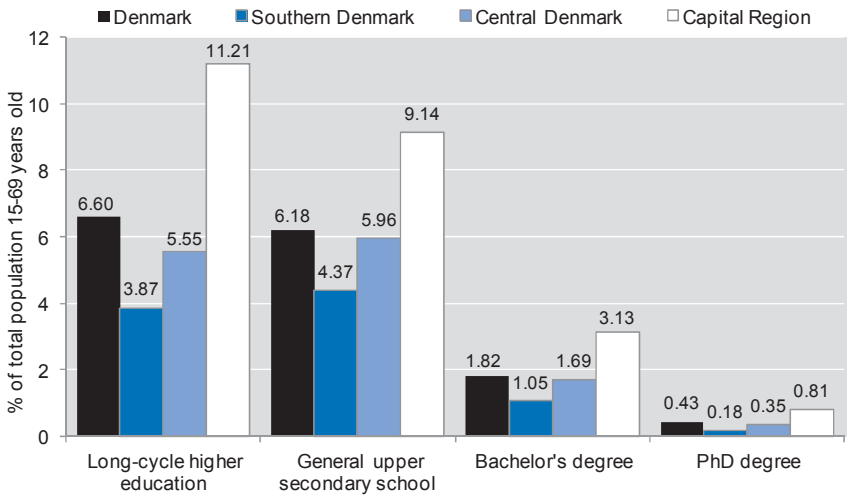
The percentage of population having completed secondary education (level 12/13) was relatively similar across the country. Values in 2009 for Southern Denmark (87%) and Central Denmark (88%) are around the national average (87%). These percentages remained stable or even decreased from 2000 to 2008. The gap between the current values and the goal of 95% of the population with secondary education remained pronounced for all Danish regions. In 2010, the percentage of youth (25-34 years old) with at least one secondary education diploma was lower in Southern Denmark (80%) than in Central Denmark (84%), which displays values similar to the Capital Region (85%), and above the national average of 82%. Secondary school drop-out is high in all Danish regions, and drop-out rates for vocational secondary education are even higher. In 2009, only 54% of students completed secondary vocational education programmes in Denmark, 57% and 55% in Central and Southern Denmark respectively.[15] Between 2000 and 2009, the secondary vocational education completion rates did not show a positive trend: they decreased by about four percentage points in both regions. Despite strong performance on PISA generally, immigrants lag significantly behind native-borns in terms of performance on the PISA tests, especially in science where the gap is among the highest in the OECD. In addition, there are very few performance advantages for second-generation immigrants, with respect first-generation immigrants (OECD, 2010c).

The educational attainment of the labour force in Central and Southern Denmark is lower than national averages, albeit those national averages are driven up by the Capital Region (see Figure 1.19). And while there are universities in all Danish regions, the share of the regional population enrolled in tertiary education is notably higher in the

Capital Region (6.4%). Central Denmark (4.2%) is close to the OECD average of 4%, whereas Southern Denmark has less than 3%. Another challenge in Denmark more generally is the long time to complete education, which hence reduces the supply of high-skilled labour force. Furthermore, the student preferences for fields that do not necessarily match the Danish business demand, as well as the low return to tertiary education in the country, exacerbate matters. Denmark is the OECD country with the lowest financial return to tertiary education (OECD, 2009a; 2010d).

Figure 1.19. **Educational attainment of the labour force**

2011 estimated data



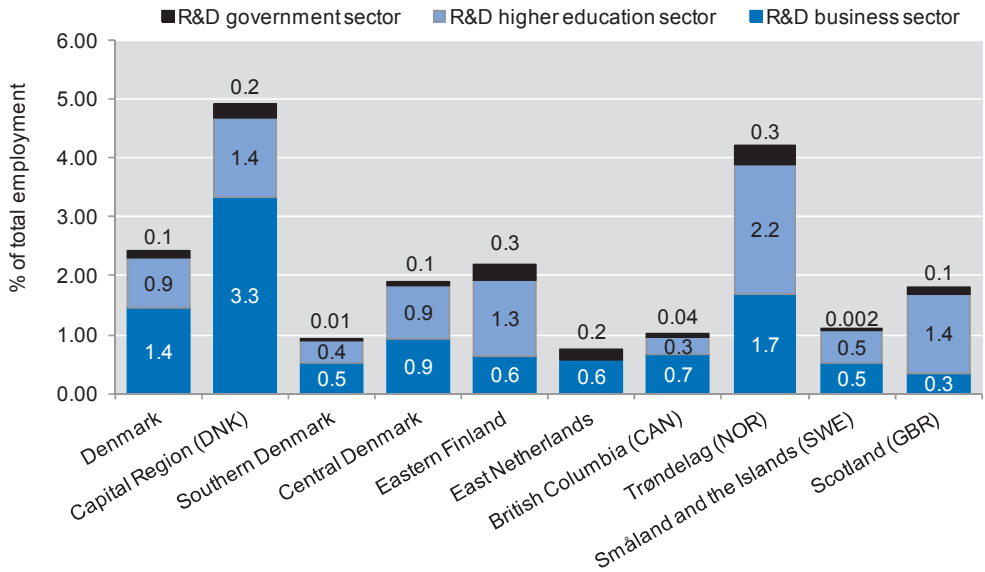
Source: Statistics Denmark.

R&D personnel

The share of employment in R&D in Central and Southern Denmark is respectively slightly higher or slightly lower than the EU-27 value (1.57%, value 2007) and well below that of the Capital Region. The Capital Region had a rate of 4.9% of employment in 2007, versus less than half that figure in Central Denmark (1.9%) and around one fifth in Southern Denmark (1.0%). Southern Denmark is therefore among the lowest of its peer group, with Central Denmark showing performance closer to the peer average (see Figure 1.20). The share of R&D personnel located in firms is higher in the Capital Region (68%) than in Southern Denmark (57%) or Central Denmark (49%). The split between higher-skilled researchers versus technicians and other R&D personnel confirms this trend. The share that are

researchers (as opposed to technicians) is 54% in Southern Denmark, 43% in Central Denmark, and 62% in the Capital Region. In 2009, 79% of researchers with a PhD were located in firms in the Capital Region, versus 9% in Central Denmark and 8% in Southern Denmark. The figures in the study regions are even lower when considering researchers coming from abroad. The Capital Region contains 88% of total foreign researchers in firms, while Central and Southern Denmark 6% and 5% respectively.

Figure 1.20. **R&D personnel (2007)**



Note: Data regarding higher education R&D is unavailable for East Netherlands.

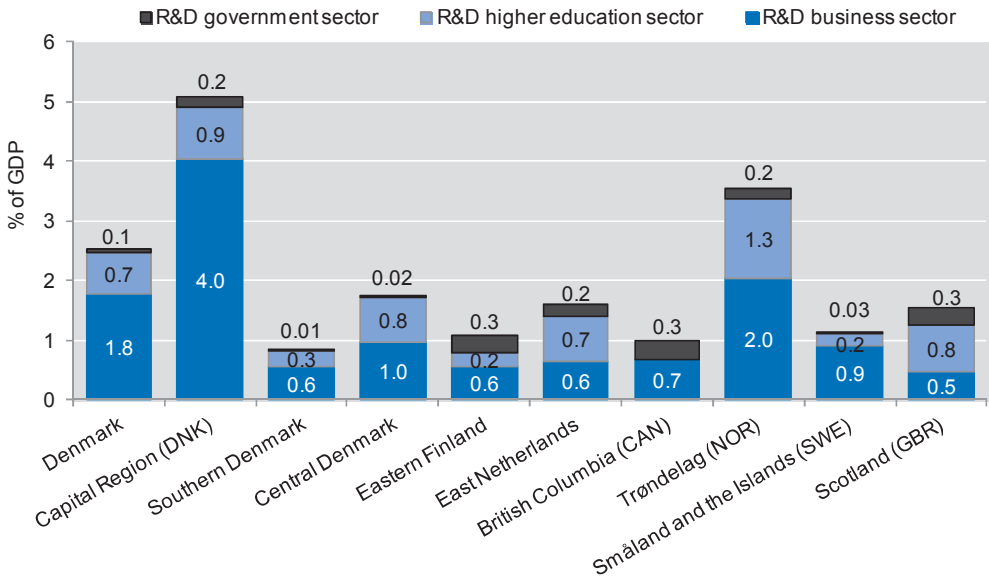
Source: *OECD Regional Database*.

Investment in R&D and innovation

R&D expenditure intensity varies considerably across Danish regions (Figure 1.21). Denmark displays the third highest variation of regional R&D intensity, after the United States and Finland. When considering the variation of regional business R&D expenditure as a share of value added in industry, Denmark ranks second, after the United States. R&D intensity is highest in the Capital Region (5% of regional GDP), which is the only region above the national average (around 2.7%) (OECD, 2010a). Central Denmark performs the second highest (1.74% of regional GDP) whereas Southern Denmark displays the lowest of all Danish regions (0.8%).

The type of actor performing R&D is also relevant for expectations about economic returns to R&D investment. In the Capital Region, 79% of total R&D expenditure is performed by the business sector, with a much lower share by business in Central (55%) and Southern (66%) Denmark. In 2010, Central and Southern Denmark accounted for 15.1% and 9.5% of the total national private expenditures on R&D. In 2009, business R&D expenditures in Denmark were mainly concentrated in development (76% of total private R&D), followed by applied research (20%) and basic research (4%). The share of business expenditures for development in the two regions was even higher: 84% and 89% of total R&D expenditures in Central and Southern Denmark was for development, followed by expenditures for applied (14% and 10% respectively) and finally basic research (2% in each region).

Figure 1.21. **R&D expenditure by type of actor (2007)**



Note: Data regarding private non-profit R&D is not considered due to data unavailability for most regions.

Source: *OECD Regional Database*.

Given the Danish innovation system, public research funds are mainly allocated to higher education institutions. In 2009, the Capital Region accounted for more than half (56%) of the national publicly funded research, whereas Central and Southern Denmark accounted for 20% and 10%

respectively. Similar regional shares can be observed by sector of public R&D research, with Central Denmark showing a disproportionately higher share of agricultural sciences funding and, for Southern Denmark, health sciences. During the same year, the expenditures for purchasing R&D services were mostly performed by firms located in the Capital Region (80%), followed by those in Central (11%) and Southern Denmark (6%).

Patterns of start-up business financing vary significantly across Danish regions. In Central Denmark, the most common source of capital is venture capital (85%), followed by the programme *Vækstkaution*[16] (11%) or a start-up loan (4%). In Southern Denmark, *Vækstkaution* constitutes a much higher share (38%), venture capital is still the primary source (60%), and start-up loans are only 2% of the total.[17] Between 2008 and 2009, in Central and Southern Denmark, the percent of venture capital per private company, even if performing slightly better than other non-capital regions, is significantly lower than in the Capital Region: around DKK 10 000 in the Copenhagen area, against around DKK 2 000 in both Central and Southern Denmark.

Innovation results

Intermediate outputs that could lead to innovations

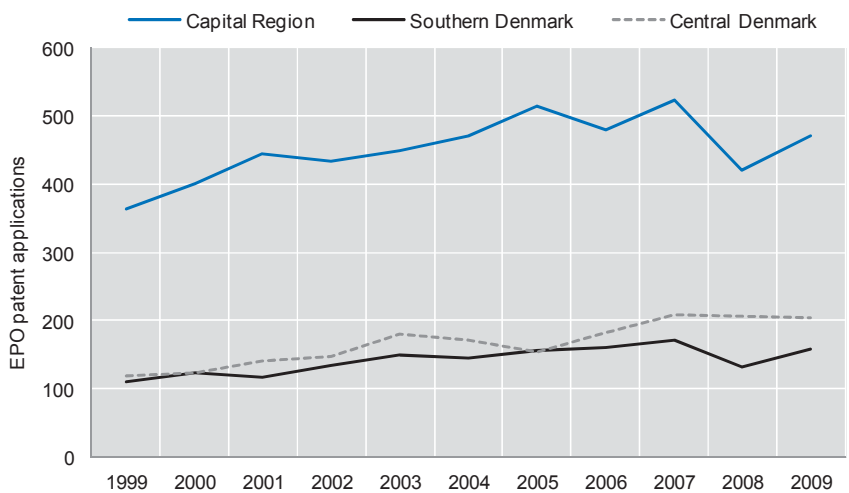
Scientific publications are an indicator of the quality of knowledge generation. Between 2005 and 2009, around 26 000 academic articles[18] were published in Denmark, corresponding to 0.52% of world academic production. Aarhus University and the University of Southern Denmark published 4 403 and 1 713 academic articles respectively between 2005 and 2009, representing 23% and 9% of total Danish university articles. Growth rates in publications in recent years (from 2000-2004 to 2005-2009) show greater progress for the University of Southern Denmark (+23%), than for Aarhus University (+8%). With respect to the sectoral specialisation in academic publications, Aarhus University is highly specialised in agriculture, forestry and fisheries (16% of its publications), physics and mathematics (15%), and chemistry and biology (10% in each). The University of Southern Denmark sees its strongest specialisation in the following sectors: 35% of its publication production in health sciences, 25% in biomedicine and 12% in chemistry. All Danish universities have relative citations rates[19] clearly above the world average. In particular, Aarhus University (together with the Technical University of Denmark – rate equal to 1.40) has the highest rate in the country (1.38), meaning that on average Aarhus University publications receive 38% of citations above the world average. The University of Southern Denmark has a citation rate equal

to 1.22, performing similarly to the University of Copenhagen (1.23) and better than Roskilde University (1.12) and Aalborg University (1.03) (NordForsk, 2011).

Patent applications are unevenly distributed across Danish regions. The Capital Region displays the highest number of national patent application per million inhabitants, but the gap with Central and Southern Denmark has been significantly reduced. Southern Denmark displays consistent trends over time, with a minor decrease starting from 2007. EPO patent applications trends display similar patterns across regions, but with different intensities (Figure 1.22). In particular, the gap between the Capital Region and Central Denmark remains larger than with national patents, given the less international dimension of Central Denmark patenting activity.

Figure 1.22. **European Patent Office patent applications per capita**

Applications per million inhabitants



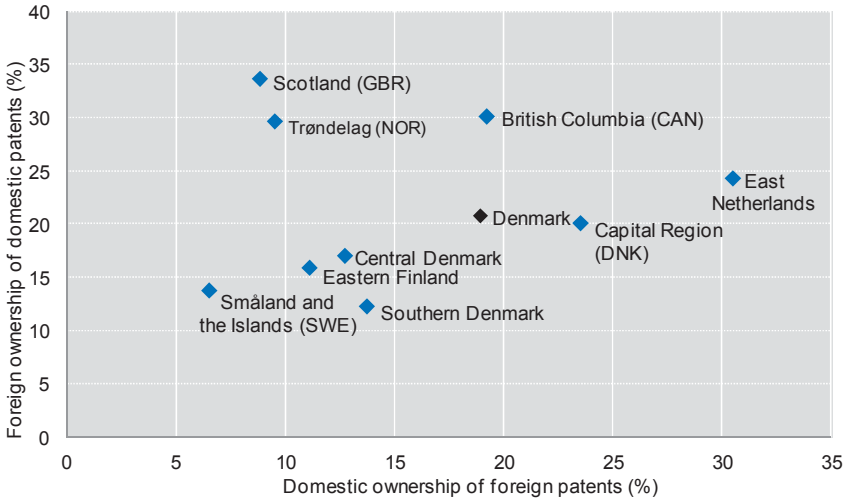
Source: Danish Patent and Trademark Office.

Furthermore, the localisation of inventive activity is not always the same as the location of patent owners, where economic benefits are more likely to accrue. Central (13%) and Southern Denmark (14%) display similar shares of domestic ownership of foreign patents, however, lower than those of Denmark overall (19%). With respect to the foreign ownership of domestic patents, the Capital Region (20%) displays similar values to Denmark averages (21%), while Central (17%) and Southern (12%) Denmark show lower shares (Figure 1.23).

With respect to PCT patent applications, Central Denmark applied for 693 PCT patents in 2005-2007, representing 0.16% of PCT patent applications worldwide. Southern Denmark performed similarly with 508 PCT patent applications, corresponding to 0.12% of the total application number globally. The Capital Region displays higher values: 1 878 PCT applications in the same period, representing 0.43% of total PCT applications.

Figure 1.23. **Domestic/foreign patent ownership**

2007 PCT patent applications



Source: *OECD Regional Database*.

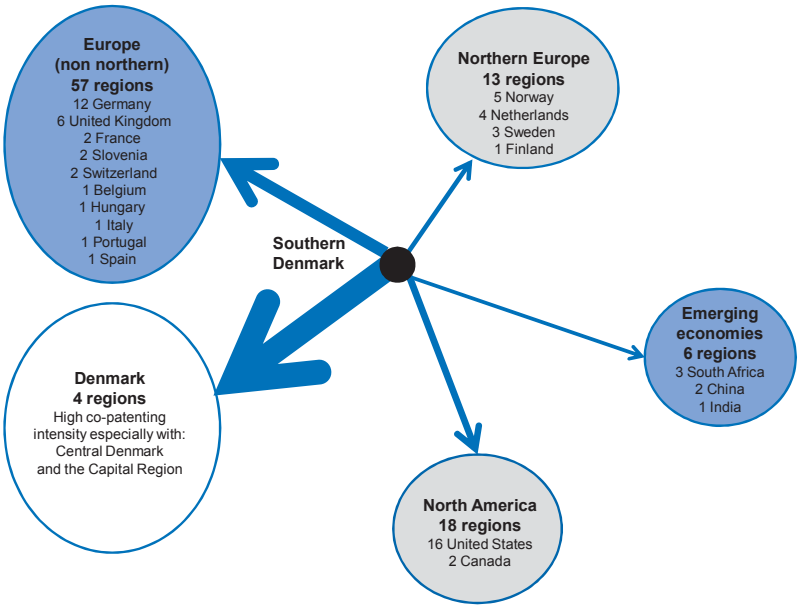
Similar trends can be observed for EU Trademark applications: both Central and Southern Denmark had an increase in trademark applications from 2004 to 2009. Central Denmark performs slightly better than Southern Denmark (191 applications against 178). However, both regions applied for significantly fewer trademarks than the Capital Region (more than 300 applications) in 2009.

The regions have different sectoral specialisations with respect to patenting. The Capital Region is among the top 20 global patenting hubs with respect to biotechnologies, but is not strong in renewable energies. Central and Southern Denmark rank respectively third (3.7% of global applications) and 14th (1.1%), in terms of renewable energies PCT patent applications (Ajmone Marsan and Primi, 2012).

Co-patenting linkages

Around one-third of the patent applications of Central and Southern Denmark are done with at least one inventor located in another region. Between 2005 and 2007, the scale of inter-regional collaboration increased significantly, as it was almost non-existent until the late 1980s. Both regions co-patent over 60% within Denmark. They are the most open Danish regions, after the Capital Region, having co-patenting connections with inventors located in 98 (Southern Denmark) and 122 (Central Denmark) different regions (Figures 1.24 and 1.25). Nevertheless, regions like Scotland and East Netherlands reach more regions through co-patenting activity: namely 136 for Scotland and 137 for East Netherlands.

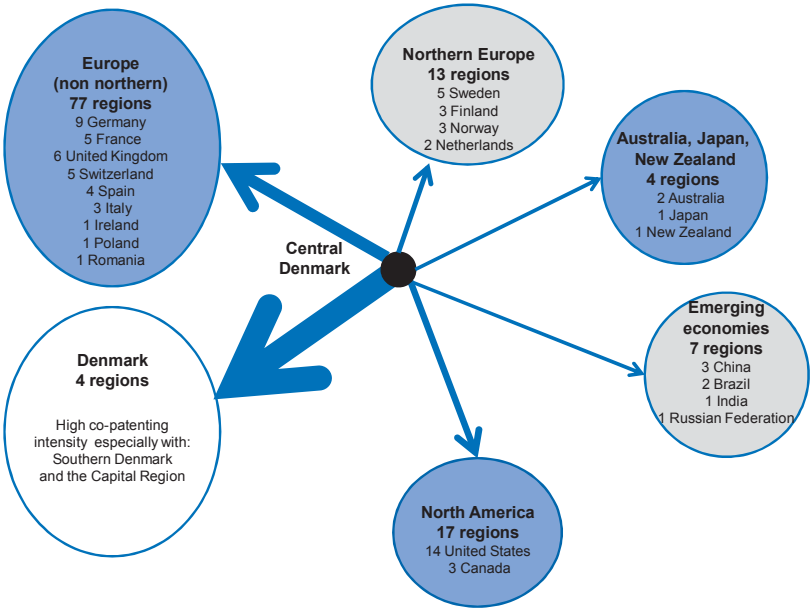
Figure 1.24. **Geography of Patent Co-operation Treaty co-patent collaborations: Southern Denmark (2005-2007)**



Note: Partner regions are calculated as having at least one resident co-inventor per year over the three-year period. The intensity of the arrows is proportional to the number of co-patents between the region and the areas of the world highlighted.

Source: *OECD Regional Patent Database*.

Figure 1.25. **Geography of Patent Co-operation Treaty co-patent collaborations: Central Denmark (2005-2007)**



Note: Partner regions are calculated as having at least one resident co-inventor per year over the three-year period. The intensity of the arrows is proportional to the number of co-patents between the region and the areas of the world highlighted.

Source: *OECD Regional Patent Database*.

Innovation and entrepreneurship

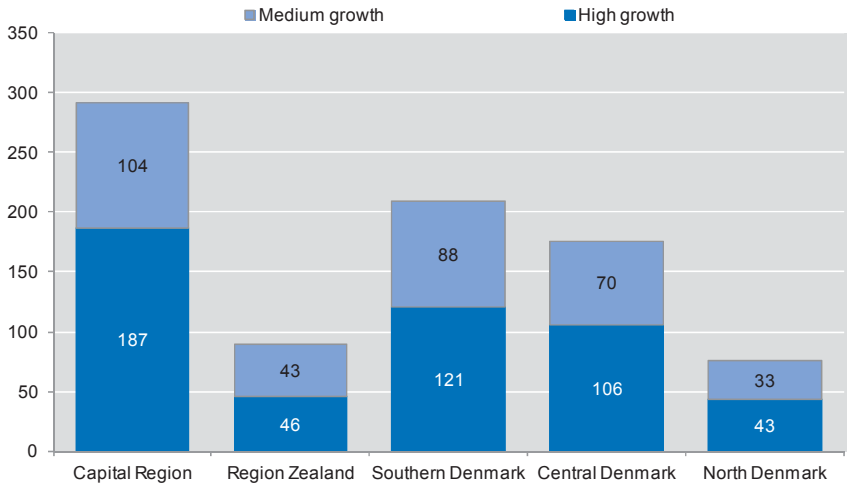
Entrepreneurship and firm demographics

Denmark is globally well-ranked (generally within the top ten) with respect to framework conditions to promote the establishment of new business and entrepreneurial activities. This is true for several international indices such as the World Bank's *Doing Business Report* or the World Economic Forum's *Global Competitiveness Report*.[20] In addition, according to the Global Entrepreneurship Monitor 2012, Denmark shows one of the highest shares of innovative entrepreneurs.

Regional rates for firm starts are comparable between the study regions and other regions in Sweden, for example. The share of establishment of new companies, between 2001 and 2008, shows that the Capital Region (11% in 2008) is performing better than the rest of the country, maintaining a stable gap with all Danish regions of approximately 2 percentage points. Both Central and Southern Denmark display a rate around 9%, below the national average. Firm survival rates in Central and Southern Denmark are around 55%, slightly above the national average of 52%. The share of establishment of new companies in Swedish counties shows values comparable to the Danish case. Stockholm displays the highest value in the country (10.1%), followed by other metropolitan counties such as Uppsala (9%), Södermanland (8.8%) and Skåne (8.4%).[21]

The crisis had an immediate negative impact on firm creation. Between Q2 2008 and Q2 2009, the number of new enterprises declined significantly in every region; however, Central and Southern Denmark were among the regions less severely hit in the country. Those figures are -33% of new enterprises in Southern Denmark and -40% in Central Denmark, in comparison with -24% in North Denmark, -44% in the Capital Region and -53% in Zealand (DEACA, 2009). In 2008, the number of growth businesses in Southern Denmark was second only to the Capital Region and followed by Central Denmark. In both regions, the number of high-growth firms is higher than that of medium-growth firms, as in other Danish regions (see Figure 1.26).

Figure 1.26. **Number of growth firms by region**



Source: Statistics Denmark.

Students in the two regions receive entrepreneurial/innovation training and learning[22] at all stages of their education. In 2010-2011, 6.9% of primary level students participated in entrepreneurial/innovation classes in Central Denmark and 6.2% in Southern Denmark (above the national value of 5%). Among secondary level students, those figures were 23.4% in Central Denmark and 27.6% in Southern (respectively below and above the national value of 25.3%). For higher education students, that share was 9.9% in Central and 7.7% in Southern Denmark (as compared to a national value of 7.9%).[23]

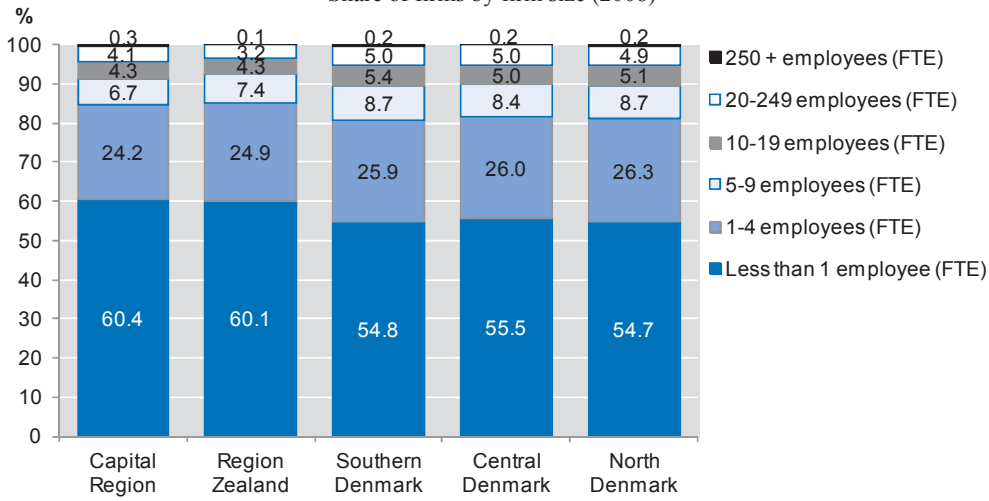
On average in Denmark, the majority of businesses are run by entrepreneurs with vocational training only. This may reflect the medium to low level of technological activity of most firms. All regions display similar patterns except for the Capital Region, where entrepreneurs with vocational training only are a smaller share in comparison with other regions. Around 37% of entrepreneurs had previous industry experience in Denmark in 2007, and this share seems to have increased from 2005 and all regions (except for Zealand with slightly higher shares) show similar trends. Around 35% of entrepreneurs prefer to be independent both in Central and Southern Denmark, an indicator of entrepreneurial attitude. In addition, in 2010, around 20% of the population 16-64 years old had taken classes related to entrepreneurial activity, in both Central and Southern Denmark: this share is higher than the national average and lower than North Denmark only.

Despite the relatively positive entrepreneurial attitude and the relatively high prevalence of entrepreneurial training, the share of higher educated employees in new companies is not particularly high. In 2007, Central Denmark displayed values similar to the national averages (around 19%) but Southern Denmark lagged behind with only 15%, showing the lowest figures together with North Denmark. Within the Danish context, the only region significantly above average was the Capital Region (with a 25% share), that moreover maintained a stable gap of some percentage points with respect to the rest of the country from 2001 to 2007.

Central and Southern Denmark display similar firm demographic profiles in terms of number of firms. Each has a majority of micro enterprises (namely enterprises with less than ten employees, corresponding to around 90% of all firms in all Danish regions) (Figure 1.27).

Figure 1.27. **Firm demographics**

Share of firms by firm size (2008)



Note: Only employees in private urban industries are included: firms in agriculture, fishing, electricity, gas, water and heat supply, harbour, railway and bus services, financial institutes, insurance, non-profit housing societies, public services, etc., are not included.

Source: SAM-K/LINE (based on data from Statistics Denmark).

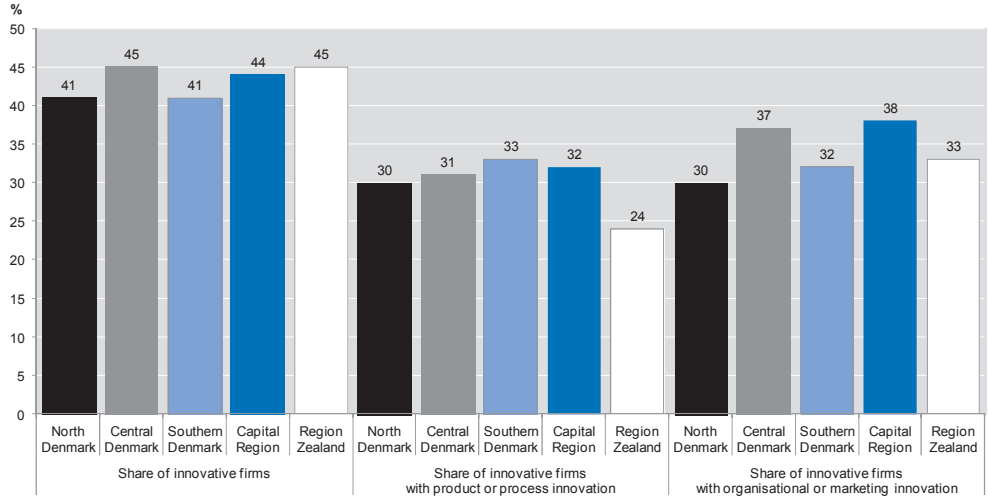
Innovation trends in firms

The share of Danish firms that innovate is at levels similar to those in other Nordic countries. Those rates are better than Norway and slightly lower than Sweden and Finland in product/process innovation. They are higher than other Nordic countries for organisation/marketing innovation. However, Danish rates are significantly lower than those in Germany for both types of innovation (Danish Ministry of Business and Growth, 2011; Central Denmark Region, 2012).

On average, Central and Southern Denmark display similar values with respect to entrepreneurship and innovation-related indicators. Central Denmark performs slightly better than Southern Denmark and both regions generally lag behind the Capital Region (Figure 1.28). According to 2009 data, Central Denmark has a higher share of innovative firms than Southern Denmark: respectively 45% and 41%. However, the share of innovative firms with product or process innovation is higher in Southern Denmark (33% versus 31% in Central Denmark). With respect to the share of innovative firms in organisation and marketing, Central Denmark performs better than Southern Denmark (37% and 32%). In 2009, new products and services represented 27% of the total revenue of

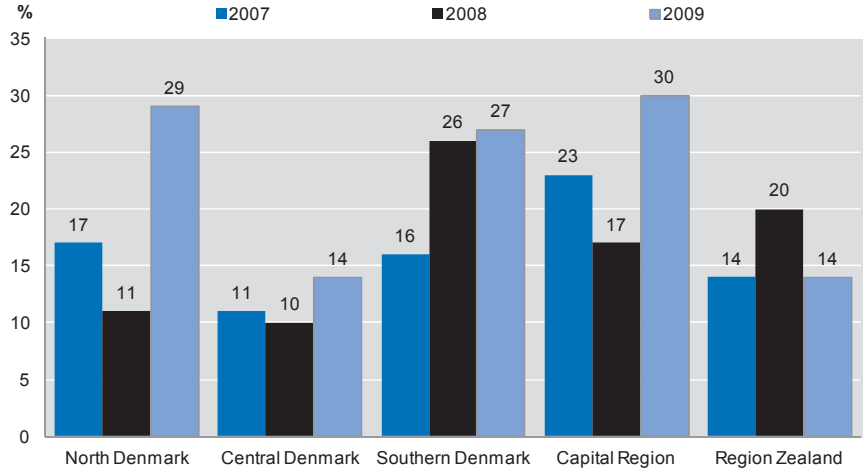
Southern Denmark but only 14% of the total revenue of Central Denmark. Even if this indicator seems to be quite volatile for Southern Denmark and other regions, also in 2007 and 2008 Southern Denmark displayed a higher share than Central Denmark, which showed one of the lowest values of all Danish regions in both years (Figure 1.29).

Figure 1.28. **Share of innovative firms in Danish regions (2009)**



Source: Statistics Denmark.

Figure 1.29. **Share of revenue coming from new products and services**



Source: Statistics Denmark.

The percentage of innovative firms between 2006 and 2008 with user-driven innovation in Central Denmark was the highest of the country (more than 35%), whereas Southern Denmark (around 27%) displayed the second lowest share after North Denmark. If Central Denmark performed better than the national average, Southern Denmark showed a gap of several percentage points. With respect to the percentage of innovative firms collaborating with foreign countries, Central and Southern Denmark had the second lowest and the lowest shares, respectively around 29% and 27%; far from the 35% of the Capital Region and below the national average (31%).

Between 2006 and 2008, the type of actors with whom innovative firms collaborate displayed a similar pattern across all Danish regions. Suppliers of machinery and equipment were the leading type of actor collaborating with Danish innovative firms (respectively 34% and 32% in Central and Southern Denmark), followed by customers and clients (respectively 28% and 22%); other companies within the same group (respectively 14% and 11%); consultants, GTS and research institutions (15% for both regions); universities (13% for both regions); and other public partners (14% and 10% respectively).

In Denmark overall, including the study regions, positive effects on firm productivity are observed subsequent to R&D collaboration with a university or a public research institution (Danish Ministry of Science, Technology and Innovation, 2011). A 15% boost in productivity is found for collaborating firms relative to a matched sample of those that do not collaborate. The effect appears to be most prominent in the first two years subsequent to collaboration, disappearing after five years. The average increase in the value added per employee is 9%. The impact is more pronounced for firms that are large, have more R&D personnel, more highly skilled employees, and are in high-tech manufacturing or knowledge-intensive business services. The productivity boost is also higher among firms that export. Joint research is found to have a greater impact than mere purchase of R&D.[24] Denmark ranks higher than the average score for OECD countries for the prevalence of industry-university collaborations (ranking seventh after countries like the United States, Switzerland, Finland, the United Kingdom, Sweden and Canada).[25]

Conclusion

Central and Southern Denmark are regions located in an innovation-intensive country with strong wealth levels in the OECD context. However, the stagnant productivity and economic growth, together with global competition, are serious challenges for maintaining wealth levels in Central and Southern Denmark in the future. Projections point to a shrinking

labour force overall and an insufficient supply of high-skilled labour in particular, driven by factors such as: an ageing population; high school drop-out rates (more problematic in the current employment context); population migration both within the regions (from peripheral rural areas to western urban ones); and challenges for attracting high-skilled workers from abroad. With the enterprise base mainly SMEs, generally not in high-tech sectors, investment in R&D is not as high as in global leading regions.

On the other hand, the two regions have strong innovation potential. The two regions contain universities and other higher education institutions, albeit Aarhus University in Central Denmark attracts significantly more public R&D funds and produces more publications. The regions are OECD technological hot spots in certain niches, like energy and green technologies, hosting some of the world's leading firms. There are opportunities to exploit other forms of innovation, not only science-based innovation, including design and user-driven innovation which Denmark is known for. Global social challenges will be providing new markets for Danish firms that are export ready. The challenge for both Central and Southern Denmark is to develop strategies that promote growth-oriented framework conditions that help mobilise investment towards transformation and job creation goals.

Notes

1. According to the Danish Growth Council Report (June 2011), the number of employees in the Danish manufacturing industry dropped from 500 000 in 1990 to 300 000 in 2010, to represent 20% of the total workforce in 1990 and only 12% in 2010.

2 Per Statistics Denmark, *www.dst.dk/pukora/epub/Nyt/2011/NR598.pdf*.

3. The disposable income of households does not take into account social transfers to households. As a consequence, a preferable measure of material conditions of households at the regional level is the adjusted disposable income which takes into account government and non-profit institution transfers to households in a given region.

4. The Gini index is a measure of inequalities among regions in a given country. The index assumes values between 0 and 1, where 0 means no disparity.

5 GDP, hours worked and patents are also available for the year 1997. The concentration of resources ten years before shows that GDP and hours worked have stayed stable, respectively: 37.4% for the Capital Region, 20.8% for Southern Denmark, 20.7% for Central Denmark, 11.5% for Zealand, 9.5% for North Denmark with respect to the GDP concentration, and 33.2% for the Capital Region, 21.8% for Southern Denmark, 22.4% for Central Denmark, 12.2% for Zealand, 10.4% for North Denmark with respect to hours worked. Patents show a more dynamic trend over time: in 1997, the share of the total national patent applications corresponded to 56.8% in the Capital Region, 15.5% in Southern Denmark, 14.4% in Central Denmark, 7.9% in Zealand, and 4.1% in North Denmark.

6. Population density displays different trends over time depending on the municipality: Aero, Langeland or Lemvig experienced a decline in their population density over 10% during the period 1993-2010, whereas municipalities like Horsens, Skanderborg or Kolding (all on the E45 road) displayed an increase of over 15%.

7. At the municipal level, the highest shares of the over-65 population in Southern Denmark were located in Fano (26%), Lagenland (28%) and

Aero (22%) municipalities. In Central Denmark, the rate is highest in Samso municipality (over 25%).

8. Data are from the *OECD Regional Database* and therefore may differ from figures reported by the regions using their data. The *OECD Regional Database* obtains data for Denmark through Eurostat. The participation rate is defined as the share of the population aged 15-64 in the labour force (either employed or unemployed but looking for work).

9. Only sectors representing more than 1% of the total regional employment are displayed, covering around 94% of the total employment.

10. The Location Quotient is a measure of relative sectoral employment specialisation in a particular region with respect to national values. It is calculated as follows: Location Quotient = (regional employment in industry A in year Y/total regional employment in year Y)/(national employment in industry A in year Y/total national employment in year Y).

11. Data from Statistics Denmark as provided by Central Denmark.

12. Data from Statistics Denmark as provided by Central Denmark.

13. The Danish education system is organised as follows: after three years of non-compulsory kindergarten from the age of three to the age of five, Danish children start pre-school classes for one year and then primary education at the age of seven. Compulsory education lasts until the age of 15. From ages 16 to 19, Danish students follow secondary education classes, divided into general upper secondary education, vocational upper secondary education and individual education. Starting from the age of 20, higher education cycles begin. They can last until the age of 24 (long-cycle higher education), the age of 22 (medium-cycle higher education) or the age of 21 (short-cycle higher education). Short tertiary education primarily leads to specialised professional degrees. Medium tertiary education mainly targets professions in the public sector. Finally, long tertiary education targets specific job functions in both the public and private sectors. Longer education programmes are typically research based. Students having completed long-cycle higher education can enter PhD programmes. Danish PhDs can be completed in three years, theoretically from the ages of 25 to 27. However, the actual average age for student completion of a PhD (2005 data) is almost 35.

14. Data from Eurostat.

15. Per Denmark Statistics.

16. *Vækstkaution* is a programme by *Vækstfonden* (Growth Fund), a state investment fund to support the creation of new growth companies by

providing venture capital and competence. *Vækstkaution* provides guarantees that help SMEs gain access to bank loans.

17. Data from the Statistics Denmark regional portal.

18. The number of publications mentioned in this section are fractionalised on the basis of each organisation's share of authors' affiliations.

19. Citation rates reported in this section are calculated as index values, namely a citation rate of 1.10 means that articles published by that university receive 10% of citations more than the world average.

20. More information on that performance may be found in DEACA (2010); Ács and Szerb (2011); World Economic Forum (2011); or World Bank (2011).

21. According to the 2007 data provided by the Swedish Agency for Growth Policy Analysis (*Tillväxtanalys*).

22. Data concerning school year 2010/2011 for education in innovation/entrepreneurship: namely participation in competitions, use of teaching materials and special education programmes related to entrepreneurship and innovation.

23. Data provided by the Danish Foundation for Entrepreneurship – Young Enterprise.

24. The study is based on panel data for more than 17 000 firms from 1997-2008 coming from three sources: Danish R&D statistics, data on firm performance, and educational statistics. The control group for causal relationships was based on a treatment group of 547 and a matching group of the same size.

25. Per rankings based on how senior managers surveyed in the country assessed that research collaboration between universities and industry is widespread per the World Economic Forum Survey 2010 as published in Confederation of Danish Industry (2011).

Bibliography

Ács, Z. and L. Szerb (2011), *Global Entrepreneurship and Development Index 2011*, Edward Elgar Publishing.

Ajmone Marsan, G. and K. Maguire (2011), "Categorisation of OECD regions using innovation-related variables", *OECD Regional Development Working Papers*, 2011/3, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5kg8bf42qv7k-en*.

Ajmone Marsan, G. and A. Primi (2012), "Tell me who you patent with and I'll tell you who you are. Evidence from inter-regional patenting networks in three emerging technological fields", *OECD Regional Development Working Papers*, 2012/3, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5k9cwmtrtwg1-en*.

Central Denmark Region (2012), *Promoting Entrepreneurship in the Central Denmark Region. How the Central Denmark Region Meets Global Competition and Promotes Entrepreneurship in Close Co-operation with All Players in the Regional Innovation System*, Central Denmark Region, Viborg, Denmark.

Confederation of Danish Industry (2011), *Global Benchmark Report 2011: Ready for Globalisation?*, May 2011 based on data from the World Economic Forum Survey 2010.

DEACA (Danish Enterprise and Construction Authority) (2009), *Entrepreneurship Index – Entrepreneurship Conditions in Denmark,* Danish Enterprise and Construction Authority, Copenhagen.

DEACA (2010), *Entrepreneurship Index – Entrepreneurship Conditions in Denmark*, Danish Enterprise and Construction Authority, Copenhagen.

Danish Ministry of Business and Growth (2011), *Denmark i den globale økonomi – Konkurrenceevneredegørelse 2011*, Danish Ministry of Business and Growth, Copenhagen.

Danish Ministry of Science, Technology and Innovation (2009), *Mapping of the Danish Knowledge System with a Focus on the Role and Function of*

GTS, Danish Ministry of Science, Technology and Innovation, Copenhagen.

Danish Ministry of Science, Technology and Innovation (2011), *Økonomiske effekter af erhvervslivets forskninssamarbejde med offentlige videninstitutioner*, Danish Ministry of Science, Technology and Innovation, Copenhagen.

European Commission, Pro Inno Europe (2011), "The innovation union's performance scoreboard for research and innovation 2010", 1 February, available at *http://ec.europa.eu/research/innovation-union/pdf/iu-scoreboard-2010_en.pdf*.

Halkier, H. (2006), "Strategic evaluation on innovation and the knowledge-based economy in relation to the Structural and Cohesion Funds, for the programming period 2007-2013, country report: Denmark", report to the European Commission Directorate-General Regional Policy, Technopolis, Brussels.

Huggins R., H. Izusho and D. Prokop (2010), "University-industry networks: interactions with large R&D performers", DRUID Paper presented at the conference "Opening Up Innovation: Strategy, Organization and Technology", Imperial College London Business School.

Kelley D.J., S. Singer and M. Herrington (2011), *The Global Entrepreneurship Monitor,* 2011 Global Report, The Global Entrepreneurship Research Association.

Maskell, P. (2004), "Learning in the village economy of Denmark" in P. Cook, M. Heidenreich and H.J. Braczyk (eds.), *Regional Innovation System*, Routledge, London, pp. 154-187.

NordForsk (2011), "Comparing research at Nordic universities using bibliometric indicators", *NordForsk Policy Briefs*, 4-2011, Oslo.

OECD (2009a), *OECD Economic Surveys: Denmark*, Volume 2009/19 November 2009, Supplement No. 1, OECD Publishing, Paris.

OECD (2009b), *OECD Territorial Reviews: Copenhagen, Denmark 2009*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264060036-en*.

OECD (2010a), *OECD Science, Technology and Industry Outlook 2010*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/sti_outlook-2010-en*.

OECD (2010b), *Measuring Innovation: A New Perspective*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264059474-en.*

OECD (2010c), *OECD Reviews of Migrant Education, Denmark 2010*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264086197-en*.

OECD (2010d), *OECD Education at a Glance 2010*, OECD Publishing, Paris.

OECD (2011a), *OECD Regions at a Glance 2011*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/reg_glance-2011-en*.

OECD (2011b), *OECD Education at a Glance 2011*, OECD Publishing, Paris.

OECD (2011c), *Regions and Innovation Policy*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264097803-en*.

OECD (2012), *OECD Economic Surveys: Denmark 2012*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/eco_surveys-dnk-2012-en*.

OECD/LEED (2011), "Managing accountability and flexibility in the Danish employment system: country report", OECD, Paris, May.

Park, S.-C. and S.-K. Lee (2005), "The innovation system and regional growth strategy in Denmark", *AI and Society*, Vol. 19, pp. 292-308.

Region of Southern Denmark (2009), "Syddanmark i tal: Fokus ressourceområder", seven reports on the sectors: energy/environment, construction, IT/communication, medico/health, transport, food and furniture/clothes – with updates.

Statistics Denmark (2011), "Stor stigning i produktiviteten", *NYT Fra Danmarks Statistik*, N°538, December, *www.dst.dk/pukora/epub/Nyt/2011/NR598.pdf.*

World Bank (2011), *Doing Business 2012: Doing Business in a More Transparent World*, World Bank Publishing, Washington, DC.

World Economic Forum (2011), *The Global Competitiveness Report 2011-2012,* World Economic Forum Publishing, Geneva.

Chapter 2

Danish governance and policy context for regional strategies

The relatively new regions in Denmark, mainly responsible for health care, are tasked with regional economic development to promote growth. This chapter first considers the mandates and institutions associated with the regional authorities. It then reviews the regional development policy context as well as that of national innovation and business development policies. The regional role in a multi-level governance context of municipalities, central government, and the EU is discussed. The chapter then explores the governance challenges of co-ordination within the region (among municipalities), with central government, and with other regions in Denmark and beyond to best achieve national and regional growth goals.

Introduction

The new regions in Denmark are charged with promoting regional growth, thus contributing to national growth. Their competencies are mainly for health care, but they were also given a mandate for regional development. New regional institutions and strategies have been created to achieve this mission. Strategies tend to channel financial support to economic development and projects in prioritised economic sectors, as well as horizontal priorities offering a stronger enabling environment for firms. Nevertheless, most public policies and resources to support regional development are outside the competences of regions (e.g. the relevant educational institutions are financed by the state). Regions therefore need to align effectively with other public and private stakeholders across levels of government to finance and implement their growth strategies. This alignment includes several national ministries with respect to different policy areas, such as innovation and business development policies.

The regional development mandate: national and regional roles

Regions are primarily responsible for delivery of health services…

Two governance reforms to consolidate sub-national jurisdictions have mainly addressed needs for economies of scale and separation of tasks for service delivery. A first reform in 1970 restructured the sub-national landscape from 25 county council districts and 1 300 parishes to 14 counties and 275 municipalities. A second reform in 2007 further consolidated to 5 regions and 98 municipalities (see Box 2.1). The process was undoubtedly swift by international (and indeed Scandinavian) standards (Bukve et al., 2008; Thomsen and Nielsen, 2008). This second wave resulted in few mergers between local authorities in the metropolitan Capital Region, while large local authorities were created in the rest of the country through a bottom-up negotiation process with limited central government involvement.

While tasks were moved between the three tiers of government with the most recent reform, regions maintain health care and gained responsibility for regional development. It should be noted that the former *Amter* (counties, i.e. smaller regions) did take action in regional economic development even if there was not the same degree of formal responsibility. Health care nevertheless dominates the regional agenda in terms of expenditure, personnel and political attention. All other tasks – specialised welfare provisions in education, social services and environmental protection – were divided between local and central government. Both local

and regional authorities are led by elected councils, but while local authorities have tax powers, regional authorities rely on transfers from central and local government (Thomsen and Nielsen, 2008). Concerns about the capacity of the 14 former *Amter* to manage health and social services in the face of escalating costs, waiting lists and public expectations were part of the background for local government reform. The drawing up of (most of) the borders of the new regions around major university/research hospitals also brought health to the fore.

Box 2.1. **Sub-national governance reforms: new regions and municipalities since 2007**

Since 1970, Denmark has had two major reforms to sub-national governance. Before 1970, Denmark was divided into 86 boroughs and approximately 1 300 parishes within 25 county council districts. The 1970 reform resulted in a first wave of consolidation, reducing the number of counties (*Amter*) to 14 and the number of municipalities to 275. This round of reforms created the basis for restructuring the distribution of some tasks and costs from the state to the counties and municipalities. First, municipalities and counties acquired more influence and more tasks within social services and health care. The transfer of tasks continued after 1970. Later, counties became responsible for local upper secondary schools, state upper secondary schools, and their courses. A major part of the reimbursement schemes were replaced by general state grants – the so-called block grants – and financial equalisation schemes between the rich and the poor municipalities were expanded.

The 2007 reforms resulted in further consolidation, some modifications to responsibilities, and the creation of new bodies. The Commission on Administrative Structure noted problems with the post-1970s model: *i)* administrative units too small for many of the administrative tasks; *ii)* responsibility for some tasks divided across several decentralised administrative units (preventing coherence and co-ordinated efforts); and *iii)* parallel functions and tasks. To address these concerns, mainly associated with the human service delivery tasks, the 14 counties were restructured into 5 regions, and the 271 municipalities to 98. Prior to 2007, more than a third of the population (1.9 million) lived in municipalities with less than 20 000 inhabitants. After the reform, less than 1% of the population (approximately 55 000) were projected to live in municipalities with less than 20 000 inhabitants. The distribution of tasks in terms of expenditure before the reforms was 46% municipalities, 14% counties and 40% the state. The estimate after the reforms was 48% municipalities, 9% regions (previously counties) and 43% the state.

Box 2.1. **Sub-national governance reforms: new regions and municipalities since 2007** (*cont.*)

Responsibilities (post-2007 reforms)
State
– Police, defence, legal system
– Foreign service, official development assistance
– General planning within the health care sector
– Education and research except primary school and special education
– Unemployment insurance, working environment and overall employment policy
– Taxation and collection of debt to the public authorities
– Social services: National Knowledge and Special Counselling Organisation (VISO)
– General road network and the state railway
– General nature, environmental and planning tasks
– Certain cultural measures
– Business economy subsidies
– Reception of asylum applicants
Region
– Hospital service, including hospitals, psychiatry and health insurance as well as general practitioners & specialists
– Regional development, i.e. nature, environment, business, tourism, employment, education and culture as well as development in the fringe areas of the regions and in the rural districts. Secretarial service for the regional growth fora
– Soil pollution
– Raw material mapping and planning
– Operation of a number of institutions for exposed groups and groups with special needs for social services and special education
– Establishment of transport companies throughout Denmark
Municipalities
– Social services: total responsibility for financing, supply and authority
– Child care
– Primary school, including any special education and special pedagogical assistance for small children
– Special education for adults
– Care for the elderly
– Health care: preventive treatment, care and rehabilitation that do not take place during hospitalisation, treatment of alcohol and drug abuse, home care, local dental care, special dental care and social psychiatry
– Activation and employment projects for the unemployed without insurance in job centres[1]
– Integration and language education for immigrants
– Citizen service regarding taxation and collection in co-operation with state tax centres
– Supplies and emergency preparedness
– Nature, environment and planning: e.g. specific authority and citizen-related tasks, preparation of local plans and plans regarding waste water, waste and water supply
– Local business service and promotion of tourism
– Participation in regional transport companies
– The local road network
– Libraries, schools of music, local sports facilities and culture

Notes: 1. Initially, the job centres were a joint responsibility of the state and the municipalities. Since 2009, municipalities are entirely responsible, via a network of 91 job centres, for all contact with the unemployed and those receiving worker disability benefits.

Source: Government of Denmark (2005), *The Local Government Reform – In Brief*, Ministry of the Interior and Health, Department of Economics, Copenhagen.

One challenge with the sub-national reform concerns the capacity for the provision of specialised services, particularly at municipal level. While municipalities and the regional level were consolidated to rationalise public service delivery, in some cases the additional responsibilities are difficult to manage. Therefore, municipalities are less able to provide the more specialised social services within their mandate that were transferred from the prior regions (*Amter*). So while some areas for co-ordination are now internalised, there are others where inter-municipal co-operation may still be relevant, such as those related to business development. At regional level, the development of more specialised services via regional hospitals is progressing, with the resulting trade-offs in proximity of services expected with service rationalisation.

There were different political positions regarding the reform, ranging from eliminating a regional layer to maintaining one. The political outcome was larger units with a slimmed-down regional tier. Given the relatively pragmatic and consensual approach in Denmark, the current situation had been generally accepted and despite recent debates about health care, their existence has been reaffirmed by the change in government late 2011. The new government has also announced an evaluation of this structural reform, which will include an evaluation of the division of labour between central government, the regions and municipalities. Nevertheless, some municipalities and sub-regional units have expressed reluctance to invest in building relations with the regional level given the uncertainty. This reluctance limits the potential of the regional level for achieving its regional development mission which, given a restricted mandate and specific funding streams, requires partnership and alignment across levels of government to be successful.

…with regional development being a new formal competence of regions post-2007…

Regional boundaries drawn for service efficiency, not economic development per se

While the reforms appear to support bottom-up regional development policy, this is in part due to political bargaining at the time.[1] What few would have predicted in advance of reforms was that the second-most important activity of the new regions would become a statutory requirement to pursue regional development through a new partnership-based institutional setup. This changes the trend from decades of voluntary involvement of the Danish *Amter* (counties) with economic development activity. The regionalisation of economic development activities in theory allows for development of solutions that reflect the specific needs of individual regions, including social partners, other tiers of government, and

private sector actors.[2] Furthermore, in terms of administrative rationalisation, the regions create an organisational platform that fulfils EU Structural Fund regulations and thus integrates both European policy programmes and mushrooming sub-national activities (Indenrigs- og Sundhedsministeriet, 2004). The reform therefore created a new governance set-up that involved new geographies and politics of regional growth and innovation.

The centrality of a partnership principle grew out of the political negotiations that added these regional development competencies. The idea was not initially part of the reform preparations, but was ultimately translated into a blueprint for the new regional growth fora (RGF, see below). The partnership approach brought on board other actors with a vested interest in regional development policy, beyond the regional council, such as local authorities and private sector representatives. These partnerships thereby increase the general legitimacy of regional business development policies, appealing to political actors less in favour of a regional layer.

As the geography of the new regions was largely determined by health care considerations, each region has a mix of development areas to serve (Figure 2.1). There is no ideal set of boundaries for regional economic development, and the regions are therefore governed by institutions that cut across functional economic regions. Functional economic regions in this sense refer generally to areas of commuting flows, but for innovation and business development, that functionality may have a somewhat different footprint. Many local authorities outside Copenhagen have grown significantly through the merger of four to six previous authorities around a medium-sized city. The mergers often made sense for commuting patterns, but have created discussions along urban/rural lines about possible centralisation of welfare services such as education. Another by-product of the municipal mergers is that they are larger and therefore more competitive among themselves to bid for jobs and investments. The diversity of areas in regions outside of the Zealand and Capital Regions (except Bornholm which has its own RGF) is evident both in terms of wealth and designation for intensive policy support for EU Structural Funds, and national policy that sets a minimal investment of 35% of overall regional development funding that has a positive impact on "peripheral" areas.[3]

Despite the small size of Denmark, the redrawing of regional administrative borders has created a new politics of place. Existing points of place attachment were in large part eliminated. In practice, this is likely to be visible at both the local and the regional levels. Some of the old *Amter* were like regions, in the sense that citizens felt a regional identify and would refer to themselves as coming from them, e.g. *Fyn* (Funen) or *Sønderjylland*

(the border area which was part of Germany from 1864 to 1920). Such identifications were maintained through separate media services and language patterns. While most *Amter* were low-profile administrative units, providing a variety of welfare services and therefore relatively mergeable from a service efficiency perspective, the existence of sub-regional identities in the new Southern Denmark Region poses particular political challenges when joint strategies have to be established. There are vested political interests as well as perceived differences in identity that render political bargaining more important.

Figure 2.1. **Areas of lagging development**

A. Synthetic index of regional development

Note: Figure A: the 25 commuting areas aggregate current local authority areas within which at least 80% of the employees live in the joint area. The synthetic index uses data on six variables: 1. change in population 2000-2010; 2. share of population of working age (20-64, 2010 figures); 3. average annual growth in jobs 1998-2008; 4. unemployment as a percent of workforce (2009 figures); 5. average growth in taxable income 1998-2008; 6. income per capita (2008 figures). For each variable, the national average is indexed to 100, and by taking their standard deviation into account, the relative weight of the six variables is adjusted to give each of them the same weight in the synthetic index which is reported by the map.

Figure 2.1. **Areas of lagging development** (*cont.*)

B. Structural Funds peripheral and transitional areas from 2006 onwards

Note: Figure B: the designation of peripheral areas is based on localities meeting two criteria: 1. work- and business-related income of less than 90% of the national average; 2. population growth of less than 50% of the national average.

Theses maps are for illustrative purposes and are without prejudice to the status of or sovereignty over any territory covered by these maps.

Source: Regeringen (2010) *Regionalpolitisk redegørelse 2010*. Analyser og baggrund, Indenrigs- og Sundhedsministeriet, Copenhagen, *www.sum.dk/Aktuelt/Publikationer/Publikationer_IN/~/media/Filer%20-%20Publikationer_i_pdf/2010/regionalpol_red_2010/anal_bagg.ashx*. Figure B original source from the Danish Enterprise and Construction Authority (now Danish Business Authority).

General regional development approach in Denmark accents growth and innovation

In the 1990s, the focus of regional development policy was on increasing the growth of regions for national goals. In 2003, the Regional Growth Strategy re-emphasised the peripheral areas with growth challenges. The 2005 Business Development Act highlighted the growth-focused

agenda for regions, including six priority areas. Four of those areas focus on "growth drivers" identified by a 2001 OECD report – innovation, ICT, entrepreneurship, and human resources (OECD, 2001). Two other priority areas concern "peripheral" areas as well as tourism development. The regional level is also required to give particular consideration to localities designated by central government as peripheral on the basis of a composite socio-economic index and, partly in support of the latter, tourism development.

Both national and regional policies for economic development shifted focus to innovation early on relative to other countries. Denmark adopted an EU Lisbon-style innovation-oriented agenda in the 1990s, well before the formal EU declaration was made (Halkier, 2008). This longstanding strategic orientation is backed by stable cross-party political consensus as enshrined in the aforementioned 2005 Business Development Act (Økonomi- og Erhvervsministeriet, 2005a; 2005b) that governs national and regional efforts in economic development. Innovation became a pre-requisite for ERDF investment strategies, in particular for the 2007-2013 programming period. And the public-private partnership approach to allocating EU Structural Funds reinforces this unique set-up in Denmark to promote growth.

… resulting in new public and public-private regional institutions

Regional council: the elected body

Regional development is now backed by elected officials and public-private partnerships (see Figure 2.2). The elected regional councils, composed of 41 members directly elected for four-year terms, must approve all expenditures in both the health care and regional development portfolios. The council elects its president from within. The regional public administration supports the regional council and the regional growth fora.

Regional growth fora: public-private partnerships for growth

The new regional growth fora (RGF), institutions created by the sub-national reforms, have evolved to adopt a proactive style of policy making to support innovation and growth. There are six RGF in Denmark (one for each region plus a second for the Island of Bornholm in

Figure 2.2. **Regional development policy actors in Denmark**

Source: Modified from prior categorisation previously available at *www.deaca.dk/regionalpolicyactors*.

the Capital Region). The composition of these public-private boards of 20 members, appointed by the regional council for a 4-year period, is determined by law. It includes: regional and municipal elected officials, business persons, representatives of the higher education and research community, and trade unions. Members are appointed upon recommendation by the municipalities and social partners. They meet approximately six times a year. An advisory group to the RGF with staff from the entities represented in the formal RGF exists in each region, albeit these bodies do not appear in any formal organisational charts. They not only support the RGF efforts by reviewing projects and materials in a first instance, they also help spread knowledge across RGF by having members of the same institution participate in multiple RGF advisory groups. The Danish Growth Council has no hierarchical role with respect to the RGF, but there is an intended goal of co-ordination through dialogue since the RGF presidents participate in this national body (see later section on co-ordination).

The main roles of the new RGF are to develop and monitor regional economic development strategies as well as recommend projects to fulfil those goals. They may recommend projects to both the regional council as well as the Danish Business Authority. Per law, the RGF may cover six areas: *i)* innovation, knowledge-sharing and knowledge creation; *ii)* use of new technology; *iii)* creation and development of new firms; *iv)* development of human resources, including regional competencies; *v)* growth and development of the tourism sector; and *vi)* development activities in peripheral areas. There is some flexibility for variation from one RGF to another. The instruments used by the regional level in pursuit of these goals do not include direct financial grants to individual firms, with exceptions for some of the state aid areas, and therefore must be to the benefit of an "open group" of firms within the region. Over time, the RGF of Central and Southern Denmark have become more concrete and focused; albeit still with similar strategy "headlines" (see Chapter 3). The different types of stakeholders (business leaders, universities, political actors from regional and local levels, etc.) have been learning to work together via this new public-private council.

There is some complexity with respect to this institutional arrangement, but this does not impede strategy development and project approval. The Business Development Act institutes a form of dual-key control where both the elected regional council and the RGF can veto each other's ideas. And it is the regional council that formally approves, or not, the budgets for RGF-recommended projects. Neither the regions nor the RGF have powers of taxation but operate on the basis of block grants from the national level, a statutory financial contribution from local authorities in the region, and European funding allocated by central government. Moreover, neither the regions nor the RGF are allowed to implement policies directly as operators. They must act through separate legal entities, e.g. bodies set up with or jointly by local authorities.

Regional employment council: supports regions but unrelated to regional governments

Regional employment councils act independently of regional level entities (public administration, regional council, and regional growth fora). These public-private councils of 22 members, that include national government representatives, monitor development in the labour markets and recommend actions. Employment policy is split between the central government (policy and benefits) and municipalities (management of 91 job

centres that have direct contact with the unemployed). Denmark is the country with the highest level of flexibility in implementing employment policy per a recent study of 25 OECD countries (OECD/LEED, 2011). The regional employment councils liaise mainly with the regional office of the national ministry and the local job centres. The four employment regions in Denmark are more a catchment area for analysis to support national and municipal level efforts. The regional employment councils do monitor the performance of the municipal job centres, even if they do not play a direct role in operations.[4] They also serve as a unit for quantitative analysis, monitor general labour market trends, and are part of the National Labour Market Authority.

This labour market flexibility is potentially a very important advantage for addressing the needs of different functional labour market areas. In a study of 11 OECD countries, policy flexibility was found to be the most important factor influencing local policy integration (Froy and Giguère, 2010). The achievement of local flexibility does not necessarily mean political decentralisation – indeed flexibility at the local agency level is sometimes higher in centralised systems. Yet there is reason to question Danish regions' ability to make the most of the advantages of flexibility given that they are not integrated with the other regional entities. While there may be some interactions between the regional employment council and the RGF, the separation of competences prevents stronger ties. The two bodies therefore operate on separate tracks reporting to different national ministries and bodies.

Several national and regional policy makers report that one of the biggest barriers to regional growth is the unskilled population, which is over-represented in the pool of unemployed. Employment and education policies are not the mandate of the regional level; however, the RGF may support human resource development through special programmes designed to assist the unskilled population as well as through programmes for highly skilled labour to meet local cluster needs. This disconnect can and should be corrected: it is difficult to imagine a coherent, integrated approach to regional development that treats issues of human capital formation and labour-market performance as something apart. Danish regions would be better served if the flexibility that exists with respect to labour-market policy implementation were exercised in the context of broader strategies and initiatives aimed at improving regional growth performance.

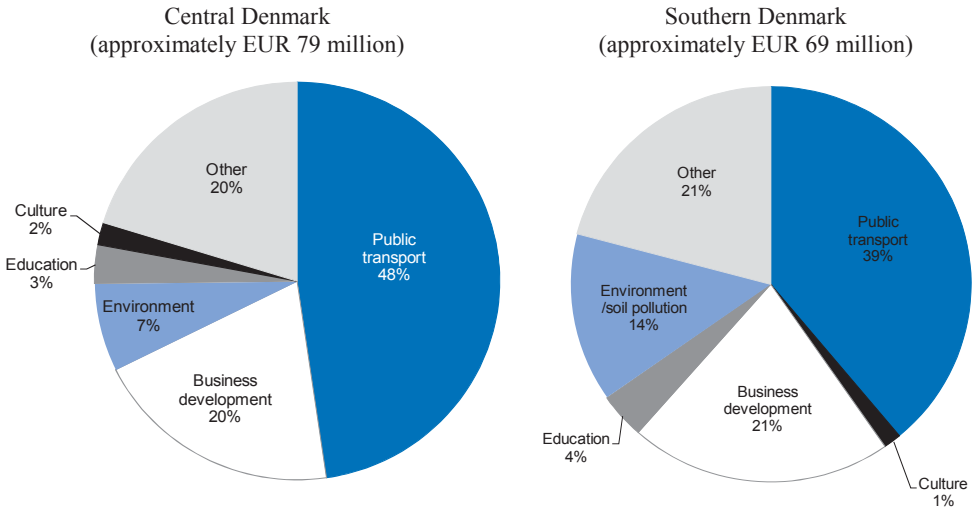
Financing of regional level strategies: multiple sources

Pooling resources around regional goals

While regional development is a function for the new regions, they have relatively limited "own" funds for innovation-promotion programmes without strings attached. Oddly, Denmark is among OECD countries with the highest share of sub-national fiscal expenditure in the OECD (63.4% in 2009, 28.7% of total revenues), although those figures are influenced by the very high share of social security expenses at sub-national level that in other countries are classified separately from national and sub-national expenditure. Regions have no tax-raising authority and rely on inter-governmental transfers from the state and municipalities. Regions receive an annually negotiated block grant from the state and transfers from municipalities. For Southern Denmark, that split in 2008 was 71% state and 29% municipalities, and for Central Denmark that split was 74% and 26%. In general, regional budgets in Denmark are spent on health care, education and social service delivery. In 2008, only 2.6% of the approximately DKK 87 billion for regional operational expenses were for regional development (EUR 303 million), excluding EU funding. Of that share for regional development, the split for all regions combined was approximately: 45% for public transport, 15% to treat soil pollution and 40% for other (EUR 121 million), of which business development and innovation are a part (see Figure 2.3 for regional development spending in both regions).[5]

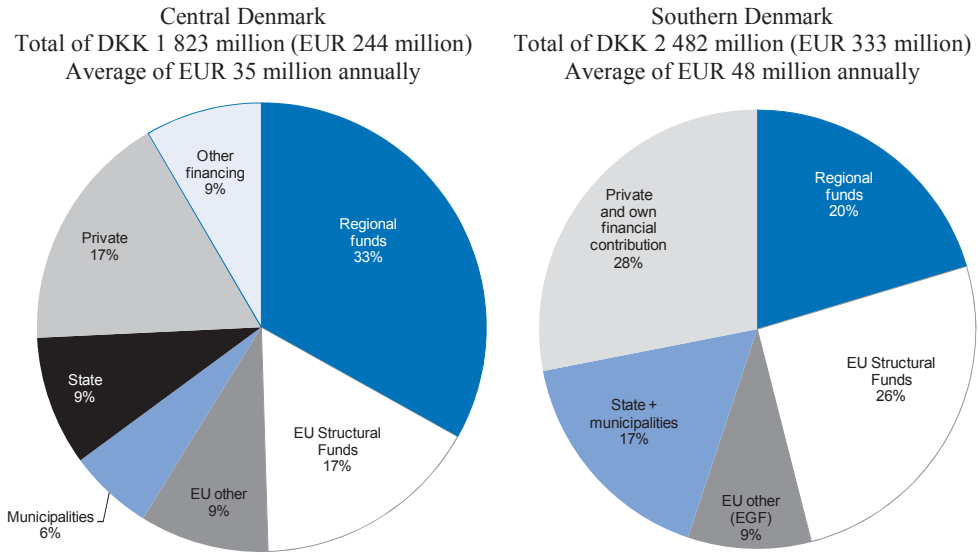
The challenge for regions is therefore to pool together funding from the EU, the Danish state, municipalities, and private sources along with its own budget, towards its regional strategy. As EU funds require matching grants, the region uses some of its "own" funds to support EU-funded projects from that funding stream. In terms of the projects under the authority of the RGF, those regional block grants account for about a third of funding in Central Denmark and a fifth in Southern Denmark (see Figure 2.4). As public funds continue to be under strain during post-crisis fiscal consolidation, the effective mobilisation of private funds becomes even more critical.

Figure 2.3. **Regional development budget 2011: Central and Southern Denmark**



Source: Regions of Southern and Central Denmark.

Figure 2.4. **Multi-level governance sources of financing for growth forum projects: estimations 2007-2013**



Notes: For Central Denmark, this split concerns projects approved by 1 March 2011. EGF stands for European Globalisation Fund.

Source: Regions of Central and Southern Denmark.

EU Structural Funds a significant financing source of regional growth and innovation programmes

In Denmark, EU funds (and their 50% required domestic co-financing) are used for several purposes, including innovation. They thus represent an important source of innovation financing for regional development and empower local and regional authorities in this area. The EU Structural Funds (mainly the Regional Development Fund and Social Funds and for poorer member countries the Cohesion Fund) are the main instruments to implement EU cohesion policy. They seek to bring all regions to a higher level of welfare and to narrow the gap between poorer and richer regions in Europe. In wealthy countries like Denmark, particularly where inter-regional disparities are low, the objective of the funds is to help areas facing economic stagnation or other development challenges by enhancing competitiveness and improving well-being. An increasingly prominent role is given to innovation in the use of Structural Funds, especially in Denmark. Use of these funds also requires that regional development actors are fully involved in a bottom-up process for the design of regional innovation strategies, programmes and projects. The European Commission is promoting the use of regionally defined "smart specialisation" strategies to help guide the use of Structural Funds in each region in the next programming period.

2000-2006 Structural Funds programming period

The main goals of the Objective 2 programmes were: innovation, globalisation, sustainability and development of endogenous strengths and potential. The instruments promoted in this period were innovation poles, networks and clusters (see Box 2.2). This approach for use of EU Structural Funds is generally in line with the division of labour between Danish national and regional authorities in the field of innovation broadly speaking. Knowledge creation, tertiary education, as well as basic and applied research funding are under the responsibility of the national level. Knowledge diffusion, network promotion and support to (new) firm innovation are promoted through projects funded by regional (and national) levels.

2007-2013 Structural Funds programming period

In the current programming period, 2007-2013, both the orientation of EU Structural Funds and the regional governance models in Denmark have changed. For Structural Funds, the whole territory of Denmark was included under the "Competitiveness and Employment" objective. The micro-zoning approach that had prevailed until 2006 was replaced by a whole-country approach based regional policy. The start of this programming period coincided with the implementation of the new administrative structure in Denmark.

Box 2.2. **EU Structural Funds: 2000-2006 programming period in Denmark**

During the 2000-2006 programming period, small areas scattered across Denmark were eligible under the Objective 2 of EU cohesion policy, meaning they were considered as areas in need of economic and social restructuring. Those areas belong to all five of the post-2007 regions of Denmark, the larger areas being located in the northern and southern periphery of the country, in the North Denmark and Zealand Regions. The eligible areas covered approximately 10% of Danish population (and an additional 7.7% under the phasing-out). In that period, actions to be funded under the Structural Funds were defined by local authorities (county councils and also municipalities) on a voluntary basis (since business development was only granted to the new regions towards the end of the period). Denmark was also eligible in this programming period for Objective 3 programmes, as well as the URBAN and EQUAL programmes.

Over the whole period, EUR 72 million of EU origin (36% of Objective 2 funding) were planned to support research, development, technology and innovation (RDTI) in eligible Danish regions. Taking a broad notion of networking, EUR 70.8 million have been devoted to projects involving formation/strengthening of networks between private firms and other private/public actors, thus absorbing the large majority of Objective 2 funds earmarked for RDTI (Halkier, 2006). As an indication, for the year 2004, national public expenditures on regional development, business advisory services and regional technology centres amounted to EUR 13 million, while the annual average amount of public funding for RDTI projects in the Danish Objective 2 programmes was EUR 7.3 million.

Evaluations of the programme period highlight the need for the development of the regions more generally. The mid-term evaluation of the programme found that funding for partnerships in the regions were likely to be effective to spur regional development; advocating, however, more focus on smaller and more traditional firms in the more peripheral areas. The final evaluation recommended that future programmes should: exploit unrealised potential of private and public co-financing; improve involvement of research and knowledge institutions; strengthen exchange of experience across projects; improve information about the programme; and focus on network and bridge-building projects (Nordentoft Andersen and Plougmann, 2010).

Source: Halkier, H. (2006), "Strategic evaluation on innovation and the knowledge-based economy in relation to the Structural and Cohesion Funds, for the programming period 2007-2013, country report: Denmark", report to the European Commission Directorate-General Regional Policy, Technopolis, Brussels; Nordentoft Andersen, F. and P. Plougmann (2010), "Expert evaluation network delivering policy analysis on the performance of cohesion policy 2007-2013: country report on achievements of cohesion policy: Denmark", report to the European Commission DG Regional Policy.

These institutional and programming changes gave rise to more integrated policy programming. from a range of financing sources towards more defined regional goals. The improvements in this period are supported by the work of the RGF, and to closer co-ordination between regional development policies and EU-supported policy. The Danish regions are in charge of developing regional strategies and receive 90% of the EU funds. The remaining 10% of the funds is allocated through national competition through the Danish Growth Council for innovative and inter-regional projects according to thematic calls through its Competitiveness Pool Programme.

This new institutional setting changed the nature of projects funded under regional policy, towards larger and more integrated projects, in contrast with greater fragmentation previously. Many of these projects combine EU, national and sub-national sources of funding (EPRC, 2009). The main orientations of projects include, among others: networks and business clusters support; soft support to SMEs on product, process and organisational innovation (notably by each region's business support agency called a Growth House); and development of linkages and networks between business and knowledge institutions. According to programme evaluations, there is strong convergence between innovation policy at EU, national and regional levels in Denmark (Nordentoft Andersen and Plougmann, 2010).

Like all old member countries, Denmark experienced a cutback in overall EU allocations in the latest programming period, but innovation-related funds increased. In total, Denmark has been allocated EUR 613 million from EU Structural Funds for the 2007-2013 period, compared to EUR 932 million in the previous period. However, Structural Funds for the new objective of Regional Competitiveness and Employment amount to EUR 255 million, a figure that compares favourably with the EUR 197 million devoted to Objective 2 areas in the previous period. The vast majority of the ERDF funds (82%, EUR 209 million) are devoted to the knowledge and innovation objective over the period. Thus, the amounts available for research, technological development and innovation have increased in absolute terms despite the overall drop in cohesion policy funds to Denmark.

Challenges for regional spending given the prominence of EU spending requirements

Denmark's approach to using EU Structural Funds is conducive to promoting innovation-driven growth. The Danish programme has the strongest innovation orientation across all EU member countries (Bachtler, 2009). However, with a notable share of regional development funding tied in some way to EU funds, Central and Southern Denmark face

a number of challenges in getting the most out of regional development spending. The challenges associated with EU spending rules are not unique to Denmark. In a study of 23 regions in 14 countries, the vast majority of respondents in those regions found barriers to access and efficient use due to: complex and bureaucratic procedures, prohibitive auditing processes, and restrictive and inflexible administrative and reporting procedures, among other barriers (Sostar, 2012).[6] Some of the perceived constraints of EU funding identified by study participants include:

- **A disincentive for private sector engagement.** The administrative burden associated with EU-funded projects has been cited by several project recipients as an impediment to engaging certain private sector actors. This gives a more top-down and public sector orientation to some projects. It also requires that applications involve an entity with a strong administrative back-office to manage the paperwork for the project, which is why many projects are managed by the Growth House in Central Denmark and the University of Southern Denmark.
- **The limits imposed by the project-based nature of funds.** Projects have to be defined and then redefined for obtaining new support, often after three years. However, some of the efforts and their benefits are long term, and may require a more stable funding outlook than short-term projects. Project recipients also report that they have trouble recruiting qualified staff for the projects as they may only do time-bound work contracts within the framework of such project-based financing.
- **An incentive to take an audit-oriented approach to monitoring.** While the regions are developing more sophisticated tools for project monitoring and evaluation, and the national government is seeking to promote a more results-oriented approach, there remains a tendency to assess project progress based on their rate of spending down funds in the EU system. This reinforces an audit, as opposed to impact, approach to funds use.
- **Reporting requirements as an impediment to policy learning.** Project managers provide regular reports in the context of project reporting requirements. However, given the audit-focused nature of the review of such materials, project managers have to provide a more administrative reporting for fear of accidentally providing details that may raise questions for audit purposes. Therefore there are sometimes double sets of reporting or valuable project learning information that goes unreported, resulting in missed opportunities to improve the impact of public funds.

Perhaps there are opportunities to identify areas for greater flexibility and simplification by looking carefully at both EU rules as well as the national interpretations of those rules. A planned evaluation study of Structural Funds use may also develop some good practice examples for the study regions, and other Danish regions, on how to overcome the negative impacts of different spending requirements. Possible EU rule changes in the 2014-2020 programming period may also contribute to greater flexibility and a lower administrative burden.

Danish national policy context for innovation and entrepreneurship

National policy with respect to innovation and entrepreneurship support determines to a significant extent the context for regional economic development action. The concern in any country is therefore whether such innovation-related policies, thought to be space blind, actually have important spatial implications (such as by default benefiting an innovation hub region, such as a capital). The flexibility of these policies to be relevant for different region types (in terms of industrial structure, availability of research institutions, etc.) therefore becomes critical. A second group of policies to consider are those that have an explicit regional dimension by design, and their effective integration with regional strategies and goals. The commonly perceived tensions between excellence and place-based approaches for research and innovation policy are giving way to a greater understanding of the mutual benefit for national and regional governments for greater consideration to the role of regions (see later section on co-ordination for examples of how other OECD countries are addressing this). This tension is also changing because of the greater pressure on research and innovation investments to have economic payoffs and social impacts, which implies greater linkages with nearby firms and institutions (OECD, 2011).

STI policy: building regional strengths in a knowledge-intensive, small country context

Danish policy increasingly taking a broader approach to innovation

Innovation policy in Denmark has evolved quite rapidly in the last few years, and is prioritised by the government. Since the early 2000s, innovation has climbed higher on the government's policy agenda and remains so today.[7] The principles for key drivers of growth per an OECD report (OECD, 2001) – namely ICT, entrepreneurship, innovation and human resources – have been adopted whole-heartedly by Danish policy makers. Innovation featured prominently in the 2006 Globalisation Strategy and in the two successive National Reform Programmes (2005 and 2008). In 2007, the Danish Agency for Science, Technology and

Innovation published *Innovation Denmark 2007-2010*, a comprehensive Action Plan for Innovation. This action plan provides the basis for the policies to be implemented by this agency together with the Danish Council for Technology and Innovation. The four focus areas concern mainly the effective transfer of knowledge to firms from universities, research institutions and technology centres.[8]

A traditionally linear drive to innovation policy has evolved to give greater consideration to a broader approach to innovation that is not only science driven. Danish innovation policy has been under the authority of the Ministry of Science, Innovation and Higher Education.[9] Actions had been focused on technology transfer from public research to the economic sector to benefit Danish firms.[10] However, the policy is paying increased attention to innovation that is not science-driven, including all areas (organisation, management, processes, products and services) (*Innovation Denmark 2007-2010*). As a result of this evolution, the strategy incorporates a dual goal: *i)* that Danish companies become more and sustainably innovative (with a particular focus on SMEs); and *ii)* that the dissemination of knowledge and interaction between researchers at the academic and research institutions and actors in the Danish business sector be strengthened. The increased importance of the first goal is reflected in the subsequent policy document *Innovation Denmark 2008*, which focuses more on strengthening innovation in the service industry, in the public sector, and through employee-driven innovation; on reinforcing the business innovation support system; and on strengthening the international orientation of innovative enterprises. Also, in 2009, the new strategy for the GTS network introduced a more business-driven model to identify priority areas of action of these technology providers.

Policy support for innovation from experienced-based learning makes sense in the Danish context. The evolution of an "STI" model of innovation (where most of the emphasis is placed on science as a source of innovation), towards one that is grounded on a "DUI" mode of innovation (experience-based learning) is very relevant for small open economies like that of Denmark (Jensen et al., 2007). Given the limited size of the home market and the globalisation of knowledge, there are opportunities to access knowledge abroad. In addition, the quality and creativity of the labour force, and the collaborative relationships with users and various knowledge providers, all contribute to the success of innovative firms (especially SMEs). The dual goal of the Danish innovation strategy is reflected in the use of the following types of criteria for its assessment, an increase in: *i)* the share of innovative companies; *ii)* the share of SMEs that have highly educated employees; and *iii)* the intensity of academia-business collaborations.

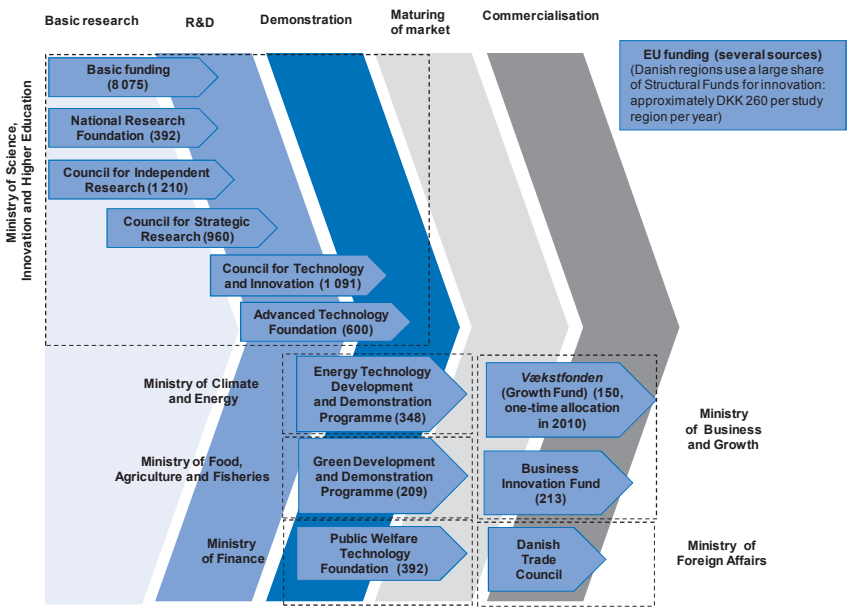
Several national funding bodies support STI programmes

There have been several changes in the nature of the funds that regions, and the actors located in them, may access. Danish national STI policy has witnessed a reduction in the number of national programmes overall. And there is a trend towards larger and broader programmes in combination with an enhanced focus on the use of competitive funding principles.

From a research and technology point of view, the majority of the publicly funded effort in support of innovation is under the responsibility of the Danish Ministry of Science, Innovation and Higher Education. But a range of other funding bodies placed under other ministries play important roles as well (see Figure 2.5). The Ministry of Business and Growth[11] and the Ministry of Climate and Energy are among the other ministries that support proof of concept and market development, often directed towards specific sectors and prioritised areas of technology.

Figure 2.5. **Major funding bodies and budgets for STI policy in Denmark**

Millions DKK (2011)



Source: IRIS Group and Danish Agency for Science, Technology and Innovation with modifications.

The distributed funding responsibility has the disadvantage of increasing complexity, rendering the work of regions to develop and upgrade their regional innovation systems more challenging. There are several autonomous councils (appointed by the different ministers) that govern many programmes.[12] Each council and board typically has its own guidelines and funding principles in accordance with the task given by the minister. Any attempts at reducing the complexity of national level institutions will therefore render the landscape of public support easier for regional actors to navigate.

Danish universities remain the central nodes in the national STI policy. Universities have extensive autonomy to decide what fields of research to prioritise and how much to invest in national or regional outreach activities. Thus, most national programmes in support of R&D activities and much of the investments in infrastructure for knowledge-sharing are anchored around the universities (see first three programmes in Figure 2.5). As a result of their key role, and the integration of formerly separate public research facilities, the universities in all regions have witnessed a significant rise in their basic funding (around 19% from 2005-2010). While Danish universities are now called to consider a third mission by the 2003 University Act, basic funding for universities has no explicit "third-stream" funding for activities beyond teaching and research. It is thus left to the universities to decide whether and how to invest in outreach activities – and whether these activities should focus on specific sectors and fields of technology of national and/or regional priority. The University of Southern Denmark received approximately 9% of the total basic funding each year, and the University of Aarhus, in Central Denmark, received 22%.[13] Similarly, in terms of public research, 10% flowed to Southern Denmark and 20% to Central Denmark (see Chapter 3: innovation system actors).

Several sources for mission-driven research exist, including technology-oriented support. The Council for Strategic Research is a major funder of problem-oriented research, mainly to universities, within thematic areas that are prioritised by Parliament.[14] Technology-oriented programmes are implemented by other ministries (see Figure 2.5). Hence public and private research actors can combine these sources when developing (applied) research falling under prioritised themes.

The Council for Technology and Innovation is a key national player (under the Ministry of Science, Innovation and Higher Education) regarding investments in infrastructure for knowledge-sharing and innovation.[15] The objective of the council is to promote collaboration and dissemination of knowledge between knowledge institutions, advanced technology groups and enterprises. The council has a total budget of DKK 3.5 billion for the

four-year period of 2010-2013 (for 2011 the budget was DKK 1 091 million). A large number of programmes are found under its four priorities: technological support (via the GTS institute network); human resources; collaborative R&D; and commercialisation (for a description of these programmes, see Table 2.A1.1 in annex). There are increasing examples of inter-council collaboration.[16]

The above funding channels are key elements in the national effort to promote a more innovative and knowledge-based economy. The programmes under the Ministry of Science, Innovation and Higher Education are designed as national instruments and, as mentioned, most of them work under competitive funding principles. Thus regions get their share of support through national programmes according to their success in accessing these funds. The location of universities and GTS is an obvious factor that determines the geographic distribution of funds, through the financing of basic and applied research. Hence the large bulk of the national funding for innovation flowing to the regions is determined *ex post*, rather than on the basis of *ex ante* regional considerations.

Only a few of the national programmes have an explicit regional dimension in the sense that the funding is dedicated to support a particular region or specific regional clusters. Two are provided by the Ministry of Business and Growth:

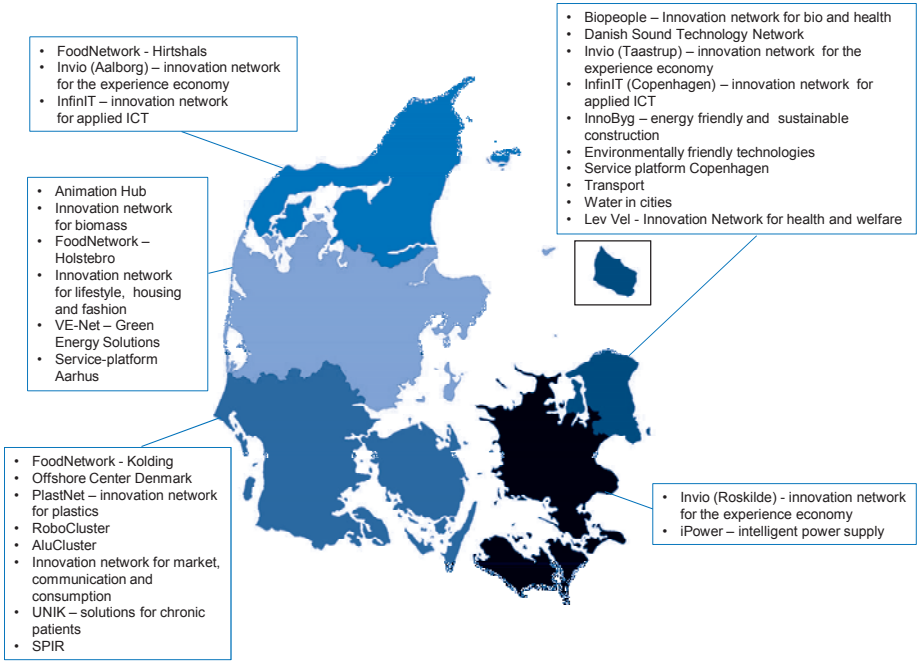
- ***Vækstfonden* (Growth Fund):** this one-time investment of DKK 150 million in western Denmark (the area outside the Capital Region) is for venture capital to technology-intensive firms.
- **Business Innovation Fund:** to promote growth, employment and export by supporting business opportunities within green growth and welfare as well as providing support for change-over to exploit new business and growth opportunities in less favoured areas of the country. It focuses on large, cross-funded innovation programmes as well as market maturation through grants and guarantees to firms. Around DKK 700 million has been allocated to the fund for the period 2010-2012 (DKK 213 million in 2011). The Regions of Southern and Central Denmark have been quite successful in attracting funding for a restructuring of their industry base from this fund. For example, Southern Denmark received DKK 37 million to develop the area where Lindø Shipyard is located. The closure of the shipyard is scheduled for 2012 and the ambition is to restructure the area into a brand new Lindø Renewable Energy Centre with incubation facilities for start-ups, a test centre, and other facilities that can attract new businesses and job opportunities within renewable energy to the area.

Under the Ministry of Science, Innovation and Higher Education, some programmes run by the Council for Technology and Innovation, while not focusing on specific regions, are designed on the basis of place-based considerations and aim at reinforcing localised innovation systems. Note that the Knowledge Vouchers and Knowledge Pilot Programmes to support SME access to knowledge may also, in practice, support relationships within a given region's innovation system, but the programmes are not place-based *per se*:

- The **Innovation Incubators** Programme: an incubation programme for research-based businesses, often spin-outs from research, provides risk capital and incubation support. The geographical location of the six innovation incubators is to some extent linked to the location of publicly funded research activities and universities. There is an innovation incubator in all regions, including one in Southern Denmark (20% of national funds) and two in Central Denmark (26% of national funds).
- The **Proof of Concept** Programme: enables technology transfer offices at the universities to apply for up to DKK 1.5 million in proof of concept funding for market maturing of research results and inventions with a commercial potential. Two "proof of concept" boards operate the programme – one that covers universities in the western part of Denmark and one representing the universities in the eastern part.
- The **Innovation Networks** Programme: supports clusters and networks in specific domains through knowledge transfer from research to firms. While they have a national dimension, they often also have a regional positioning. As this programme is of particular relevance to regions, it is described in more detail below.

The Danish Innovation Networks Programme promotes national "clusters" within various technologies and disciplines based on initiatives that often started from a regional base. It currently supports 22 national networks that help companies with project development as well as matchmaking activities such as contact to relevant researchers/experts (Figure 2.6). The innovation networks play a particularly important role in helping small and medium-sized enterprises getting started on collaborating and sourcing new knowledge from universities and other knowledge institutions to boost innovation. Via outreach initiatives, information activities, conferences, matchmaking offers, innovation projects, etc., the networks act as the gateway to the knowledge institutions and the right researchers and trainers.

Figure 2.6. **Regional distribution of Denmark's 22 national innovation networks**



Note: Some networks are located in more than one region, for example FoodNetwork, Invio and Serviceplatform. This map is for illustrative purposes and is without prejudice to the status of or sovereignty over any territory covered by this map.

Source: IRIS Group and *www.netmatch.dk*; map based on Wikimedia Commons (2007), "Regions of Denmark".

The 22 networks serve companies all over the country and are not necessarily in line with the priorities supported by an RGF. The network management units are based in a region with a strong and relevant research and/or industry base. Close to 50% of the companies engaged in an innovation network are located outside the region where the network has its home base. Each network organisation typically has four to six employees and an annual turnover of DKK 7-10 million, of which national funding from the Council of Technology and Innovation is the single most important funding source. In 2010, more than 3 000 Danish companies were involved in activities organised by the innovation networks (26.3% were from Central Denmark and 21.5% from Southern Denmark) (DASTI, 2011a).

Regional use of national programmes targeted towards particular sectors and technologies

Programmes oriented towards specific technologies or fields of research give *de facto* prioritised access to some regions, research areas and sectors. When regional strengths in research and industry coincide with the fields of technology prioritised by national funding bodies, this creates in practice an *ex post* advantage in public funding allocation. The national funding bodies have a total budget of close to DKK 3 billion (2010) invested in programmes directed at R&D and demonstration of specific fields of technologies: this creates opportunities for the Danish regions to draw on national funding sources to enhance regional innovation capacity in those fields.

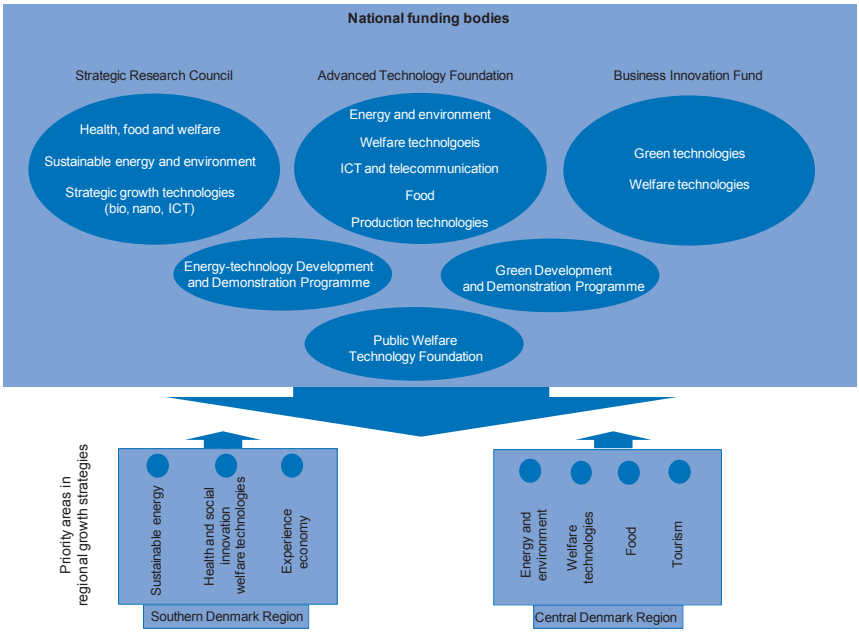
The sectors and technology areas of national and regional priority (in Central and Southern Denmark) coincide to a large extent, facilitating regional access to competitive national funds (see Figure 2.7). This alignment also reinforces the role of the regions in building excellence to better compete for these national resources, as well as assisting actors in their region in accessing such programmes. An estimated 50%-70% of the total budget is directed towards technology areas that are also prioritised in the regional growth strategies of Southern and Central Denmark. This underlines a notable degree of common priorities for national and regional support. But it is difficult to make a clear regional split of national funding, as much of the money is directed towards consortia with a large number of collaborators from all over the country, not just in one region.

For many programmes, both regions appear to capture funds in line with the regional distribution of companies and public/private R&D activities. Central Denmark has 13% of participating companies in the programme of the Advanced Technology Foundation and 20% of the funds in the user-driven programme. For Southern Denmark, those figures are 20% and 19% respectively.

Sectoral alignment between national and regional levels in Denmark generally makes sense to achieve critical mass in the global economy, but also raises a few questions. As Danish national policy has been focusing mainly on science-based and high-tech sectors, analyses have suggested that this is not sufficiently covering the firm base of many SMEs not in these sectors. The country's Globalisation Strategy has nevertheless highlighted the importance of boosting innovation in SMEs (European Commission, 2009). There is a greater imperative for the regions to ensure growth in sectors of importance to their economy or related to their assets to counterbalance possible gaps in national policy. If the vast majority of firms and employment are **not** in the prioritised sectors, there would appear to be a

mismatch between these priorities and a realistic strategy for achieving overall economic growth goals at both national and regional levels.

Figure 2.7. **Alignment of national and regional prioritised technologies and industries**



Source: IRIS Group.

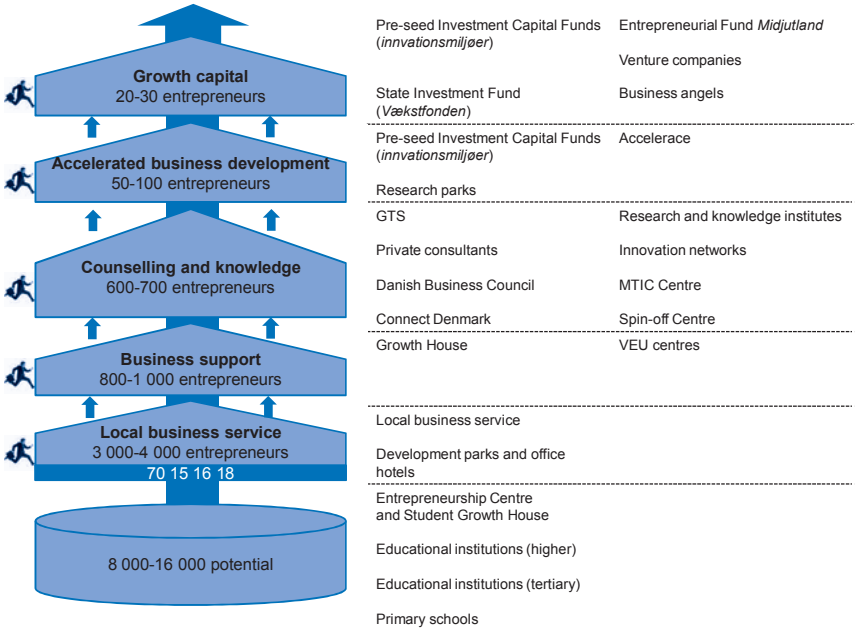
Business and entrepreneurship support: an active sub-national role

Denmark has been prioritising entrepreneurship policy in its efforts to boost productivity. Previous policy approaches have emphasised framework conditions as the best way to increase entrepreneurship. These efforts were evaluated as positive in an OECD context, with the exception of taxation rates. More active entrepreneurship policies have been put in place to support start-ups and high-growth firms in the last decade, culminating in more prominence and funding via Denmark's Globalisation Strategy. Further improvements in entrepreneurial education, availability of venture capital, and greater knowledge transfer to firms have been suggested (OECD, 2008a).

The delivery of many entrepreneurship-related services is performed by municipal business development units and the Growth House in each region. The municipal level is in charge of basic business development services,

implemented with local business development councils, and offers the first contact for firms seeking business support. The Growth Houses have a generalist profile and provide impartial assistance by referring advanced and high-growth businesses to specialised service providers. The Growth Houses are now funded by the municipalities that are also on their board of directors. The national government transfers funds per capita to the municipality that is earmarked for business support, and municipalities then transfer these amounts to the regional Growth House. Growth House services are of course part of a much more complex system of business support that includes many other actors (see Figure 2.8). Regions rely on these operators to differing degrees (see Chapter 3 for further information on the role of Growth Houses in the two regional innovation systems).

Figure 2.8. **Services to entrepreneurs by type of firm need: example of Central Denmark**



Source: Region of Central Denmark.

Co-ordination mechanisms for achieving each region's innovation and growth goals

The issue is not whether Danish regions should pursue an innovation-oriented economic agenda, as they do, but how this shared goal across levels of government can best be achieved. The effectiveness of the joint efforts requires appropriate governance arrangements, strategy development, and implementation. Several governance challenges are faced by Danish policy makers to realise these goals:

- **Horizontal co-ordination of actors in the region and beyond** within the framework of the post-2007 institutional set up, including the new statutory regional growth fora (RGF) which bring together social partners and sub-national political actors in programming and implementing regional policy.
- **Vertical co-ordination between the local, regional and national tiers** of government while maintaining scope for initiatives tailored to address the specific challenges of individual localities and regions.
- **Cross-sectoral co-ordination at national level** between the activities of two main pillars of the Danish innovation support system: particularly those revolving around basic research within the Danish Ministry of Science, Innovation and Higher Education, and those funded by the more business-oriented applied knowledge processes driven by the programmes of the Ministry of Business and Growth. However, other ministries are involved with the regions for the implementation common goals, such as the Ministry of Foreign Affairs and the Ministry of Food, Agriculture and Fisheries, among others (see Figure 2.5).

Working within and across regions and municipalities

Public and private collaboration among regional institutions facilitated by regional growth fora

The RGF have increasingly played an effective horizontal co-ordination role among public and private actors focusing on innovation and growth. They bring private business, public knowledge institutions, local authorities and the regional council together in developing and implementing a future-oriented growth agenda in the Danish regions. Efforts have been made to maintain a strategic focus of the RGF.[17] RGF would benefit from being more outward-looking towards global trends, as well as being more inclusive to ensure even greater private sector feedback, if not via RGF members then through other associated working groups.

The regional council gives an administrative approval of RGF projects to ultimately accept or reject a budgetary allocation. It was reported that in both Central and Southern Denmark, the Regional Council has never rejected a proposed project by the RGF. The volume of paperwork on the projects for the council to approve is significant, preventing some council members from being able to take the time to review them. The Secretariat of the Growth Forum, located within the regional government, along with the RGF advisory group comprised of staff of representatives to the formal RGF, will often play a mediating role. They address potential conflicts before they reach the RGF for recommendation and the council for official approval. Furthermore, in both regions, the President of the Regional Council is also the President of the Growth Forum, creating strong institutional relations.

Given that the majority of spending is related to health care, the regional council naturally must devote considerable time to this policy area. But legally, the regional council has to approve budget allocations for projects suggested by the growth forum. Some easing of the administrative burden resulting from this double approval has been implemented to avoid multiple considerations of the same project, which had been causing administrative delays for recipients.

The partnership and horizontal collaboration role is reinforced by the requirements of the RGF to consider peripheral areas. This national political agreement must be adhered to by all six RGFs; namely that at least 35% of Structural Funds expenditure must benefit the designated peripheral areas, with individual targets set for each of the RGF. Territorial politics are therefore not just about inter-city distribution of regional funds but also about supporting peripheral areas, often by developing stronger links of the designated peripheral areas to nearby cities and areas of growth and innovation (Halkier, 2011b). Peripheral regions' or sub-regions' interests need to be appropriately voiced at regional or sub-regional level, as well as the east/west divide (including rural/urban disparities).

Co-ordination between the regional and the local tier has in many ways been one of the most difficult parts of the partnership processes within the RGF (Larsen, 2011). First, inter-local rivalry in terms of location of projects and activities naturally remains. Second, there is a widespread aim to strengthen the position of local authorities *vis-à-vis* the regional level. With the sub-national reforms, local authorities increased in size and tasks, whereas regional actors saw their scope of tasks minimised, their powers of taxation removed, and long-term political support from the national level reduced. The Danish regional development plans (RUPs) are one vehicle to

focus local-regional dialogue. These plans are broader in scope than the regional business development plans developed by the RGF. RUPs also serve as a tool for regional-national dialogue but are not subject to partnership agreements like the business development strategies.

In all Danish regions, local authorities have formed *kommunekontaktråd* (KKR – local government regional councils) which try to build common positions also on regional development matters. The extent of effort and success in this has been varied, especially in the early years of RGF operation. The current, relatively constructive, working relations can be seen as a result of a learning process on the part of the actors involved (Larsen, 2011, *cf.* Andersen, 2008). An agreement in the RGF is a condition for drawing down funding from the national and European levels. Furthermore, the type of projects primarily funded by the current Structural Funds programme are of a network-oriented nature that are less tied to particular localities such as through physical investment in infrastructure. A recent agreement between the Ministry of Business and Growth and the Danish Local Authority Association concerns the future financing of the specialised business development activities in the regional Growth Houses.[18] This helps to ensure that the Growth Houses initiated by the national government remain intact and at regional level, even through their funding is now being channelled by national government through local authority budgets.

Horizontal collaboration at municipal level: different approaches in the two regions

Horizontal co-ordination at the local level takes place in two ways. The first is through collaborative arrangements for all the local authorities in a particular region. The second is collaboration between groups of local authorities within a region. Collaboration between the smaller pre-reform local authorities had both been growing from below and actively encouraged through a series of central government schemes in the 1990s (Halkier and Damborg, 2000; Halkier and Flockhart, 2002).

The sub-regional units of bottom-up municipal horizontal collaboration are more developed in Southern Denmark, where functional economic regions and historical identities are more complex. These entities function as drivers of projects and networks in business development, and presumably thrive thanks to their capacity to mobilise the commitment of private firms and public institutions in their (identity) areas of operation. While this could be perceived as a problem for vertical co-ordination within the region, it could also be viewed as an effective way of mobilising non-government actors for business development and innovation activities which target the particular strengths of sub-regional areas (see Chapter 3 for further

information on the role of Growth Houses in the two regional innovation systems). Three examples drawn from both study regions illustrate the nature of such horizontal municipal co-operation in practice (see Box 2.3).

Box 2.3. **Examples of horizontal municipal co-operation in the two regions**

Trekantsområdet (the triangle area) is an inter-municipal collaboration between six post-reform local authorities in the Southern Denmark Region which taken together are nearly the size of one of the old *Amter* (350 000+ inhabitants). The area is one of the three most dynamic and wealthy parts of Denmark, and its business development is organised through TRIN ("steps" in Danish) as an RGF-style partnership focusing in particular on cluster, network and competence building in collaboration with local government, private business and public knowledge institutions. As the financial budget is relatively limited (DKK 2.1 million in 2006), its main resource is the time invested in collaborative projects by its private and public partners and its role as a knowledge hub through its innovation monitoring programme (IRIS Group, 2011).

Nordvestjysk Erhvervsråd in the north-western corner of the Central Denmark Region serves as an interesting contrast. The organisation was originally established around three medium-sized industrial towns, one of them Struer, which is home to the Danish hi-fi firm Bang & Olufsen, and serves as a delivery vehicle for local authority business development policies (business advice, network building, competence development through education, and attraction of highly skilled staff). At the same time, it is a membership organisation for private firms within the area. Now the three local authorities have ceased to be regular sponsors of the organisation which instead continues to work on the basis of membership contributions and services. This change is likely to have been caused by a combination of inter-municipal rivalry, financial austerity, and a growing involvement in regional-level RGF-driven activities.

UdviklingsRåd Sønderjylland (URS) in the southern part of the Southern Denmark Region bordering Germany is a collaborative project between the four post-merger local authorities which cover the area of the old Sønderjyllands *Amt*. Activities focus on specialised business services with a clear cluster orientation (lean energy, biotech), while more basic services for start-ups and entrepreneurs are taken care of by the local authorities themselves. URS works with a budget of around DKK 3 million, partly derived from local governments and other partners, and partly through RGF and Structural Funds projects.

Sources: www.trekantområdet.dk; www.trin.dk; www.nordvest-erhverv.dk; and *www.soenderjylland.dk.*

Danish cross-regional efforts could intensify

Given the transaction costs associated with cross-regional collaboration, this should be undertaken when there is a clear rationale for working

together. Such possible benefits include: supporting a functional area that crosses administrative boundaries (the case for neighbouring regions); addressing common problems, increasing critical mass and supporting greater specialisation/complementarity, or economies of scale for joint action. In Sweden, for example, the nature of regional level support of the biotech industry served to divide the cluster around Stockholm instead of strengthening it (OECD, 2007a). In other locations, cross-regional collaboration is driven by the private sector given political impediments to joint public action (OECD, 2012). Other international examples of cross-regional collaboration in regional contexts more similar to Denmark include the Northern Way that grouped three regions in England that faced common challenges, had some common strengths, and needed greater critical mass to compete with the regions around London (see Box 2.4).

Box 2.4. **The Northern Way: North of England, United Kingdom**

The Northern Way was created in 2004 by the government as a vehicle to support the regions of the North of England in efforts to reduce the output gap with other parts of the United Kingdom. It was structured as a partnership between the three regional development agencies (RDA) in the North but works also with local authorities, universities and the private sector. The Northern Way's Growth Strategy was supported by a fund of GBP 100 million (50% from government, 50% from the different RDA budgets), allocated to collaborative projects in ten different investment priorities. including skills, transport, innovation, clusters, entrepreneurship, etc. Starting in 2007, the Northern Way revised its approach to be more strategic than programme oriented. The budget provided by the RDAs for the next three-year period was GBP 45 million, to support an ambitious policy research programme and collaborative demonstration projects, including in the innovation field. This revision has resulted in a change in roles and priority areas. The refocused priorities for action fell under three categories: transport, attracting private investment and innovation. There is also a stronger emphasis on providing an evidence base for policy with respect to the North, and in influencing national policy in areas of distinctive interest to the North. It should be noted that the RDAs and Northern Way ceased to operate in 2011.

Source: OECD (2008), *OECD Reviews of Regional Innovation: North of England, United Kingdom 2008*, OECD Reviews of Regional Innovation, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264048942-en*.

In the case of Central and Southern Denmark, and likely other Danish regions (particularly outside of the Capital Region), several of these collaboration rationales exist. For example, they both lack critical mass in many areas of industrial and research expertise for effective global competition and face several common problems regarding different aspects of their industrial structure and geographic position, among others. They also may face issues of insufficient specialisation for certain business

services. There are research institutions or clusters in one region relevant for the development of the cluster in another region. In fact, many of the regional clusters already see beyond the administrative barriers. There exist several areas of common sectoral priorities. Disincentives, beyond co-ordination costs, may concern the types of success measures of the RGF (what they do for their own region) as well as the fact that a limited number of regions in Denmark means that multi-regional projects would, in fact, come close to being national projects and hence might be funded through other channels.

A recent mapping by the Danish Regions association of cross-regional collaboration among RGF notes there is cross-regional collaboration in Denmark.[19] It occurs notably in the priority areas such as welfare technology, climate and energy, and growth projects that are common to most Danish regions. They found 37 formal cross-regional initiatives, 40% between two regions and a third among all Danish regions. It notes that while in the early phases the RGF focused on engaging actors located within the region, in more recent years they have reached out to other regions. The Competiveness Pool in Denmark requires cross-regional collaboration for receipt of funds. Projects with regions in other countries are mainly driven by the EU INTERREG programmes and associated with neighbouring countries, and may also involve cross-regional collaboration within Denmark.

The Association of Danish Regions plays an important role in organising networks across regions that can be focal points for collaboration. This is particularly relevant for several areas, such as for data, evaluation, interfacing with the national government, etc. For example, the six RGF and the Danish Business Authority began a joint project on improving impact measurements of the initiatives taken by the RGF.

There exist a few incentives from the national level promoting inter-regional collaboration. One example is the 10% of EU Structural Funds allocated by the Danish Growth Council for cross-regional initiatives, the Competitiveness Pool (see Box 2.5). While funds are one way to drive inter-regional collaboration, given the restriction of themes for projects and the administrative burden, it is not clear that increasing the share of EU funds in the pool would necessarily improve regional and national growth prospects. In other national competitive programmes, particularly from the Danish Agency for STI, there are explicit requirements in tenders to involve more than one region as a condition for competition. Evaluations of the regional Growth Houses have also suggested greater cross-regional support for specialised services given findings by firms that the services are too generic (see Chapter 3 for discussion of the use of Growth Houses in the different regional innovation systems).

Box 2.5. **The Danish Growth Council and the Competitiveness Pool**

The Danish Growth Council gives advice to the government about policies and initiatives able to promote and stimulate economic growth in Denmark and to make it more competitive in the global economy. It is also responsible for promoting co-ordination between national and regional strategies concerning economic growth and business development. The Danish Growth Council focuses on a small set of specific themes per year. The Minister for Business and Growth appoints the 20 members of the Danish Growth Council (the chairman and 19 other members), representing private enterprises, knowledge institutions, local authorities, the six regional growth fora, and labour organisations (unions and employers).

The Danish Growth Council funds projects related to regional competitiveness and employment through a competitive bid to use the set aside of 10% of the EU Structural Funds of Denmark (the Competitiveness Pool). Project applications, which should preferably include more than one Danish region, fulfil themes selected by the Council for that year and are evaluated by a team of experts in consultation with Danish Growth Council representatives. For 2011, these themes were: *i)* spin-off companies as a source of growth and establishment of new business; *ii)* partnership as a source of growth and innovation; and *iii)* enhancing skills and competences in SMEs. In 2010, the selected themes were: *i)* creation of knowledge centres to increase productivity and digitalisation in the construction sector; and *ii)* development of public problem-solving and new welfare technology. In 2009, themes addressed: *i)* favourable conditions for foreign workers in Denmark; and *ii)* improved environment in secondary teaching.

Source: Danish Growth Council
www.danmarksvaekstraad.dk/den_konkurrenceudsatte_pulje.

Going beyond EU-funded cross-regional initiatives for accessing international networks

The same general principles for cross-regional collaboration within Denmark apply to international settings, albeit the barriers to co-operation tend to be greater. Many of the existing international collaborations for Central and Southern Denmark fall in the context of EU-funded INTERREG programmes of different types of territorial co-operation: cross-border (Strand A), trans-national (Strand B) and inter-regional (Strand C). Findings of evaluations among these three strands in Central Europe noted successes in the immaterial effects (knowledge-sharing), and the best results were often achieved in the cross-border strand where larger sums of money and more concrete projects were developed (Hummelbrunner, 2012).

For example, the Region of Southern Denmark, on the border with Germany, is leading the operational INTERREG 4A Programme for cross-border co-operation of the Schleswig-KERN area across the two countries. In the innovation field, there is a project to support stronger co-operation between clusters in Southern Denmark and Schleswig-Holstein and the creation of a framework for sustainable co-operation in the cross-border region within the fields of business, science and education. In addition to the INTERREG 4A Programme, the Region of Southern Denmark has also built a strong strategic partnership with the *land* Schleswig-Holstein that focuses on transforming a peripheral region into a growth region. Another INTERREG Strand A programme, OKS – Öresund-Kattegat-Skagerrak – is viewed as highly relevant by Central Denmark. Among transnational (Strand B programmes) are the Baltic Sea Programme and the North Sea Programme. For the North Sea, during the current programming period, EUR 138 million is devoted to a large number of projects focused on coastal communities, areas in decline, energy efficiency and sustainable development. Partners in the regions only use to a lesser extent the Strand C programmes.

However, the regions need to go beyond the EU-funded programmes to better integrate international networks. Central Denmark has more instruments in its policy mix supporting international collaboration (see Chapter 3), and appears more proactive in seeking out such opportunities. For example, Central Denmark has entered into a strategic partnership agreement with the Shanghai City-Province in China, covering areas such as welfare technology and IT innovation. The region has also formalised partnerships with a series of foreign regions in Hungary, Poland, the Russian Federation, etc. Finally, it is participating in a series of international projects with mainly European partners to influence EU policy, such as through the Conference of Peripheral Maritime Regions of Europe, and EU institutions involved in the North Sea and the Baltic Sea areas. Other opportunities for knowledge exchange occur through participation in the European network EURADA and the EU 2020 Monitoring Platform, as well as Districts of Creativity, a global network of creative and innovative regions. Southern Denmark has some co-operation with foreign regions such as Guangdong (China), Malopolska (Poland) and Olomouch (the Czech Republic).

Central-regional relations, formal and informal mechanisms

There are several vehicles for regional-national collaboration to mutually inform each other's policies and strategies. As in any country, communication via political parties is one vehicle for central-regional

co-ordination. There are also annual negotiations for the regional economy between all regions and the central government, supported by the Danish Association of Regions. The relationship between the RGFs and the national level is, from the outset, based on political and financial sponsorship. The 2005 Business Development Act created the new partnership organisations, defined their tasks and their policy instruments, and designed the funding arrangements for their activities which include a significant element of state transfers (21% in 2009).[20] The Danish Growth Council has as a task to promote (not require) co-ordination between the National Growth Strategy and the regional business development strategies (see Box 2.5). The council includes the presidents of each RGF. The council would therefore seem a relevant forum for understanding how each region contributes to national growth, but it is not clear the council has made the most of this opportunity to do so.

In addition, two features of Danish regional policy can be seen as vertical co-ordination between the national and regional levels. Both venues of vertical co-ordination provide a framework for regional action. They prescribe particular policy instruments and project types, while still leaving the RGFs free to decide how to structure their programmes.

- **Strategic co-ordination** takes place through the so-called partnership agreements between government and each of the six RGF. The process is managed by the Ministry of Business and Growth but involves other ministries as well. There has been growing acceptance of this instrument of vertical co-ordination for regional development activities by departments of central government outside of the sponsoring ministry. The case of the partnership agreements thus neatly demonstrates the possible links between vertical and horizontal co-ordination processes in a relatively small policy network. The existence of strategic co-ordination also can be useful for quick decision making, such as in Denmark and other countries like Sweden where plans and actors were in place for deployment of stimulus packages.

- **Implementation co-ordination** takes place within the Structural Funds programmes in which the Danish Business Authority plays a pivotal part. It produces nationwide, cross-regional programmes and ensures that individual projects comply with national and European regulations. In the current programming period, this has pushed for larger and more complex projects and reduced the scope for direct grant-aid for productive investments and physical infrastructure (Halkier, 2007; 2011a).

Partnership agreements: building strategic national-regional co-ordination

Instituted with the 2007 reforms, these partnership agreements increasingly facilitate inter-governmental dialogue but do not have any budgetary implications. Co-ordinated by the Ministry of Business and Growth, these short documents are mainly political statements describing a concrete co-operation project or a process of further dialogue that may clarify co-operation possibilities. The partnership agreements are made within the existing economic and administrative frames. They therefore do not make any direct binding economic commitments where ministries allocate funds through competitive procedures. Agreements include both a general political commitment to shared goals and specific undertakings that the two sides will attempt to progress. This mechanism was introduced after the RGF had been established as part of the so-called globalisation strategy of national government to secure compatibility between the globalisation strategy of central government and regional strategies for economic development.

A first advance was to have regions and national government sharing the same general goals for supporting growth, which is now achieved. When first introduced, the partnership agreements were viewed with some scepticism by many regions as additional and unexpected interference in their own strategy development processes (Larsen, 2011; Halkier, 2011b). The agreement development process initially began with regional submissions of project "wish lists", which the relevant ministry would accept or reject. Over time, they have become more focused on dialogue. In 2011, the Ministry of Economic and Business Affairs (now the Ministry of Business and Growth) organised a "speed dating" approach to bring together a wider range of ministries and to discuss in greater detail possible joint action before finalising any agreements through more bureaucratic procedures. They nevertheless remain relatively "light" documents of mutual intent (see Table 2.1).

The use of the instruments has been described by public actors as a "journey" with increasingly positive feedback at both levels of government. The regions view these agreements as a way to open the door for a discussion of funding in the future that initially was perceived as more top-down. The Ministry of Science, Innovation and Higher Education has seized the opportunity of these agreements to promote its national agenda with regions. Other ministries have been less proactive in engaging in dialogue with the regions.

Table 2.1. **Partnership agreements: Central and Southern Denmark (2010)**

Central Denmark	Southern Denmark
Action plans in the following areas (**both regions**): – Education and labour supply – Improving conditions for new growth businesses – Innovation and knowledge transfer – Branding and marketing of Denmark – Green growth – Evaluation and impact measurement of regional efforts for growth and business development – Cross-border co-operation (Southern Denmark) – Digitalisation (Central Denmark)	
Special focus on key initiatives: – Risk capital: government fund of DKK 150 million for western Denmark (includes Central Denmark Region) – Increasing efficiency through ICT: closer co-operation between national and regional programmes to promote SME innovation and use of ICT in business processes. – Increasing interaction between educational institutions and firms: national and regional efforts will increase the number of training places/internships for students (primarily vocational education); support talent attraction for high-skilled labour (supported by a government initiative to allow additional international upper secondary education in the region); both seek to strengthen technical and natural science education in the region. – Focus on the food industry: both will support regional high-quality food products; work to develop an integrated competence centre for fishery in Thyborøn; the development of food-related education and competence building in the sector; integrating the food industry in "the experience-based economy". – Establishing a Centre for Coastal Tourism: a Knowledge Centre for Coastal Tourism will be established in Hvide Sande (a western coastal town) in collaboration with the neighbouring regions.	**Special focus on key initiatives:** – Welfare technologies and public-private innovation: including a new regionally sponsored Innovation Centre for User Involvement; strategic partnership with Export Council – Better access to venture capital in western Denmark: government fund of DKK 150 million that the region will promote; region set aside DKK 50 million for venture capital in welfare technology and services (an additional DKK 25 million added by region since then) – Cross-border research and education: closer university co-operation between Southern Denmark and Schleswig-Holstein region in Germany, government will look into cross-border with Germany for several regions – Strengthening green offshore energy: both Growth Forum and government to support centres in Funen Island in western Denmark; boosting of science skills with focus on lean energy cluster (Growth Forum allocated DKK 40 million); working with National Centre for Nature, Technology and Health, need to attract highly educated foreign workers

Source: Regions of Central and Southern Denmark.

Informal co-ordination patterns have started to emerge as a result of the annual political partnership agreements.[21] The Ministry of Science, Technology and Innovation – most often through the Agency for Science,

Technology and Innovation – has taken advantage of the opportunity to collaborate with regions, both at the strategic level and for programme implementation, to maximise impact of national funds. Within the limits of the overall partnership agreement between the government and the RGF, a further agreement is entered with the Danish Council for Technology and Innovation and the RGF to ensure co-ordination, coherence and synergy between the national and regional innovation efforts. There are also examples of collaboration with specific ministries in relation to the strategic focus areas in an RGF's strategy.

Consideration could be given to promoting other areas of regional development not in the explicit domain of regions. In the case of the partnership agreements with the RGF, given the innovation focus, the scope for many new areas is more limited. However, other forms of inter-governmental contracting with the regions may be possible, and in some cases could include a major city in the form of a tri-partite agreement. For example, underinvestment in the country's infrastructure has been identified as a barrier to growth (OECD, 2009). Regional development plans (RUP, broader than the regional business plans – see Chapter 3), for example, cover issues of infrastructure. There are other major growth drivers that are essentially beyond the control of regions, such as secondary and tertiary education (albeit regions can develop specific regional programmes) that can be subject to such agreements.

Many OECD countries use contracts that promote relationship building since this is a core part of the dialogue between levels of government. However, when the funds are to support regional development, including supporting clusters and regional innovation systems, it is not always clear upfront from the national, or even regional level, what the best solutions are. This is why the concept of relational contracting is used. The regional level generally has better information about what is needed to support specific regional needs. At the same time, national government has the resources that need to be used efficiently and effectively, and a perspective on what is taking place in other Danish regions as well as globally. Relational contracts serve to build capacity and engage both parties. Much of the benefit of the learning is in the nature of the discussion about the needs of the region and how to best support them. Unlike a general call for proposals, whereby the national government evaluates the responses, relational contracting is more interactive. It serves as a vehicle for managing a relationship that involves information sharing over time.

There are a number of OECD examples that could be considered by Denmark as the partnership agreements continue to evolve (see OECD, 2007b). In France, the *Contrats Plan État-Region* have been used for several cycles as a framework (now seven years) for joint action to

support regional development. They also promote alignment with regions for clusters supported by national policy (*systèmes de productifs locaux* and the *pôles de compétitivité*). In Italy, the *Accordi di Programma Quadro* support joint action, sometimes with a timeframe for projects up to ten years, that can cover a wide range of regional development issues including enterprise support for innovation and human capital. In Spain, *convenios* are used on both a bilateral and multilateral basis. The fact that such multilateral *convenios* are public ensures a high level of transparency (Box 2.6).

Box 2.6. **Contracting procedures: the case of France and Italy**

Contracts can be used in the context of different governance frameworks (from unitary to federal countries). Analytical reasoning based on contract theories reveals a continuum of contracting logic that ranges from "transactional" (co-ordination problems can be stated *ex ante*, before the signature of the agreement and the arrangement between the parties states the reciprocal duties of each of them) to "relational" (parties commit to co-operate *ex post* after the signing of the contract and design a "governance mechanism" for that purpose). The "optimal" type of contract is highly dependent upon the purpose of the co-ordination between the parties, upon the resulting nature of the co-ordination process to be managed, and upon the implementation context (constitutional framework that organises the relationship among levels of government).

In France the *Contrat de Projet État-Region* (CPER) is the primary mechanism for regional planning and development. First, CPERs are signed between the central government (the regional prefect) and the head of the regional council (an elected official). Other regional actors, such as associations and firms, also play a notable role in the process of preparing the regional strategic plan. Second, CPERs include a territorial component that consists of specific sub-contracts. Although they address different issues, these contracts nonetheless belong to a single framework – that of the state-region planning contracts. A third element related to all aspects of CPER, and not just to the "territorial" dimension, is that these CPERs are co-funding and, strictly speaking, not delegation contracts. Thus, parties agree upon the realisation of a certain number of tasks and the way these tasks will be funded.

The French CPER offers a framework for long-term planning and co-financing of the region, including a number of investments related to science, technology, and innovation. On the other hand, contracts with sub-national entities leave more room for manoeuvre to the sub-national levels of government because these contracts define the projects that the sub-national agents have worked out. However, these projects must still be accepted by the central government. Over time, this top-down conception has seemingly evolved into a more ascending view of contracts based on projects designed by the regions themselves, thus increasing the role and importance of regions.

Box 2.6. **Contracting procedures: the case of France and Italy** (*cont.*)

In Italy, the *Accordi di Programma Quadro* (APQ) operationalise the *Intesa Istituzionale di Programma* (IIP), a broad agreement reached by the central government and the regions or autonomous provinces. It defines the objectives, the sectors, and the areas where the (material and immaterial) infrastructure essential to territorial development should be located. The APQ is signed by the interested region, by the Ministry of Economics and Finance, and by one or more central administrations, depending on the nature and the sector of intervention. In cases where negotiations preceding the signing of the IIP are sufficiently mature, the IIP and the APQ might be signed simultaneously.

The APQ's primary purpose is to co-ordinate the actions of the many public and private agents (vertically or functionally specialised) that are involved in the definition of territorial development policies to achieve greater coherence, quality and speed of intervention. Co-ordination is sought through an *ex ante* process of negotiation of the objectives and the instruments of multi-year territorial policies, as well as of the definition of reciprocal commitments and of a clear schedule. The co-ordination objective is reflected also in the duration of most APQ that stipulate commitments by their signatories over a multi-year period (actions, financing, monitoring and conflict resolution). Indeed, many of the APQ signed thus far envisage commitments through 2015. The APQ are used in all the major sectors of intervention: cultural and human resources, cities and networks, and industrial districts.

Source: OECD (2007), *Linking Regions and Central Governments: Contracts for Regional Development*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264008755-en.*

Regions in Denmark report that one of their main governance-related challenges is overcoming gaps in inter-ministerial co-ordination at central level, which partnership agreements may help address. In the most recent round of agreements, three ministries were actively involved. Agreements can serve to better co-ordinate actions by different central level agencies in a particular region, a concern raised in the regions. One example from Central Denmark was the use of the partnership agreement to promote the merger of Aarhus University (under one ministry) with the engineering college (under a separate ministry). The French and Italian examples both bring together different ministries behind these long-term focused contracts. The Spanish *convenios* tend to be more bilateral and do not address this inter-ministerial co-ordination question.

A range of possible mechanisms for national-regional support of innovation policy exist

National governments use a range of strategies to bring a regional dimension into innovation-related policies. They include: consultation processes, regular dialogue, regional agencies of national governments, agreements/contracts, project co-financing, and national territorial representatives. OECD countries generally report using several of these mechanisms simultaneously, but have rated consultation and dialogue as the most effective (OECD, 2011). As cluster-related policies are a common national innovation policy programme with a regional dimension, countries have developed policies to jointly select and/or co-fund them (OECD, 2007c).

Several of these mechanisms are already used in Denmark. The aforementioned partnership agreements are a way to align intentions and possible independent projects. Co-financing of projects supported by the RGF is another practice, as municipalities and the national government also contribute to regional projects. Applications and development of innovation networks, for example, involve the Ministry of Science, Innovation and Higher Education and the RGF. Both national ministries and regional officials share a responsibility to promote this mutual information sharing.

Consultations and dialogue are promoted by some national ministries. The Ministry of Business and Growth has brought regions together to finance and develop joint national-regional projects, such as evaluation of the Growth Houses. The Ministry of Science, Innovation and Higher Education will, in the consultation for the new national Innovation Strategy, include the development of a joint strategy for national and regional policies on networks and clusters, as well as to co-ordinate the entities initiated at each level. Such a strategy would benefit from jointly accepted mapping exercises to identify the geographic location research and industrial competencies, as well as the associated organisational initiatives. This should also serve a valuable role in helping each region understand its contribution to national goals, informing national government in funding and location decisions, and highlight opportunities for cross-regional initiatives. The United Kingdom's Technology Strategy Board used an alignment procedure for funding to convene national government with regional representatives that resulted in this greater understanding of the different niches across the country (OECD, 2008b).

For STI policy, new mechanisms are being developed to help ensure national-regional alignment in several OECD member countries. In the Netherlands, for example, the Ministry of Economy (which is responsible for both innovation and regional development policy) is a shareholder,

together with provinces, in three regional development agencies. In Finland, the Centres for Economic Development, Transport and the Environment (ELY) are national institutions reporting jointly to the Ministry of Employment and the Economy and to the Finnish Funding Agency for Technology and Innovation (Tekes), which work in close co-operation with regional councils on innovation-related programmes. Norway has taken several initiatives to allow for regional participation in joint institutions or in regionalised use of research funds (Box 2.7).

Supporting joint policy intelligence

It makes sense, particularly given the scale of Denmark, to work together on policy intelligence for efficiency and information-sharing. There are already several examples of such efforts, including for impacts of the Growth Houses (shared data analysis), development of better impact and evaluation measurements (use of EU Structural Funds), or for information-sharing and input (participation in evaluations of innovation networks). A number of national level entities (Ministry of Business and Growth; Danish Business Authority; Danish Agency for Science, Technology and Innovation; FORA; Danish Statistics, etc.) could make additional analyses with regional level data, or develop data relevant for regional needs (such as more relevant categories for data given regionally supported clusters). Furthermore, the regions also have their own analysis units, some specific regional data, and a number of regionally funded reports (such as on clusters). The Danish Regions Association can also contribute by promoting harmonisation of some of the data and budgetary practices that facilitate greater cross-regional and inter-governmental policy intelligence-sharing. It could build on the tracking of regional innovation-related statistics as done through the Danish regional statistics portal.[22] In that context, the toolkit developed by the French government to help regions in the development of their regional innovation strategies might be a source of inspiration (Box 2.8).

Inter-departmental co-ordination at central level to create synergies and reduce system complexity

Formal committees in Denmark for inter-ministerial co-ordination to support regional development have proven less effective than proactive measures taken by individual ministries. Per the 2006 Danish Globalisation Strategy, an inter-ministerial committee was charged with co-ordinating regional policy, although this committee was disbanded after the 2011 elections.[23] The new government appointed a ministerial committee for new business and growth politics, but it is too early to make observations about its functioning.[24]

Box 2.7. **Norway: multiple programmes and institutions for a regional dimension to STI policy**

Norway has cluster-type programmes, similar to those found in many countries, which add an explicit regional dimension to STI policy. But Norway has also developed new practices and institutions to further this regional dimension through joint development and implementation, going beyond mere co-ordination.

Innovation Norway is a creative approach to national-regional co-ordination through joint ownership of a national agency. Launched 1 January 2010, Innovation Norway is 49% co-owned by the county municipalities (regional level). Hence, the regional responsibility for design and funding of Innovation Norway's programme portfolio (covering substantial parts of the innovation policy) will increase.

The Norwegian Programme for Regional R&D and Innovation (VRI) is one of the leading initiatives promoted by the Norwegian Research Council and it aims to promote research and innovation at the regional level in Norway. VRI was launched in 2007 through 2016. Regions have developed strategies and identified priority areas for development and designed instruments to strengthen collaboration and knowledge transfer. VRI initiatives are carried out in partnership with regions that actively support VRI projects and initiatives. VRI also support the establishment of **regional dialogue conferences**, namely meeting places for regional actors to learn about each other and share experiences to develop a common idea on how they could work together. The priority areas selected by regions all over Norway are varied and diversified and cover topics such as: ICT, energy (oil and gas, bio, renewable), food, maritime industry, biotechnology life sciences, electronics, culture and creative industries. Within the framework of VRI, each region has selected business-oriented priority areas and within these areas each region selects a set of instruments that it wishes to use to promote collaboration between companies and research units. The most commonly used instruments by regions are: mobility schemes, competence brokering, active research in companies, networks, pre-project funding, and regional foresight.

SIVA, the Industrial Development Corporation of Norway, was launched in 1968 to develop regional and local industrial clusters by means of the development of infrastructure, investments, knowledge networks and innovation centres. The aim of SIVA is to develop and improve the national infrastructure for innovation through: *i)* real estate; *ii)* innovation; *iii)* industry; and *iv)* internationalisation. SIVA is particularly focused to promote innovation in remote peripheral areas, so as to create economic development in each region in Norway, as well as working with companies outside of Norway. SIVA co-operates closely with Innovation Norway. SIVA has been supporting firms by investing in physical infrastructure, offering risk and financial help, providing access to markets, and mobilising private and public resources. SIVA has promoted the development of business and research incubators, business gardens (an action that aims to stimulate innovation in SMEs and in firms located in peripheral areas), research and science parks and centres of expertise.

Source: The Research Council of Norway, *www.forskningsradet.no/prognett-vri/Home_page/1224529235237*, *www.siva.no*.

Box 2.8. **Regional innovation strategies: toolkit for French regional authorities, 2007**

When applying for Structural Funds, French regions prepare documents on their development strategies and forward them to the European Commission. Brussels often considered that such papers lacked coherence and that the policy analysis could be more robust. The French government therefore decided in 2007 to create a guide that would help regions to assess their strengths and weaknesses and would also improve the decision-making process. The guide was completed in November 2007 after discussion and consultation with several pilot regions. It has now been communicated to all regions. The guide provides an overview of the main factors determining regional growth in modern economies. It describes the overall components of the innovation system and indicates a number of regional indicators to calculate as well as benchmarks to consider. It provides methodological keys for establishing a regional strategy based on the diagnosis. Priorities are selected according to a number of criteria. Programmes are monitored through the use of appropriate indicators and references.

Source: *www.datar.gouv.fr.*

Many OECD countries have instituted inter-ministerial committees to address the multi-dimensional nature of regional development, with varying degrees of success. When such committees are managed by the highest levels of government, above sectoral ministries, they are more likely to have impact. For example, the Austrian Conference on Spatial Planning is managed under the Federal Chancellery. Slovenia has recently instituted a Council for Territorial Balance of Development, chaired by the Prime Minister. If the chairmanship is held by a sectoral ministry, then a rotating chairmanship is another strategy for ensuring greater engagement of different ministries. France's CIADT – *Comité interministériel à l'aménagement et au développement du territoire* – has not only served as a long-term strategy of the government to bring different committees together, it has served additional purposes such as in helping with a crisis recovery strategy. But beyond committees, a wide range of vehicles are used in the OECD for supporting this central level co-ordination in support of regional development policy (Box 2.9). Another example is that of the Finnish Centres of Expertise (CoE) Programme, managed by an inter-ministerial committee administered by the Ministry of Interior's Regional Development Department, to combine a regional approach with an inter-sectoral dimension. Flanders (Belgium) has taken a horizontalisation approach, where innovation has been considered as a policy goal across departments by emphasising creativity, entrepreneurship and innovation, including services and the public sector.

Box 2.9. **Inter-sectoral co-ordination for regional development: OECD country strategies**

- **Co-ordinating structures such as inter-ministerial committees and commissions.** This is one of the simplest systems for horizontal governance as it is based on the existing government structure. Examples include the Presidential Committee on Regional Development in Korea and the Cabinet Sub-committee on Rural and Regional Policy in Norway.

- **Fully-fledged ministries with broad responsibilities and powers that encompass traditionally separate sectors.** Some positive implications of the concentration of different responsibilities within the same authority include: a more open and coherent view, the concentration of skills and the possibility for a more integrated approach. Specific ministries for regional development were created in Chile, the Czech Republic, Poland the Slovak Republic, and Slovenia.

- **Strategic planning and programming, including agreements, frameworks and instruments.** The formulation and implementation of regional policy programmes and/or spatial planning can provide the impetus and framework for greater central co-ordination and is widely used across OECD countries. Planning and programming have been recognised as policy tools for regional competitiveness policies. In many countries, spatial planning is gradually moving from land-use regulation frameworks towards long-term strategic documents, focusing on the co-ordination of diverse issues and interests across sectors as well as between levels of government. They often incorporate monitoring, feedback and revision mechanisms. Examples include the National Strategic Reference Framework in EU countries, the National Spatial Strategy in Japan, and the Comprehensive National Territorial Plan in Korea.

- **Special units or agencies that provide planning and advisory support to facilitate policy coherence across sectors at the central level.** High-level "special units" have been created in several countries to ensure consistency among sectors. The closer such units or co-ordinators are to a chief executive, the greater the incentives are for co-operation across sectoral ministries. Examples include DATAR (Délégation interministérielle à l'aménagement du territoire et à l'attractivité régionale) which is linked to the Office of the Prime Minister in France and the Austrian Conference on Spatial Planning under the auspices of the Federal Chancellery. Special units under sectoral ministries include, for example, the National and Regional Planning Bureau of the Ministry of Land, Infrastructure, Transport and Tourism in Japan and the Spatial Economic Policy Directorate of the Ministry of Economic Affairs in the Netherlands.

Box 2.9. **Inter-sectoral co-ordination for regional development: OECD country strategies** (*cont.*)

- **Regional ministers.** Ministers must take into consideration the territorial aspects of the programmes and policies of their portfolios. For example, Canada appoints "regional ministers" who have regional responsibilities and represent the interests of their respective regions. Ministers combine their regular (sectoral) portfolio duties with their regional political roles. France and the Netherlands have appointed a minister who represents the interests of the leading region in the country, i.e. the State Secretary for the Development of the Capital Region of Paris and the Minister for Randstad.

- **Territorial proofing mechanisms.** Territorial proofing is a mechanism that monitors government policies to prevent them from having a negative impact on certain types of territories. Ideally, proofing should be implemented in the early stages of the policy design process. In addition to the rural proofing system of the United Kingdom and Canada, Korea and Sweden recently introduced a rural proofing mechanism. In Sweden, the rural development strategy was developed in 2009 and every ministry had an assignment to look at their own policy area with a rural perspective. In Finland, the Ministry of Employment and Economy has required sectoral policy makers to clarify their regional strategies and assesses regional impacts (regional proofing) since 2004. Ten key sector ministries must define regional development plans concerning their field of responsibility, which fit into the Regional Development Act guidelines defined by law and the nine regional development targets adopted by the government in 2004.

- **Combining financing and/or creating a consistent and comprehensive budget.** The budgeting system is also a powerful tool for more integrated policy making. Integrating financial tools and programmes can contribute to improve transparency, create synergies across sectors and facilitate accountability and performance monitoring. Mexico grouped together ministerial budgets for rural policies into an official rural budget under the Special Concerted Rural Development Programme. Korea transformed many specific-purpose national grants into general grants, and established the Regional Development Special Account. A block grant was then adopted to give local municipalities the authority to autonomously design projects.

Source: OECD (2010), *Regional Development Policies in OECD Countries*, OECD Publishing, Paris, *http://dx.doi.org/10.178/9789264087255-en.*

With respect to horizontal co-ordination for Danish innovation policy, there are two lead actors. They include the research-driven Ministry of Science, Innovation and Higher Education and associated bodies, and the business-oriented Ministry of Business and Growth and associated agencies.

Moreover, within the regions, the final beneficiaries of the different policy streams (private firms and knowledge institutions) overlap to some extent. A degree of informal co-ordination would seem to exist not just at the political level but also at the more substantial level where innovation, knowledge creation and economic growth take place. The partnership agreements serve as a platform for the two ministries to co-ordinate their activities with each region within this framework. In addition, the two ministries have an agreement on the division of labour and responsibilities with respect to innovation policy issues. But the agreements have also worked as a platform for the regions to address regional challenges where the solutions need action from several ministries, e.g. application for the European Globalisation Fund, or issues important for further regional growth, e.g. testing facilities for large-scale windmills.

Given the challenges for formal co-ordination bodies to achieve the goals, several "bottom-up" initiatives by national ministries or agencies are supporting this inter-departmental co-ordination. The various sector ministries participate in the steering groups of the cluster organisations part of the Innovations Networks Programme run by the Ministry of Science, Innovation and Higher Education. The Ministry of Energy, the Ministry of Food, and the Ministry of Climate and Energy consult the Strategic Research Council. The Ministry of Science, Innovation and Higher Education also co-ordinates its investments in innovation consortia, innovation projects and innovation networks with the funding bodies of the sectoral ministries to avoid double financing of activities and to ensure co-ordination and transparency with respect to concrete activities.

Despite these efforts, the regions still identify insufficient inter-departmental co-ordination at national level as a problem due to system complexity and programme proliferation (see also Figure 3.2 in Chapter 3). For example, Netmatch and REGX are two organisations supported by the two ministries to support innovation networks and cluster organisations respectively. While the tasks of each entity may not overlap, as they are financed by different ministries there is not necessarily a consultation prior to the initiation of a programme. There is some shared representation on respective boards, and more recently meetings of the two to co-ordinate so as to reduce possible duplication and more clearly define the tasks. Efforts to prevent possible overlaps from the beginning could reduce some of the transaction costs associated with rationalisation of activities afterwards, through discussion not only among national ministries, but also between national ministries and regions informing each other of possible initiatives.

Conclusion

Denmark has introduced profound changes in its governance system and laid the groundwork for a more rational management of regional and innovation issues. Regional councils and RGF are evolving to be agents of transformation for their regional economies. This is particularly critical for peripheral regions with sub-optimal conditions for innovation, as is the case with several municipalities in Central and Southern Denmark.

Partnerships have been established with the central government to make the regional/state relationship increasingly productive, supported by the annual partnership agreements. The central government could make more active use of the RGF mechanism to meet both national and regional goals. RGF play an important role in boosting the regional economy, helping to set priorities for investment, and serving as a mechanism for project approval of national programmes. And the agreements are reportedly supporting greater inter-ministerial co-ordination, which is needed to reduce, when possible, unnecessary system complications. Trust-building between the regions and central government, as well as with the municipalities, needs to continue. In that context, more advanced use of contracting procedures between the different levels of government could be a way forward. International experience seems to show that formalised relationships between the regions and the central government can help the regional level to become a driving force in regional policy making. Furthermore, thanks to contracting procedures where there is funding and formal mechanisms, regions can gain further expertise in strategic policy design and national governments get valuable information from regions.

As is common in OECD countries, mechanisms are required to assess the relevance of different regional assets for national goals. Regions outside of the capital in many countries often feel marginalised by their relative remoteness. To support the upcoming new national innovation strategy, as well as other business development policies, commonly accepted mappings of different areas of industrial and research excellence are needed. This serves both to illustrate the regional contribution to national goals, as well as the regional niche on a global scale. It will also serve to identify areas for further co-operation for building critical mass, or complementarity in the regional contributions to national targets. Greater use of harmonised data and budget information, as well as shared policy intelligence between national and regional levels, will further serve these interests.

Funding of regional business and innovation support requires piecing together different funding streams. The influence of EU Structural Funds affects nearly all regional level spending in Denmark. However, the spending rules do impose constraints on the nature of regional action. It is

therefore important to focus on simplification and an orientation towards results. This is particularly important given the increasing need to mobilise private sector investment towards regional growth goals.

Key recommendations

- Build on the progress thus far of national-regional partnership agreements to:
  - promote greater inter-ministerial co-ordination at national level with respect to place-based policies for supporting growth, also seeking to reduce programme proliferation in the innovation system when possible;
  - consider establishing more concrete and longer-term commitments with associated funding;
  - address bottlenecks to growth outside of the regional mandate for action.
- For development and implementation of the new national innovation strategy, as well as entrepreneurship policies, and in collaboration with the regions:
  - generate commonly accepted mappings and studies of research and industrial competencies to match the localisation of research with industrial competences when possible and identify the contribution of each region to national goals in an international context;
  - make greater use of bottom-up cross-regional opportunities to build critical mass and support specialisation of clusters in national and international networks;
  - continue to support shared policy intelligence and data analysis between national and regional governments.
- Given the prominence of EU funding rules for regional growth forum spending:
  - identify with regions and the EU opportunities for administrative simplification and flexibility in EU spending rules and/or the Danish interpretation of those rules;
  - use the joint national-regional impact evaluation of Structural Funds to develop best practices for project monitoring and impact.

Notes

1. See, for example, Cooke and Morgan (1993) and Halkier and Danson (1997).
2. See, for example, Regeringen (2004), Indenrigs- og Sundhedsministeriet (2004), Økonomi- og Erhvervsministeriet (2005).
3. The main function of the designated peripheral areas is a political commitment to devote at least 35% of expenditure on regional development projects (including both ERDF and ESF) for the benefit of the designated peripheral areas in which only around 10% of the Danish population lives.
4. There is one for each of the three regions in the Jutland Peninsula and one for Zealand including the Zealand Region and Capital Region.
5. In 2008, the regions' operational expenditure amounted to approximately DKK 87 billion of which municipal co-financing constitutes approximately DKK 18 billion, and overall regional development spending was DKK 2.3 billion (Danish Regions, 2008).
6. For example, 86% of respondents said that complex and bureaucratic application process limited the usefulness of EU funding; 71% of respondents found that prohibitive and disproportionate control and auditing processes were also a challenge; 68% said that restrictive and inflexible administrative and reporting procedures were also getting in the way of access and efficiency; and 72% said that the financial management of EU Structural Funds is too complex and 59% said that the overall administration was too complex. Furthermore, the administrative burden deters third-sector organisations, universities and SMEs from applying for EU funding for the first (*sic*) to some extent according to 46% and a great extent for 48% respondents.
7. Per the Prime Minister's address to the European Parliament 18 February 2012, "The only sustainable future for our social market economies is to embrace change and increase competitiveness. The essential basis for that is stability that fosters growth, and opportunity that maximizes innovation." (Danish Prime Minister's Office, 2012)

8. These four areas are: *i)* strengthening co-operation between companies and knowledge institutions; *ii)* increasing the number of highly educated in enterprises; *iii)* increasing commercialisation of public research; and *iv)* strengthening the GTS (Advanced Technology Groups) network and their technological service delivery to companies.

9. The former Ministry of Science, Technology and Innovation now also oversees higher education since the 2011 elections.

10. As stated in the Innovation Denmark Action Plan, "it is of great economic significance that this knowledge is increasingly being exploited by Danish business through effective knowledge dissemination".

11. New name of the Ministry of Economic and Business Affairs after the elections in 2011.

12. The autonomous Council for Strategic Research decides how to prioritise the DKK 960 million earmarked for strategic research. Likewise, it is the board members of the Advanced Technology Foundation that administer the yearly budget of DKK 600 million dedicated to the development of new and advanced technologies. And the Council for Technology and Innovation administers a large number of programmes to promote technology diffusion, with a budget of DKK 1.091 billion in 2011.

13. Funds for basic research are divided among the universities on the basis of a historic distribution. But a new funding model is about to be introduced in which a small (but increasing) part of the basic funding is allocated among universities on the basis of their results. The new funding models have the following weights: 45% = number of students, 20% = amount of external research funding, 25% based on research excellence (bibliometrics), 10% = number of PhDs awarded. The first step towards an introduction of this new model was taken in 2010 where DKK 100 million was distributed according to results. It is agreed that future growth in funding for basic research should be distributed according to this new model.

14. Its budget for 2011 is DKK 960 million. Its main target groups are universities (only 5% of the funds are disbursed to companies). The choice of these areas is determined by societal challenges facing Denmark. The prioritised areas in 2011 are: *i)* sustainable energy and environment; *ii)* individuals, disease and society; *iii)* health, food and welfare; *iv)* transport and infrastructure; *v)* strategic growth technologies; and *vi)* education and creativity.

15. The government has announced that it intends to merge the Council for Strategic Research and the Council for Technology and Innovation for

greater coherence at national level, which would also help regional innovation system actors.

16. In 2010, the Council for Strategic Research together with the Council for Technology and Innovation initiated SPIR (Strategic Platforms for Innovation and Research) which focus on public-private partnerships. A budget of DKK 70 million was devoted to this programme in 2011.

17. The preparation of their meetings through elaborate systems of administrative and political committees has to some extent moved the formal meetings of growth fora away from strategic debates and towards a more approval role, because consensual positions on strategies, initiatives and individual projects have been achieved well in advance (Larsen, 2011). However, there are some initiatives such as in Southern Denmark where RGF members have participated in retreats to reflect about upcoming strategies away from their administrative role.

18. For more information, see Økonomi- og Erhvervsministeriet og Kommunernes Landsforening (2011).

19. See note "Mapping of the cross-regional collaborations of the growth fora" 31-08-2011; Case No. 07/2743; Document No. 34256/11; prepared by Danske Regioner.

20. Per Danske Regioner (2010).

21. See also Halkier (2011b).

22. See *http://www.regionalt.erhvervsstyrelsen.dk/regional_statistikbank* .

23. The last two annual meetings of the committee covered themes such as the development challenges of outermost regions, and the previous year impacts of the crisis for employment.

24. The Minister of Business and Growth is the chairman of the committee. Other members include: the Minister of Economic Affairs and the Interior; the Minister of Finance; the Minister of Science, Innovation and Higher Education; the Minister of Taxation; the Minister of Housing, Urban and Rural Affairs; the Minister of Employment; the Minister of Food, Agriculture and Fisheries; the Minister of Climate, Energy and Building; the Minister for Trade and Investment; the Minister of Health; the Minister of the Environment; and the Minister of Culture. Other relevant ministers are included when it concerns their respective areas.

Bibliography

Altavilla, C. and F. Caroleo (2009), "Unintended effects of national-based active labour market policies", *IZA Discussion Paper*, N°4 045, Institute for the Study of Labour.

Andersen, N.Å. (2008), *Partnerships: Machines of Possibility*, Policy Press, Bristol, United Kingdom.

Andersen, F.N. and P. Plougmann (2010), "Expert evaluation network delivering policy analysis on the performance of cohesion policy 2007-2013, task 1: policy paper on innovation: Denmark", report to the European Commission.

Bachtler, J. (2009), "Structural Funds in Denmark: an international perspective", Erhvervs – og Byggestyrelsen, Copenhagen.

Bukve, O., H. Halkier and P.D. Souza (eds.) (2008), *Towards New Nordic Regions? Politics, Administration and Regional Development*, Aalborg University Press, Aalborg, Denmark.

Cooke, P. and K. Morgan (1993), "The network paradigm: new departures in corporate and regional development", *Environment & Planning D,* 11, pp. 543-64.

Council for Science, Technology and Innovation (2010a), "Innovation Denmark 2010-2013", Council for Science, Technology and Innovation, Copenhagen.

Council for Science, Technology and Innovation (2010b), "The Industrial PhD: an effective tool for innovation and knowledge sharing", Council for Science, Technology and Innovation, Copenhagen.

DASTI (Danish Agency for Science, Technology and Innovation) (2009a), *A Step Beyond: International Evaluation of the GTS Institute System in Denmark*, Danish Agency for Science, Technology and Innovation, Copenhagen.

DASTI (2009b), "Tal om forskning 2009", Danish Agency for Science, Technology and Innovation, Copenhagen.

DASTI (2011a), "Innovation Network Denmark performance accounts 2011", Danish Agency for Science, Technology and Innovation, Copenhagen.

DASTI (2011b), "The impact of cluster policies in Denmark", Danish Agency for Science, Technology and Innovation, Copenhagen.

Danish Agency for Science, Technology and Innovation (2011c), "FORSK2015 – Strategiske satsninger", Danish Agency for Science, Technology and Innovation, Copenhagen.

Danish Prime Minister's Office (2012), "The Danish Prime Minister's speech in the European Parliament, 18 January 2012 in Strasbourg", Prime Minister's Office, Copenhagen, *www.stm.dk/_p_13598.html.*

Danish Regions (2008), "The Danish regions in brief", Danish Regions, Copenhagen, *www.regioner.dk/In+English/Publications+and+Policy+Papers/~/media/Filer/Danish%20Regions/1%20the%20Danish%20Regions%20in%20brief.ashx.*

European Commission (2009), *INNO-Policy Trend Chart-Innovation Policy Progress Report: Denmark 2009*, European Commission, Brussels.

EPRC (European Policies Research Centre) (2009), "*Ex post* evaluation of cohesion policy programmes 2000-2006 co-financed by the ERDF (Objective 1 and 2), Work Package 11: management and implementation systems for cohesion policy, mini case-study: co-ordination between Objective 2 programming and national/regional initiatives in the framework of the Danish regional growth fora", EPRC, Glasgow, United Kingdom.

Froy, F. and S. Giguère (2010), *Breaking Out of Policy Silos: Doing More with Less*, Local Economic and Employment Development (LEED), OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264094987-en*.

Giguère, S. and F. Froy (eds.) (2009), *Flexible Policy for More and Better Jobs*, Local Economic and Employment Development (LEED), OECD Publishing, Paris, *http://dx.doi.org/10.1787/10.1787/9789264059528-en.*

Government of Denmark (2005), *The Local Government Reform-In Brief*, Ministry of the Interior and Health, Department of Economics, Copenhagen, *www.sm.dk/data/Lists/Publikationer/Attachments/291/Kommunal_UK_screen.pdf.*

Government of Denmark (2008), *Denmark's National Reform Programme,* Contribution to the EU's Growth and Employment Strategy.

Halkier, H. (2006), "Strategic evaluation on innovation and the knowledge-based economy in relation to the Structural and Cohesion Funds, for the programming period 2007-2013, country report: Denmark", report to the European Commission Directorate-General Regional Policy, Technopolis, Brussels.

Halkier, H. (2007), "Closing down and opening up – Danish Structural Funds programming Spring 2007: country report for Denmark for the meeting of IQ-Net, Sachsen-Anhalt 2007", Vaarst, KatPlan.

Halkier, H. (2008), "Regional development policies and structural reform in Denmark. From policy segmentation towards strategic synergy?", in Bukve, O., H. Halkier and P.D. Souza (eds.), *Towards New Nordic Regionalism. Politics, Administration and Regional Development*, Aalborg University Press, Aalborg, Denmark.

Halkier, H. (2011a), *IQ-Net Spring 2011: Review of 2007-13 Programme Development in Denmark*, Vaarst, KatPlan.

Halkier, H. (2011b), "Quiet days are here again: regional policy developments in Denmark. EoRPA country report 2011", Vaarst, KatPlan.

Halkier, H. and C. Damborg (2000), "Development bodies, networking and business promotion – the case of North Jutland, Denmark", in Danson, M., H. Halkier and G. Cameron (eds.), *Governance, Institutional Change and Regional Development*, Ashgate, Aldershot.

Halkier, H. and M. Danson (1997), "Regional development agencies in Europe: a survey of key characteristics and trends", *European Urban and Regional Studies*, Vol. 4, pp. 243-56.

Halkier, H. and J.E. Flockhart (2002), "The Danish cases – bottom-up initiatives between regional and national environments", in Östhol, A. and B. Svensson (eds.), *Partnership Responses – Regional Governance in the Nordic States*, Nordregio, Stockholm.

Hujer, R. and M. Caliendo (2000), "Evaluation of active labour market policy: methodological concepts and empirical estimates", *IZA Discussion Paper*, 236, Institute for the Study of Labour.

Hummelbrunner, R. (2012), "European territorial co-operation as a vehicle for European integration", paper presented at the conference New Territorial Development Model: Macro-regions and Cross-border Co-operation, 15 March, Paris.

Indenrigs- og Sundhedsministeriet (2004), *Aftale om strukturreform*, Indenrigs- og Sundhedsministeriet, Copenhagen.

Indenrigs- og Sundhedsministeriet (2005), *Kommunalreformen – Kort fortalt*, Indenrigs- og Sundhedsministeriet, Copenhagen.

IRIS Group (2011), *Innovation Monitor Trekantsområdet, maj 2011*, Kolding, Trekantområdet/TRIN.

Jensen, M.B., B. Johnson, E. Lorenz and B.-Å. Lundvall (2007), "Forms of knowledge and modes of innovation", *Research Policy*, Vol. 36, No. 5, pp. 680-93.

Larsen, P.W. (2011), "Partnerskab og Regional Erhvervsfremme i Danmark", *Culture and Global Studies*, Aalborg University, Aalborg, Denmark.

Nordentoft Andersen, F. and P. Plougmann (2010), "Expert evaluation network delivering policy analysis on the performance of cohesion policy 2007-2013: country report on achievements of cohesion policy: Denmark", report to the European Commission DG Regional Policy.

OECD (2001), *The New Economy: Beyond the Hype: The OECD Growth Project*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264033856-en*.

OECD (2007a), *Globalisation and Regional Economies: Can OECD Regions Compete in Global Industries?*, OECD Reviews of Regional Innovation, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264037809-en.*

OECD (2007b), *Linking Regions and Central Governments: Contracts for Regional Development*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264008755-en.*

OECD (2007c), *Competitive Regional Clusters: National Policy Approaches*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264031838-en*.

OECD (2008a), *Entrepreneurship Review of Denmark*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264059559-en*.

OECD (2008b), *OECD Reviews of Regional Innovation: North of England, United Kingdom 2008*, OECD Reviews of Regional Innovation, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264048942-en*.

OECD (2009), *OECD Economic Surveys: Denmark*, OECD Publishing, Paris.

OECD (2010), *Regional Development Policies in OECD Countries*, OECD Publishing, Paris, *http://dx.doi.org/10.1787 9789264087255-en*.

OECD (2011), *Regions and Innovation Policy*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264097803-en*.

OECD (2012), *OECD Territorial Reviews: The Chicago Tri-State Metropolitan Area, United States 2012,* OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264170315-en*.

OECD/LEED (2011), "Managing accountability and flexibility in the Danish employment system: country report", OECD, Paris, May.

Økonomi- og Erhvervsministeriet (2005a), "Forslag til Lov om erhvervsfremme 24.2.2005 (L47)".

Økonomi- og Erhvervsministeriet (2005b), "Lov om erhvervsfremme 16.6.05".

Økonomi- og Erhvervsministeriet og Kommunernes Landsforening (2011), "Aftale mellem KL og Økonomi- og Erhvervsministeriet om væksthusene i 201", Økonomi- og Erhvervsministeriet og Kommunernes Landsforening, Copenhagen.

Regeringen (2004), *Det nye Danmark – bilag om opgaveplacering*, Regeringen, Copenhagen.

Regeringen (2010), *Regionalpolitisk redegørelse 2010. Analyser og baggrund*, Indenrigs- og Sundhedsministeriet, Copenhagen.

Sostar, M. (2012), "Regional development: access and management of European funding", in *International Journal of Academic Research in Economics and Management Sciences*, Vol.1, No. 1, pp. 165-180.

Thomsen, S.H. and L.D. Nielsen (2008), "The 2007 Danish local government reform", in Bukve, O., H. Halkier and P.D. Souza (eds.), *Towards New Nordic Regionalism. Politics, Administration and Regional Development*, Aalborg University Press, Aalborg, Denmark.

Annex 2.A1

Table 2.A1.1. **Danish STI policies and regional dimensions**

Sources of funding	Annual budget (2010)		Purpose	Regional dimension (if any)
Danish Ministry of Science, Innovation and Higher Education			University basic funding is allocated to the three main objectives – education, research and other purposes.	(No explicit regional dimension) Funds for research are granted to the universities on the basis of a historic distribution results. A new funding model is about to be introduced where funding is allocated based on results.
Basic funding for universities		Millions DKK	The council is responsible for awarding funding for Danish research within prioritised and thematically delimited areas determined by the Danish Parliament.	(No explicit regional dimension) Funding for strategic research is based on application. Strategic research projects are subject to special quality criteria. The council assesses the quality of applications on the basis of the relevance, potential impact and quality of the research.
	Education	5.767		
	Research	7.290		
	Other purposes, etc.	1.063		
	Total basic funding	14.120		
Strategic Research Council	DKK 1.1 billion (2010)			

Table 2.A1.1. **Danish STI policies and regional dimensions** (*cont.*)

Sources of funding	Annual budget (2010)	Purpose	Regional dimension (if any)
Danish Council for Independent Research	Approximately DKK 1.4 billion (2010)	The Danish Council for Independent Research (DFF) supports individual researchers and research groups that contribute to the advancement of excellence in Danish research.	(No explicit regional dimension) Funds are awarded through open competition. The funds are not earmarked politically for specific research purposes, but are granted to individual researchers who – by virtue of their qualifications and expertise – are seeking to implement their own original research ideas of a high standard. The council thus funds all types of research, such as basic and applied research.
The Danish National Research Foundation	DKK 415 million (2010)	The foundation works to strengthen Danish basic research within all research fields. The foundation's primary working method is to set up and fund research centres of highest international standing – so-called centres of excellence – for longer periods of time.	(No explicit regional dimension) The Centre of Excellence (CoE) Programme is the key funding mechanism. Top researchers with the most ambitious ideas are awarded a CoE through fierce competition involving a two-stage application process. Centres may be established within or across all fields of research. A total of 77 centres of excellence have been established so far.
Danish National Advanced Technology Foundation (*Højteknologifonden*)	DKK 509 million (2010) The foundation will have a base capital of DKK 16 billion by 2012. The interest earned from the base capital will yield DKK 600 million to be invested in public-private research projects each year.	The Danish National Advanced Technology Foundation offers grants in the form of co-funding for high-technology research and innovation initiatives and projects.	(No explicit regional dimension) The Danish National Advanced Technology Foundation supports selected fields and technologically advanced projects or consortiums, which have a range of participants that will contribute financially.

Table 2.A1.1. **Danish STI policies and regional dimensions** (*cont.*)

Sources of funding	Annual budget (2010)	Purpose	Regional dimension (if any)
Danish National Advanced Technology Foundation (*Højteknologifonden*) (*cont.*)			Funds are awarded through open competition. Each initiative or project must meet three criteria: – obvious commercial potential; – technology transfer; – collaboration between public sector research institutions and private sector companies.
The Danish Council for Technology and Innovation	The Danish Council for Technology and Innovation administers a number of initiatives of which the purposes are to promote innovation and dissemination of knowledge between knowledge institutions and enterprises. The different initiatives are briefly introduced below		
Innovation Consortia	DKK 92 million (2010)	The purpose of the consortia is for the parties to jointly develop knowledge or technologies that benefit not only individual companies, but also entire industries within the Danish business community.	(No explicit regional dimension) The only criteria are that innovation consortia should consist of at least two companies: a research institution and advisory/knowledge dissemination party. Collaboration should be agreed for a duration of between two and four years.

Table 2.A1.1. **Danish STI policies and regional dimensions** (*cont.*)

Sources of funding	Annual budget (2010)	Purpose	Regional dimension (if any)
Approved Technological Service	DKK 379.5 million (2010) distributed among nine GTS-institutes	The nine authorised technological service institutes (GTS institutes) have a special obligation in bringing knowledge from labs to business. Each institute has its own technology profile and varies in terms of size and field of research. They are all not-for-profit organisations.	(No explicit regional dimension) The Ministry of Science, Innovation and Higher Education approves a business as a GTS institute. Approval is valid for three years and grants access to negotiate a "performance contract" with the ministry. Funding through the performance contracts represent about 10% of the nine institutes' total revenue. The nine institutes employ a staff of about 3 500 and generate annual revenue of DKK 3.4 billion. The lion's share of revenue comes from selling knowledge and services on a commercial basis.
Industrial PhD	The programme grants a wage subsidy up to DKK 522 000 over a three-year period to a private company in order to co-fund the salary for the Industrial PhD. In the period 2002-2010 a total of 800 Industrial PhDs were awarded to companies across the country.	An Industrial PhD project is a business-oriented PhD. The research project is conducted in co-operation between a private company, an Industrial PhD student and a university.	(No explicit regional dimension) Industrial PhD projects are awarded through open competition based on research excellence. In the years 2002-2010, the Central Denmark Region and Southern Denmark Region accounted for respectively 15% and 9% of the total number of Industrial PhDs granted. The Capital Region of Denmark accounted for close to 70% of the Industrial PhDs.

Table 2.A1.1. **Danish STI policies and regional dimensions** (*cont.*)

Sources of funding	Annual budget (2010)	Purpose	Regional dimension (if any)
Knowledge Pilot (*Videnpiloter*)	SMEs can receive a wage subsidy of DKK 12 500 per month if they hire an academic (knowledge pilot) for a period of 6-12 months. A total grant amount of DKK 12.1 million was distributed in 2009.	The purpose is to strengthen innovation capacity in SMEs.	The Knowledge Pilot Programme has an implicit regional dimension, since it is aimed at SMEs that have no experience with academic workers. The only criterion is that the academic should carry out a specific development project for the company.
Knowledge voucher (*Videnkupon*)	Up to DKK 100 000 in subsidy to SMEs wanting to procure knowledge services from publicly funded research organisations. A total budget of DKK 32 million (2010).	The knowledge vouchers for small and medium-size businesses are to promote the collaboration between SMEs and knowledge institutions with the purpose of enhancing the innovation and development activities in the SMEs.	The knowledge voucher has an implicit regional dimension, since the programme is aimed at SMEs who have no experience with academic workers and since the regional "Growth Houses" (regional business links) are responsible for promoting the knowledge voucher programme to enterprises.
Danish innovation networks	Each year the Ministry of STI supports innovation networks with approximately DKK 75 million. A similar amount of co-funding is required from businesses, knowledge institutions, regions, etc.	The innovation networks offer access to a broad overview on the latest science results and innovation trends within their respective fields of expertise. Each network employs on average four to five people who support businesses and researchers in developing joint innovation projects.	The innovation network initiative has a clear regional dimension. Each network operates on a national basis, but the networks are located all over Denmark according to regional clusters and strongholds. Close to half of the 22 networks are anchored in the Southern and Central Denmark Regions.

Table 2.A1.1. **Danish STI policies and regional dimensions** (*cont.*)

Sources of funding	Annual budget (2010)	Purpose	Regional dimension (if any)
Proof of Concept funding		The aim of the Proof of Concept schemes is to support the commercialisation of inventions. The schemes bridge the gap between grant-funded research at public research institutions and initial product development by innovation consortia or private investors.	The programme does not have an explicit regional dimension but is divided geographically. Funds are awarded through two regional consortia, one involving research institutions west of the Great Belt and one involving research institutions east of the Great Belt.
Open funds	DKK 20 million (2010)	An open pool to support projects, which the existing programmes and means do not cover.	(No explicit regional dimension) The purpose of the open funds is to strengthen the collaboration between knowledge institutions and companies on innovation and the dissemination of knowledge to benefit the business community. Projects must support wider application in other companies to be eligible for support.
SPIR – strategic platforms for innovations and research	DKK 70 million (2011)	The objective of SPIR is to create a dynamic and integrated public-private partnership in research and innovation for promoting growth and prosperity.	(No explicit regional dimension) In 2011 there was a call for "intelligent welfare technology solutions". Consortia of researchers and businesses can apply for funding for research and innovation of high international standard, aiming at new ICT-based solutions within welfare areas of significant societal importance.

Table 2.A1.1. **Danish STI policies and regional dimensions** (*cont.*)

Sources of funding	Annual budget (2010)	Purpose	Regional dimension (if any)
Innovation incubators: Incubation and pre-seed funding for early-stage technology ventures	The six innovation incubators administer a total yearly grant amount of approximately DKK 200 million	The six so-called "innovation incubators" are a unique combination of government-backed pre-seed capital, science park and venture company. The innovation incubators provide pre-seed funding and function as host and mentor for new high-risk business ideas – from the first tentative steps to a viable enterprise.	The innovation incubators have a strong regional dimension. The six innovation incubators are located at HEIs throughout the country – three of the six innovation incubators are located in the Central and Southern Denmark Regions.
Danish Ministry of Business and Growth	The Ministry of Business and Growth is responsible for a number of policy areas which are important for the general business environment, including business regulation, intellectual property rights, competition policy, the financial sector, etc. The ministry is also responsible for the Danish Growth Council and a new (2009) policy initiative called the Business Innovation Fund (*Fornyelsesfonden*).		
The Business Innovation Fund (*Fornyelsesfonden*)	DKK 760 million for 2010-2012	The aim of the Business Innovation Fund is to promote growth, employment and export by supporting innovation and market maturation within green growth and welfare as well as providing support for change-over to exploit new business and growth opportunities in less favoured areas of the country.	(A strong regional dimension) The Business Innovation Fund offers financial support through loans and economic guarantees for projects that contribute to creating new business and growth opportunities in less favoured geographical areas of Denmark. These are areas with unemployment significantly above the national average, or where it is extremely difficult for the unemployed labour to find new employment.

Table 2.A1.1. **Danish STI policies and regional dimensions** (*cont.*)

Sources of funding	Annual budget (2010)	Purpose	Regional dimension (if any)
The Danish Growth Council (*Konkurrenceudsatte midler*)	DKK 50 million (2010) The funds originate from the EU Structural Funds, while the Danish government contributes up to 25% of budgeted costs for approved projects. Note that 90% of Structural Funds are spent by the regional growth fora across the country and that Denmark is the country with the highest share of Structural Funds dedicated to innovation.	The Danish Growth Council has as a special task to promote co-ordination between the national growth strategy and the regional business development strategies set by the regional growth fora to contribute to an effective and continuous process enhancing growth and business development in all parts of Denmark.	(A strong regional dimension) In 2011 there was a call for projects under the theme "Strengthening the growth competencies of SMEs", with a special focus on spin-offs and partnerships. While project applications must show national significance, the purpose of the funds is to support the strengthening of regional competitiveness.
Danish Ministry of Finance			
The Public Welfare Technology Foundation (*Anvendt Borgernær Teknologi-fonden*)	A total budget of DKK 3 billion from 2009 to 2015, with yearly investments of DKK 500 million.	The Public Welfare Technology Foundation supports the development of innovative, labour-saving technologies and intelligent reorganisation of service delivery processes with the goal to increase productivity, efficiency and working conditions in the public sector, and provide the choice of more flexible, user-centred services to citizens.	(No explicit regional dimension) The Public Welfare Technology Fund grants support to two types of projects: demonstrational projects, for tests of newly developed technology; and implementation projects, for already existing technology. Funds are distributed in open competition. Both types of project focus on application potential or capacity for wider implementation nationally within the public sector.

Table 2.A1.1. **Danish STI policies and regional dimensions** (*cont.*)

Sources of funding	Annual budget (2010)	Purpose	Regional dimension (if any)
Danish Energy Agency	The agency is responsible for the whole chain of tasks linked to the production, transport and utilisation of energy, and the impact on the climate. The task is to ensure the legal and political framework for reliable, affordable and clean supply of energy in Denmark. The agency is also responsible for Energy-technological Development and Demonstration Programme (*Energiteknologisk Udviklings- og Demonstrationsprogram*) and Green Labs DK.		
Energy-technology Development and Demonstration Programme (*Energiteknologisk Udviklings- og Demonstrationsprogram*)	DKK 400 million (2011)	The Energy-technological Development and Demonstration Programme promotes new climate-friendly energy technology that increases supply and realises the business potential in the Danish energy sector.	(No explicit regional dimension) Funds are awarded to projects on the basis of an application. Applicants can be private enterprises, public organisations or research institutions. Projects must focus on development, research or demonstration of energy-oriented technology. For development and demonstration projects an own-contribution of 50% is expected.
Green Labs DK	DKK 210 million over the years 2010 to 2012.	Green Labs DK is a support scheme focusing on the establishment of large-scale test facilities for the demonstration of new climate technologies.	(No explicit regional dimension) Funds are awarded on the basis of an application in open competition. Special attention is given to public-private collaboration and international involvement.
Ministry of Food, Agriculture and Fisheries	The agency is responsible for the whole chain of tasks linked to the production, transport and utilisation of energy, and the impact on the climate. The task is to ensure the legal and political framework for reliable, affordable and clean supply of energy in Denmark. The agency is also responsible for the Energy-technological Development and Demonstration Programme.		

Table 2.A1.1. **Danish STI policies and regional dimensions** (*cont.*)

Sources of funding	Annual budget (2010)	Purpose	Regional dimension (if any)
Investment-scheme for food processing companies (*Investering i nye teknologier til forarbejdning af fødevarer*)	DKK 120 million over the years 2010 to 2012.	The purpose of the investment-scheme is to support the development of new technology for food processing in order to strengthen growth and productivity in Danish food industries and agriculture.	(No explicit regional dimension) The scheme has an implicit regional dimension through its focus on rural districts and development of industries working with agricultural products. Applications are selected based on its commercial potential, technological novelty and growth opportunities.
Green Development and Demonstration Programme (*Grønt Udviklings- og Demonstrationsprogram*)	Approximately DKK 600 million over the years 2010 to 2012. 90% of the funds each year are earmarked for projects with budgets over DKK 3 million.	The purpose of the programme is to support the development of competitive and sustainable food and non-food production within ecology.	(No explicit regional dimension) Funds are distributed through open competition, where projects are prioritised based on their focus on applied research, development of prototypes, knowledge-sharing activities and commercial potential.
Danish Environmental Protection Agency			
Subsidy for Environmentally efficient technology (*Tilskudsordning til miljøeffektiv teknologi*)	DKK 64.3 million in 2010 and 2011.	The purpose of the subsidy is to support the development, test and demonstration of environment technology, which otherwise would not have been developed.	(No explicit regional dimension) Funds are distributed on the basis of the project's relevance to the strategy of the Danish EPA, the novelty of the technology and the potential for environmental improvements. Private companies, research institutions, public and private organisations are all eligible to receive the subsidy.

Chapter 3

Regional strategies for innovation-driven growth

What strategies and actions are being taken by the Regions of Central and Southern Denmark to promote innovation-driven growth? This chapter reviews the regional business development strategies and associated policy mix, particularly in light of EU expectations for smart specialisation strategies. The prioritised industrial sectors for regional action are discussed in depth. Other bottlenecks for regional growth are highlighted. Finally, the state of policy intelligence, monitoring and evaluation to inform the development of these strategies and projects is addressed.

Introduction

The Regions of Central and Southern Denmark are faced with several common strengths and weaknesses. Both regions have a strong wealth level in an OECD context. Central Denmark benefits from several advantages, notably Denmark's second city Aarhus and its strong university that is a magnet for young adults and public R&D funds. Southern Denmark has a distinctive landscape with existing sub-regional institutions associated with the former *Amter* (county) areas. Both have a few successful multinational firms. However, like Denmark overall, the regions have suffered from lagging productivity growth. The study regions also experience challenges attracting and retaining high-skilled labour. There is also a need to manage population outflows from the more peripheral municipalities and to reduce the level of high-school dropouts (increasingly difficult to integrate in the labour force post-crisis). Upgrading and transitioning the SMEs in traditional sectors, as well as spurring innovation in other sectors, are critical for retaining sufficient jobs in the regions (see Chapter 1 and Table 3.1).

The scope for regional action depends on the national institutional and policy context. In Denmark, alignment with other levels of government is even more critical than in a context of greater regional autonomy for implementing independent policies. Through different vehicles for national-regional relationships, there is an increasingly productive dialogue between national and regional governments towards the common goals of innovation-driven growth. EU Structural Funds, and their matching funds requirements, are a key determinant for regional spending. Regional business development strategies are therefore circumscribed in this multi-level governance context (see Chapter 2).

While Danish regions are relatively new, they have been able to leapfrog, to a certain extent, other OECD regions with decades of experience. Strategy development is focused on growth, and with increasingly targeted focus areas. In some cases, such as renewable energy, the regions are building on areas of industrial expertise recognised at a global scale. The regional growth fora (RGF), bringing together public and private stakeholders around these regional priorities, are another institutional achievement in the regions.

Table 3.1. **SWOT of the Central and Southern Denmark regional innovation systems**

Strengths	Weaknesses
– High wealth levels in OECD regional context – Favourable conditions for entrepreneurship – New public-private regional growth forum in each region to guide strategy – Increasing regional engagement of universities – Central: growth pole of Denmark's second city, Aarhus – Central: Aarhus University a magnet for students and public R&D funds – Southern: Highest growth rates among Danish regions in GDP per capita and per worker pre-crisis – Southern: strong inter-municipal collaboration efforts	– Lagging productivity growth – Firm demographics less favourable (SMEs) – Industrial specialisation in low- to medium-tech sectors – High-skilled labour shortages relative to industry needs – Prominence of EU spending rules in regional spending for innovation – Central: lowest levels of GVA per worker growth in country – Southern: complex geography and settlement patterns with lesser critical mass in growth poles – Southern: below median levels of public and private R&D intensity (R&D as a share of GDP)
Opportunities	**Threats**
– Increasing STI policy recognition of many forms of innovation (user-driven, public sector, design, etc.) – Attracting high-skilled talent (domestic and international) – Building on Danish branding in several sectors – Greater inter-regional collaboration within Denmark to build critical mass in global competition – Southern: stronger international cross-border arrangements with Germany – Central: building on increasing technology and science-based success, public and private	– Projected labour shortages and population ageing – Off-shoring trends continue due to high labour costs – Long-term unemployment for low-skilled workers – Population decline in peripheral areas of both regions – Increases in technological sophistication in emerging economies

Regional business development strategies

From first- to second-generation strategies

The core task of an RGF is to design a regional business development strategy focused on growth through documented growth drivers. It serves as a guide for: the selection of projects within the framework of the EU Structural Funds; the choice of initiatives supported by regional funds (transfers from local and national governments used essentially to co-finance EU-funded projects). RGF priorities are also a guide for topics included in the partnership agreements with national authorities. Note that there are more general regional development strategies developed by the region that cover a broader range of topics under the regional domain, such as health care and quality of life (see later Table 3.10).

A striking feature of the first round of business development strategies developed in Denmark, which is not uncommon to other OECD countries, is the extent to which they resemble each other on the surface. Governance-related issues are likely to have contributed to reinforcing the strategic convergence across the six RGF strategies.[1] The convergence across strategies raises questions about the regional specificities and their role in supporting national goals. It also reflects broad similarities in economic structures. Furthermore, the actual projects and initiatives under the "headline level" (energy, welfare technology, etc.) are often different, reflecting the variations in innovation system characteristics and different regional approaches.

The second generation of strategies better reflects the aspirations of the regional partnerships embodied in the concept of the RGF. Unlike the first round that was for a period of three years, the second-generation strategies are for periods of eight to ten years depending on the region. Once the permanent RGF started to work in the beginning of 2007, regions needed to become operational fast in order to spend funds. All the RGF and their members found it difficult to adjust to the new set-up in which no one (public) actor was able to prevail through exclusive control of key (financial) resources. Moreover, the social geography of the RGF appears to have been an important factor in hampering or furthering the creation of a future-oriented partnership. In some regions like Bornholm or North Jutland, the geography did not change much with regional reforms and hence existing patterns of collaboration simply needed to be adjusted to the new institutional setup. For the regions created on the basis of three or more *Amter* (former counties), the higher degree of internal diversity affected the extent to which progress has been made through a region-wide partnership, such as in the case of Southern Denmark.

The "headlines" of the second generation of strategies remain very similar in the two study regions (Table 3.2). The overall visions are to be competitive in a global context. The horizontal priorities are shared and concern the framework conditions for businesses to be innovative. The regional horizontal priorities differ in the sense that Southern Denmark prioritises cluster organisations as a tool for promoting growth. The region also places more explicit emphasis on design. The quantitative targets concern productivity gains, but not at the cost of job losses. Therefore both regions also target job growth, either explicitly (in Central Denmark) or implicitly as part of a broader focus on the participation rate of adults in the labour force (Southern Denmark). The participation rate is subject to a wide range of policies unrelated to job growth, but is nevertheless to monitor in light of projected future labour shortages.[2] It is not clear in either region that the strategy targets are based on more than adjustments to prior trends.

Therefore it is not clear which targets are achievable and which are merely aspirational. The sectoral priorities share several commonalities but there are clear areas of distinctive specialisation within each region (see section on prioritised sectors and clusters).

Table 3.2. **Regional business development strategies of Central and Southern Denmark**

	Central Denmark: a globally competitive region: Business development strategy 2010-2020	Southern Denmark: Economic development strategy 2012-2020
Vision	In 2020, Central Denmark Region is to be a globally competitive region – amongst the best in Europe.	In 2020, Southern Denmark is to be distinguished by strong growth powered by high productivity and employment, and by companies that act globally.
Horizontal priorities	– Innovation and business development – Digitalisation – Entrepreneurship – Education and skills development	– Research, innovation and new technologies (including ICT and design) – Entrepreneurship – Human resources and education – Cluster development
Sectoral priorities	– Energy and environment – Welfare innovation – Tourism – Foodstuffs	– Sustainable energy – Health and social innovation – Experience economy (tourism and design)
Other goals	– Internationalisation and region in balance	– Peripheral areas, cross-border collaboration, and internationalisation
Quantitative targets (economy-wide)	– Growth in value added: from a yearly average growth of 1.3% to 2.0% – Growth in productivity: from a yearly average growth of 0.05% to 1.5% – Growth in employment: from a yearly average growth of 1.3% to 0.5% – Growth in exports: maintaining a yearly average growth of 4.0%	– Productivity that is 10% above the OECD average (currently around 2%) – Participation rate (share of 15-64 year-olds in the labour force) on par with the OECD top 5

Source: Regional strategies of Central and Southern Denmark.

As the public-private RGF view their role as supporting overall growth, there remains some tension for regional policy makers with respect to where that growth occurs. Success of regions is measured by the national government, and generally the RGF, by overall growth. However, just over a third of EU Structural Funds must be spent for the benefit of peripheral areas, and tourism development is part of the regional mandate, which explains why tourism is part of the regionally prioritised sectors. While the goals of growth overall and growth in the peripheral areas are not mutually exclusive, there remains some areas for further clarification between national level and regions with respect to the expectations for achieving both.

A recent evaluation report of all RGF strategies highlighted numerous areas of success, but also several areas where most RGF need to make progress. They include: greater cross-regional and cross-border collaboration, continued efforts for larger projects, facilitation of greater private-public-academic co-operation, centralisation of services in Growth Houses, and better monitoring and evaluation efforts. Central Denmark was considered less advanced than others in its inter-regional collaboration. Based on its pre-2012 strategy, it was considered that Southern Denmark, compared to some other regions, made less use of the Growth House as a central hub for provision of regional business development support (Lodberg, 2010). The findings of this evaluation are generally confirmed by this study, albeit the lesser degree of centralisation of Southern Denmark's business development is by design (see section on innovation system actors) and the cross-regional activities are always areas for further work regardless of the region.

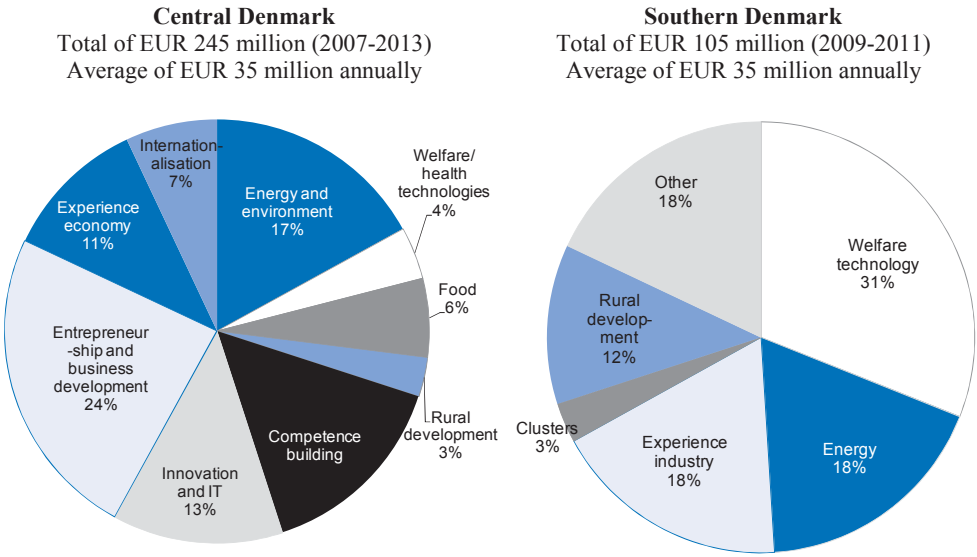
Policy mix of growth forum projects

Central Denmark has allocated a greater relative share to horizontal priorities, while Southern Denmark has put greater emphasis on sectoral priorities (Figure 3.1). From 2007-2013, approximately 33% of Central Denmark's Growth Forum funding is to be focused exclusively on the four strategic areas, 59% for general framework conditions (entrepreneurship and business development, IT and innovation, education and competence building, internationalisation) and 3% for rural development. In contrast, in Southern Denmark for the period 2009-2011, two-thirds (67%) of funding was dedicated to sectoral priorities (welfare technology, energy, and experience industries – including tourism) while 21% was used for horizontal priorities, in addition to 12% in rural development. The differences may be a bit less stark in reality. In Central Denmark, projects for horizontal themes may very well benefit priority sectors. And in Southern Denmark, spending by strategic priority is done through their strategy's growth model, focused on demand, supply, research/education and capital.

The allocation to priority sectors, in particular in Southern Denmark, raises possible questions about absorption capacity and risk. Welfare technology has considerable potential market, given the large share of employment in the public health and social services sector in Denmark and the global challenges for reducing health care costs. The 31% share of regional development spending implies considerable investments in a sector that has few existing firms and a small share of current employment in private firms (see section on sectoral priorities). Some of these funds are used to support the creation of demand, such as through training and studies

on potential for public procurement in regional hospitals, so not all funding goes directly to firms. However, other regions in Denmark and many around the world are also trying to promote welfare technologies. Those that will ultimately succeed will have not only critical mass in a particular niche, they will also have the other aspects of their innovation system (e.g. skilled workers) needed to capitalise on these investments.

Figure 3.1. **Central and Southern Denmark: funding by business development priority area**



Source: Regions of Central and Southern Denmark.

Another potential concern with the current policy mix between horizontal and sectoral priorities is that there are opportunities for growth in non-prioritised sectors. It is difficult to determine in advance the next great idea that becomes an innovation. That concern is perhaps even greater in a situation where a higher share of the portfolio goes to sectoral priorities (such as in Southern Denmark), or where projects are determined by a limited set of actors (such as in Central Denmark, see section on project selection). Despite these concerns, local actors did express that good ideas can find funding through horizontal programmes or national policy instruments. In some cases of course, entities not funded may disagree with regional choices, even if they are in a priority sector.

Within the policy mix of growth fora projects, there is also a shift towards more concentrated funding into larger programmes for greater efficiency and effectiveness. For example, in Southern Denmark, during the first generation of the strategy, there were between 20 and 40 projects annually, with an average size of between DKK 5 to 10 million. In 2010 and 2011, the number of annual projects decreased to 10 or 15 with an average size between DKK 20 to 25 million.[3] To a certain extent, some of the consolidation may be due to larger grant sizes to other intermediary operators, such as a Growth House or cluster organisation.

Denmark's regions use a moderate range of innovation-support instruments in an international context; with some variation across the study regions (see Table 3.A1.1 in annex). Among reporting OECD countries, Denmark had one of the lowest number of instruments used at regional level (OECD, 2011a). For example, R&D financing (institutional or competitive, for public or private actors) are accessed through national programmes and not funded by regions. The national-regional alignment on several sectors therefore facilitates this access of national funds (see Chapter 2). However, the regions do stand out in an OECD context for their efforts at promoting innovation-driven public procurement, particularly Southern Denmark. Central Denmark is also employing more instruments for integration into international networks relative to Southern Denmark, including both scientific and firm networks. The nature of instruments used is of course determined in part by the type of innovation system actors available within and beyond the region.

Another distinction in the policy mix concerns the mode of innovation support. The two regions complement the STI-based approach which still dominates national innovation policy, with a more DUI (doing, using, interacting) approach focused on a user- and experience-driven approach to innovation through. Nevertheless, regional actors expressed concern that there was too little emphasis on the commercial value of research and technology, as well as on user-driven innovation.

The two strategies in the context of EU-promoted "smart specialisation" approaches

As "smart specialisation" strategies are a likely *ex ante* condition for use of the next round of EU Structural Funds, it is valuable to consider the current strategies and action plans in light of these expectations. The definition and nature of smart specialisation are still being discussed in academic and policy circles. Generally, a smart specialisation strategy is one based on a relevant strategy development process (in terms of participants

and policy intelligence) that results in choices for investing in a region's areas of competitive advantage with critical mass (see Box 3.1).

Box 3.1. **Smart specialisation strategies (RIS3) for regions: an emerging EU concept**

There are several rationales for the European Commission's (EC) efforts to promote smart specialisation strategies. There is a need to target spending in regions rather than trying to cover all topics, with a particular focus on improving the innovation process. On a broader EU scale, the EC is seeking to avoid duplication and fragmentation in the European R&D area. As most regions promote economic development in the same sectors, even though they may not have the right assets and chances to emerge as local or global leaders, there is a need to seek opportunities for international differentiation and visibility to attract private investment and tap into global networks. There are a range of strategies that can be promoted, not just one type, whether it is for building on existing technological leadership or for catching-up. The approach is also intended to promote improved governance and inclusiveness with respect to the strategy development process. The concept of smart specialisation was developed in part building on several EU reports and experts groups such as the Barca Report (Barca, 2009), the EU 2020 Strategy, the Innovation Union, and the "Knowledge for Growth" expert group set up by DG Research.

National/regional research and innovation strategies for smart specialisation can be defined as integrated, place-based transformation strategies that: *i)* focus policy support and investments on key national/regional priorities, challenges and needs for knowledge-based development, including ICT-related measures; *ii)* build on each country's/region's strengths, competitive advantages and potential for excellence; *iii)* support technological as well as practice-based innovation and aim to stimulate private sector investment; *iv)* get stakeholders fully involved and encourage innovation and experimentation; *v)* are evidence-based and include sound monitoring and evaluation systems. In terms of types of transformation, a categorisation of four types has been identified: *i)* modernisation; *ii)* transition; *iii)* diversification; and *iv)* radical foundation.

This type of strategy has also been characterised as having the 4 "C"s. They include: *i)* (tough) **C**hoices and **C**ritical mass (limited number of priorities on the basis of own strengths and international specialisation); *ii)* **C**ompetitive advantage (by mobilising talent by matching RTD + I capacities and business needs through an entrepreneurial discovery process); *iii)* **C**lusters and Connectivity: develop world-class clusters and provide arenas for related variety/cross-sectorial links internally in the region and externally, which drive specialised technological diversification – to match what a region has with what is found in the rest of the world; and *iv)* **C**ollaborative leadership: efficient innovation systems as a collective endeavour based on public-private partnership (quadruple helix) – and an experimental platform to give voice to unusual suspects.

Box 3.1. **Smart specialisation strategies (RIS3) for regions: an emerging EU concept** (*cont.*)

Smart specialisation strategies can be translated into practice by implementing the following steps:

1. Analysis of regional potential for innovation-driven differentiation.
2. RIS3 design and governance – ensuring participation and ownership.
3. Elaboration of an overall vision for the future of the region.
4. Selection of priorities for RIS3 and definition of objectives.
5. Definition of coherent policy mix, roadmaps and action plan.
6. Integration of monitoring and evaluation mechanisms.

Source: Foray, D. et al. (2012), "Guide to research and innovation strategies for smart specialisation (RIS3)", European Commission, Brussels, March 2012 version, *http://s3platform.jrc.ec.europa.eu/s3pguide*; Eurada (2011), "Directory of 'no-nonsense' activities to build S3-minded regions", scoping document for Agorada 2011, European Association of Development Agencies, Brussels; European Commission (2012), "Research and innovation strategies for smart specialisation", European Commission, Brussels, *http://ec.europa.eu/regional_policy/sources/docgener/informat/2014/smart_specialisation_en.pdf.*

The regional strategies for Central and Southern Denmark generally perform the steps promoted by the EC for a smart specialisation strategy. However, there are different areas for refinement to reach the best practice international examples for each of these different steps.

1. **Analysis of regional potential for innovation-driven differentiation:** the two Danish regions have focused on innovation-driven strategies for growth per their mandate. EU Structural Funds spending in the country has been innovation-driven pre-dating the EC emphasis. One area for improvement concerns the efforts to fully map the different aspects of regional and sectoral innovation systems (stocktaking in a way that facilitates decision making) as well as different strengths and weaknesses in the system. For the latter, the region of Skåne (Sweden) has been active in comprehensive analyses of its capacity (see OECD, 2012b). Another area is the regional differentiation in a global context. There exist several studies for the top two key sectors; however, their findings could be more clearly articulated for policy intelligence as well as explained to clarify regional positioning within Denmark and the world more generally. International peer review is another opportunity for supporting this

regional differentiation. For example, the region of Catalonia (Spain) previously used international representatives that met periodically to review its strategy and actions (see OECD, 2010a).

2. **RIS3 design and governance – ensuring participation and ownership:** the RGF have grown to become an effective public-private forum for strategy development and building consensus in the region (see Chapter 2). The RGF (and their associated advisory groups representing the same bodies) include prominent stakeholders (municipal and regional officials, leading firms, universities). An area for future improvement would involve greater outreach to the more "unusual" suspects often under-represented in strategy design. SMEs typically do not have the time to participate in ongoing strategy development. Firms outside of the priority areas may have relevant ideas for the region. And stakeholders in different civil society sectors may have relevant ideas for different aspects of the strategies (to render the approach a so-called quadruple helix). Some invited participants should have "boundary spanning" skills that go beyond the sector or type of institution represented, bringing in more creative ideas as well. OECD examples of regional efforts include the numerous facilitated working groups managed by the innovation agency Innobasque in the development of the latest STI plan for the Basque Country, Spain (see OECD, 2011d). Other initiatives seek to promote innovation in society more generally, such as was done in the Basque Country or in the United Kingdom as facilitated by the National Endowment for Science, Technology and the Arts (NESTA).

3. **Elaboration of an overall vision for the future of the region:** like numerous EU regions, the vision for both Central and Southern Denmark is that of being among the top EU innovative regions. While this vision is relatively basic, it has nevertheless been widely adopted in the two regions. Furthermore, there have been scenarios discussed by Southern Denmark about the different possibilities of growth in key sectors considering best and worst case scenarios as well as wildcards for regional positioning in the global landscape. However, regional foresight exercises seem more limited relative to other advanced OECD regions.

4. **Selection of priorities for RIS3 and definition of objectives:** both regions have selected horizontal priority themes as well as those for particular sectors/clusters (see section on regional priorities). The priority selection process has been subject to considerable discussion in the regions, focused on areas where there is perceived

growth in value added and jobs. Two of the prioritised sectors address social challenges (sustainable/renewable energy and health/welfare technology). The emphasis on energy builds on clear and internationally recognised strengths. The welfare technology focus is also an attempt to seek synergies with regional hospitals and through public procurement growth firms for export of health-related products, albeit the currently defined sector does not have globally competitive critical mass today. It is therefore a bet for the future. The choice of food in Central Denmark supports a transition of an established sector with strong regional multinationals. The choice of tourism-related initiatives is a political compromise in part for rural areas in both regions. As R&D is not financed by the region, capturing national and international funds, as well as spurring private R&D investment must be supported by other instruments in the policy mix, which explains why the prioritisation is more focused on sectors than technologies. While there are some sub-sector niches identified under the headline priority sectors, the strategies generally do not fall into the same trap as many other regions where one headline actually covers so many niches that it does not really result in prioritisation. This is, however, somewhat the case with the experience economy priority of Southern Denmark. While the field can be defined as covering both tourism and design and there are clearly potential synergies, the description and actions of the two show distinctly different paths in the plan.

5. **Definition of coherent policy mix, roadmaps and action plan:** the policy mix set by the regions is circumscribed by the multi-level governance context, the need to use other operators for implementation, and associated EU funding requirements. Each strategy has short-term action plans that define priority areas for project-based activities (see policy mix section). An effort is already made to support innovation in health services in both regions and to consider other non-S&T areas of innovation such as design. Greater opportunities exist for cross-sectoral linkages, as well as for considering greater incentives for innovation in public services outside of hospitals (already begun in Southern Denmark) and with other levels of government, including innovation-driven procurement, in those other sectors and areas.

6. **Integration of monitoring and evaluation mechanisms:** project selection is top-down in one region, bottom-up in another, and monitoring is performed by the RGF as supported by the regional public administration (see section below on monitoring and

evaluation). As a region is not authorised to implement projects directly, it must rely on monitoring reports. Large projects financed by the region are subject to mid-term and final evaluations. As regions are relatively new (begun in 2007), there are naturally few evaluations of long-term impacts available. What appears to be the area for greatest improvement is a better feedback mechanism between project results and future project design and implementation.

The innovation system actors

Differing approaches to mapping regional innovation systems

Over the last several years, Denmark has sought to consolidate its innovation system actors and increase the interactions among them. For example, many public research institutions have been merged into the leading universities. However, as in any country, the mapping of different institutions reveals a certain level of complexity (Figure 3.2). There are institutions that are developed and supported by policy at different levels of government and from different ministries. Complexity is unavoidable, therefore options for simplification include: *i)* consolidation; *ii)* top-down alignment (through formal policy); *iii)* bottom-up alignment (based on actors that align due to common goals); or *iv)* "no wrong door" type approaches to the system, that guide actors to the right place regardless of their point of entry, as well as other ways of achieving network fluidity (see also Chapter 2).

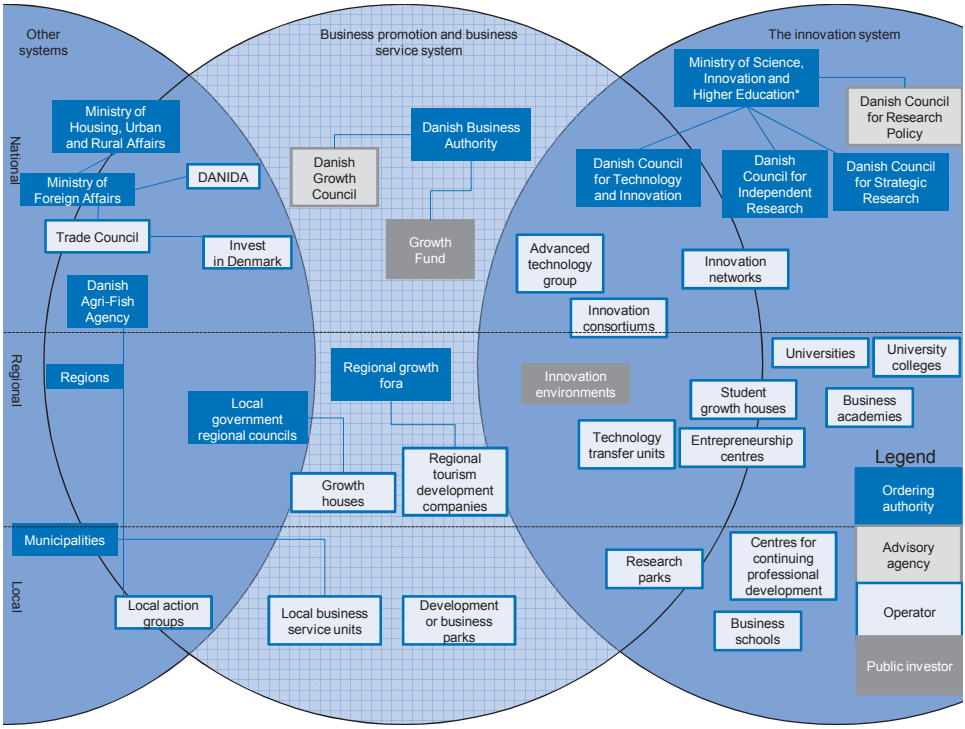
This mapping is very helpful for framing the national institutional context for the sectoral and regional innovation systems, but cannot in one image also illustrate the place-based dimension. The importance of different types of institutions for a particular region (or sector), and the existence of some institutions not on this mapping, are important to understand the policy mix and the instruments chosen by the regions to fulfil their strategies (see Table 3.A1.2 in annex for a listing of some of these institutions located in the study regions).

The action plans of Central and Southern Denmark have taken different paths in part due to the strength and role of different core actors in their regional systems. One notable actor missing in this national mapping is that of cluster initiatives (supported by regions separately from the innovation networks), which play a particularly important role in Southern Denmark's regional support system and also exist in Central Denmark. These differences also reflect distinctive philosophies with respect to the conception of regional support (see Figures 3.A1.1 and 3.A1.2 in annex). The presence and type of firms further determines the technological and

sectoral strengths relevant for the interventions by priority sector. The most prominent of the differences between the two regional innovation systems, aside from the firm differences, include the:

- levels of university quality and engagement.
- use of Growth Houses versus cluster organisations for business support.

Figure 3.2. **Business and innovation support system in Denmark, by level of government**



Note: * Danish Agency for Science, Technology & Innovation, Danish Agency for Universities & Internationalisation, Agency for Higher Education & Educational Support.

Source: Reproduced from original in Danish as published in DAMVAD (2011), "Afdækning af erhvervsfremme- og innovationssystemet i Danmark", DAMVAD, Copenhagen.

Levels of university quality and engagement

Across the OECD, universities are expected to play an increasing role in regional development. They contribute through different channels, such as training the future labour force, conducting research, and, increasingly,

through a third mission of economic development (OECD, 2007a). Setting strategic objectives in pursuit of these other missions is important, but these objectives should be defined without neglecting the primary mission – the education of the future labour force (SSTI, 2006).

In terms of the primary mission of teaching, firms in the region reported that universities and university colleges could do more to develop curricula tailored for local industry needs. For example, in the energy sector, there are shortages of high-skilled engineers. Aalborg University in North Denmark has curricula that are adapted to the needs of firms located in Central Denmark, and has a department in Southern Denmark (Esbjerg) that trains future employees for the region. Universities have been requested to develop more relevant curricula for certain regional labour supply needs, albeit the funding and timeframe for such adaptations have proven barriers to universities making such adjustments. Another challenge is the per-pupil funding mechanism. For example, there are university colleges that are focused on training the future labour force for common public sector positions in education and health. However, as the public sector will need to become more efficient, perhaps in the future the demand for such labour will decline. But there is no incentive for these institutions to adjust their approach today to teach needed subjects for the future.

The third mission of universities was initially viewed in policy circles with respect to a university's entrepreneurial activities. This has been measured through indicators of the number of patents and spin-offs. Contract research with firms (in terms of number of firms, type of firm such as SMEs and volume of research dollars) are further indicators sought to better capture the relevance of universities to the needs of existing industries. The challenge is that in regions that are less competitive, there can be a less dense network of innovative firms and other intermediary institutions that help capitalise on university knowledge.[4] And there are initiatives in other OECD countries to go beyond some of these traditional research quality indicators (such as publications) and third-mission indicators to report on the social impact of research such as through case studies. This is the case, for example, in revisions to the UK Research Excellence Framework starting in 2013.

In Denmark, the third mission of universities is not regulated but rather at the initiative of the individual university and could be significantly strengthened (see Chapter 2). There is no dedicated funding stream for regional engagement. However, it is clear that the universities, through the RGF and their own actions, are increasingly partners of their respective regions for economic development. Furthermore, the enhancement of institutionalised co-operation will be important not only to build an effective interface with industry partners in the two regions and other territories in the

country, but also to unite forces to address the regional bias in the Danish higher education and research funding system (see Kerndrup, 2006). Their role as both a node within the regional innovation system, and a gateway to the world (through joint research and publications as well as attraction of foreign students and researchers) are further areas to be strengthened.

Each of the study regions has a main research university, with Aarhus University in Central Denmark having greater scale and quality on university-related indicators for research and technology transfer (Box 3.2 and Table 3.3). In terms of basic R&D, Aarhus University captures 21% of the national share, as compared with 20% of R&D professors. The University of Southern Denmark accounts for 13% of Denmark's professor R&D personnel but only 9% of national public research funding to universities. With respect to private funding of research, a relatively similar relationship holds, with Aarhus University capturing 24% of the national total, and the University of Southern Denmark 10%. Aarhus University is particularly strong in private R&D funding of humanities, capturing more than half of the national total. The quality of research, as measured by publication citations, is higher at Aarhus. In terms of sectoral strengths, Aarhus University is strong in agriculture, forestry and fisheries; physics and mathematics; chemistry; and biology. The University of Southern Denmark sees its strongest specialisation in health sciences, biomedicine and chemistry (see Chapter 1). In terms of technology transfer, Aarhus University has 17% of national patent applications, produces 26% of national spin-out firms and contains 18% of R&D technology transfer staff. The University of Southern Denmark captures around 10% of the national totals for patents, spin-outs and technology transfer staff.

The universities in the two regions contribute in many ways, in part with RGF support. They have science parks, technology transfer activities, and networking/partnering arrangements; engage in triple-helix type activities both at corporate level (e.g. membership of RGF) and at more specialised departmental level; and have recently attempted to integrate entrepreneurship in their teaching programmes as well as student growth houses. For example, the University of Southern Denmark has set up an initiative called "TEK Momentum" which offers an "Innovation Check" – identifying potential for innovation and helping companies pursue collaborative R&D and innovation projects with researchers and experts at the university. Aarhus University has a similar initiative – the Interdisciplinary Centre for Entrepreneurship and Innovation. In 2010, Aarhus University was also appointed as Denmark's entrepreneurial university by the Danish Business Development Agency. The centre provides a number of different services to the regional businesses – for example the centre assists the region's SMEs in project development and

matchmaking with researchers at the university. Regional technology centres are also attached to universities and contribute to clusters (e.g. offshore technology centre in Southern Denmark, part of Aalborg University).

Box 3.2. **Aarhus University and the University of Southern Denmark**

Aarhus University (AU) was established in 1928 as Denmark's second university after Copenhagen (established 1479). From the beginning, it was steeped in the European multi-faculty tradition with a focus on science, medicine and humanities, and a strong social science faculty soon emerging. Until recently all activities were physically located around its campus in the north of Aarhus, but as AU was among the most active institutions in the recent wave of mergers, the university is now also present in other locations, including Copenhagen. AU integrated two other major specialised HEIs, the Aarhus School of Business and the Danish School of Education, as well as several applied research institutions primarily with a science-oriented remit (environment, agriculture). In January 2012, it also merged with the Engineering College of Aarhus. AU has embarked on a very expansive institutional strategy, also promoted by the national government.

The University of Southern Denmark (SDU) was formed in 1998 as a multi-campus university combining the medium-sized and fairly new (1966) all-faculty Odense University with smaller HEIs and research units in what later became the Southern Denmark Region. The multi-campus structure was seen as contributing to regional development by facilitating access for local talent to higher education. One of the research organisations merged into SDU had a very explicit regional development remit while several of the other decentralised units also focused on issues of regional development. SDU was not greatly extended by the latest wave of mergers, adding a minor specialised research centre (medicine) in Copenhagen and an undergraduate business school in West Zealand to its already wide-ranging geography. Despite extensive talks and bidding rounds, no merger or take-over with Aalborg University's activities in Esbjerg has taken place.

Use of Growth House versus cluster organisations for business support

Growth House is the lead operator for regionally financed business support in Central Denmark

Central Denmark has chosen to centralise the regionally funded business services within its Growth House (more so than Southern Denmark). A centralised model is perhaps easier to achieve in Central Denmark as the region's configuration, with one large metropolitan area and a hinterland,

lends itself to that approach. The Growth House has two offices (Aarhus and Herning) and a single telephone number with a "no wrong door" approach. A firm will generally consult a municipality in the first instance, before being referred to a Growth House if needed. Certain municipalities in Central Denmark have outsourced their business development services to the regional Growth House. This may be due to resource constraints for a small municipality (such as Lemvig), as the amounts available at municipal level were deemed insufficient for the Local Business Council to deliver effectively on their mission.

Table 3.3. **Universities in study regions: role in innovation system**

	Central Denmark (Aarhus University)		University of Southern Denmark	
	Absolute values	Share of Danish total (%)	Absolute values	Share of Danish total (%)
Basic funding research (millions DKK, 2010)[a]	1 492	21	648	9
R&D personnel[a] (2009)				
Professors	171	20	108	13
Senior lecturers/ associate professors	678	28	193	8
Post docs/lecturers	335	18	181	10
PhD students	689	21	378	11
Projects funded by private Danish sources (millions DKK, 2007-2010)[b]				
Private funding	8 100	33	3 979	16
Humanities	990	55	370	20
Social science	464	33	378	27
Medicine	3 753	38	2 457	25
Technology and science	2 888	27	774	7
Total	20 855	24	8 953	10
Technology transfer (2008-2010)[c]				
Patent applications	63	17	28	7
Spin-out companies	8	26	3	10
Technology transfer staff*	28.4	18	20	12

Note: The share of basic research funding by university varied very little from 2005-2010, therefore only 2010 is displayed. * 2008 data.

Source: a. Data for selected universities from Danish Universities: Statistics Database. b. Danish University: Statistics Database c. Data from the Danish Agency for Science, Technology and Innovation: Public Research Commercialisation Surveys.

The Growth House in Central Denmark has been a proactive partner in the region's innovation system. This role is in part due to the investment strategy of the RGF, which has used the Growth House as a lead partner in several funded projects. And the Growth House has sought out new opportunities to run programmes from other ministries in Denmark, such as the Ministry of Foreign Affairs. It has therefore developed new competencies over time as well as taken on an expanded role in the regional innovation system, of benefit to the region.

A recent evaluation of Denmark's Growth Houses noted some general challenges across the country (DEACA, 2011).[5] The study found that generally there is a lack of industry specificity in consulting services and therefore firms do not receive sufficiently tailored advice. There is also a perception that the services are only useful for start-up firms. Suggested changes included greater cross-regional collaboration to achieve the industry-specific knowledge needed by firms being served, a more tailored client management feel, and better services to structure firm growth plans. Annual evaluations of the Growth Houses using quantitative and qualitative data, including feedback from beneficiaries, are one source of information about the institution in each region, but do not necessarily give a full picture of their overall role in the innovation system.

While a more centralised model may seem more appealing, several factors should be considered in such an assessment, beyond firm satisfaction. Cost effectiveness of interventions and impact on firm growth as well as regional development are critical factors. A joint national-regional initiative in progress to link data across registries of firms and services of Growth Houses in all regions could yield the kind of analysis on firm success that can help better assess the effectiveness of these different models. The findings will help structure lessons that all Growth House programmes, as well as other regional projects, may benefit from. They will also open ways to investigate the relevance of cross-regional action in some areas or sectors where the individual Growth Houses may lack sufficient specialisation.

The current mandate of the Growth Houses is to support the creation and expansion of high-growth start-ups. Their main tasks are to provide free and impartial assistance, referring enterprises to specialised private advisors and relevant government agencies and organisations. This brokerage role therefore links firms to programmes and institutions from other ministries, such as with the Trade Council for Internationalisation, the Patent and Trademark Office for IPR, etc. Therefore, the fact that innovation policy in the narrow sense (research-based innovation) comes from the Ministry of Science, Innovation and Higher Education, while innovation in a broader perspective (user-driven innovation, service innovation and innovative

entrepreneurship) falls under the Ministry of Business and Growth results in different sets of institutions. Given the lack of specialised services by Growth Houses, technology institutes and cluster organisations are better able to provide technical services or identify the right consulting services provider for innovation support. This is why a "no wrong door" approach that allows greater inter-connections among innovation system actors becomes particularly important.

Southern Denmark chose cluster initiatives, supported by its sub-regional units, as business service providers

Southern Denmark has chosen a different model for operating regionally funded projects, viewing business-led cluster organisations as a more efficient means of achieving their growth goals. In each business area prioritised by the region there is a cluster headed up by leading firms in the region and involving the participation of knowledge institutions, local authorities and other public sector parties. Furthermore, since a greater share of Southern Denmark's regional funds are allocated to specific sectors, as opposed to horizontal programmes, the need for industry-specific knowledge is even more relevant. The associated cluster initiatives were deemed by the region more apt to support business development services in priority sectors. As a result, the Growth House in Southern Denmark is a smaller node in the innovation system network, relative to Central Denmark, by design.

Another consideration is that the different politics of place in Southern Denmark make a centralised delivery model more difficult to achieve. The cluster initiatives are associated with different sub-regional units (institutions with groupings that cover areas similar to the former counties that were merged in the 2007 reforms to constitute the region). With three medium-sized cities and separate islands, Southern Denmark has a more complex socio-political landscape rendering the development of such a centralised model less able to maintain proximity relationships with regional firms. As a result, there is a political need to accept greater bottom-up partnership building given stronger sub-regional identities in Southern Denmark.

To measure the effectiveness of the Southern Denmark system of business support, Growth House evaluations alone will not address this. Assessment of the cluster management and the actions taken with firms via clusters are needed to determine if this regional choice for delivery has proven both cost-efficient and effective for improving firm innovation.

Other OECD regional experiences

There is not one optimal model for regional intermediaries in charge of supporting business development and innovation support. It is therefore not possible to judge *a priori* the better model between Central and Southern Denmark. However, a number of success criteria have been identified through comparative research with respect to such agencies' overall role in the innovation system, particularly for those agencies that provide innovation-related programmes in addition to business support referrals (Table 3.4). The brokerage role of these entities in facilitating relationships in regional networks is a key function, whether it is a Growth House or a cluster initiative. And with respect to service delivery, it is important to help SMEs develop proactive innovation strategies, addressing their latent needs rather than offering only reactive support to what the firms themselves have identified. Therefore evaluations that consider only Growth Houses, and not the business services delivered across different entities in the region, will miss part of the regional story.

Table 3.4. **Regional innovation agencies: new approaches**

Issue	Old paradigm	New paradigm
Role	Top-down resource provider from outside of system	Facilitator, node in the system
Rationale for intervention	Market failures	Systems failures, learning failures
Mission	Redistributing funds	Identifying and reinforcing strengths in the system: a change agent
Instruments	Isolated	Policy mix
Accountability and control mechanisms	Administrative and financial	Strategic, goal-oriented, additionality
Autonomy	Restricted to execution	Expanded to strategic decisions

Source: Modified from OECD (2011), *Regions and Innovation Policy*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264097803-en*.

As the proliferation of business support services through too many intermediaries is also a perennial problem in OECD countries, there are many OECD examples of strategies to address this. The national emphasis on seeking to consolidate many entrepreneurship support activities into the regional Growth Houses is one strategy. The fact that they share a common brand name, information system (excluding confidential business information), and meet regularly for experience-sharing, also supports this harmonisation and simplification. While the local business development councils continue to promote their own services, attempts to clarify the role of these groups versus that of the Growth Houses should help. The United Kingdom underwent an extensive effort of business simplification to

reduce the number of business support schemes offered at the time at national, regional or local level (Box 3.3).

Box 3.3. **Business Support Simplification, United Kingdom**

The Business Support Simplification Programme (BSSP) was initiated by the Department for Business Enterprise and Regulatory Reform (now the Department for Business, Innovation and Skills) for English regions. It aims to make it easier for companies and entrepreneurs to understand and access government-funded grants, subsidies and advice with which to start and grow their businesses. It was estimated over 3 000 publicly funded business support schemes existed. Businesses reported that they were confused by the number of schemes, which discouraged them from applying. Streamlining helps save them time and money when looking for support. Better targeted schemes have more impact for businesses and provide the public sector with greater value for money from a leaner system. The 3 000 schemes were reduced to 100 or less by 2010 and made available through the nationally sponsored and regionally administered Business Link gateway. With the new UK government in 2010, this process was consolidated into Solutions for Business. The portfolio will contain only 13 products and will no longer be supported by the administrative regions that ceased to exist 31 March 2011 but rather offered through an Internet portal.

Source: Department for Business Innovation and Skills (n.d.), "Solutions for business: simplified business support", BIS, London, *www.bis.gov.uk/policies/enterprise-and-business-support/solutions-for-business-simplified-business-support.*

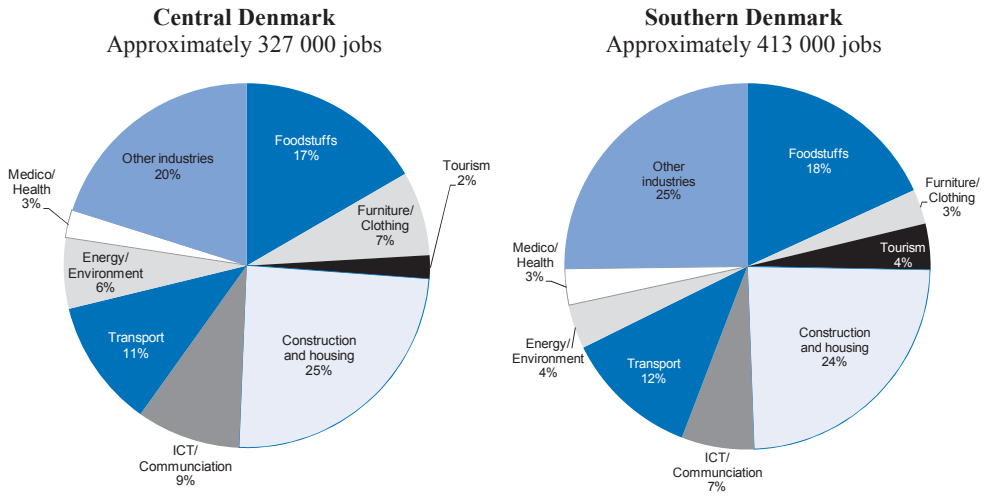
Prioritised sectors and clusters for regional action

Employment and productivity trends in prioritised sectors

While there are positive growth trends for employment and productivity in the selected sectors, they don't account for a large share of regional employment *per se*. Unfortunately, figures directly related to the prioritised sectors are not available. Using the very rough proxy of "resource areas", in Southern Denmark, 11% of private sector jobs combined are in medico-health, energy/environment or tourism. For Central Denmark, priority sectors, given the inclusion of the large food sector, they represent almost 27.5% of regional private sector jobs (see Figure 3.3). However, the classifications do not categorise the types of firms being targeted in these sectors, such as IT for welfare technology or housing and construction for lean energy.[6] Analysis of employment from 2003-2008 shows that medico-health, tourism, and energy/environment were the three of eight private sector resource areas with net job increases in Southern Denmark. In Central Denmark, between 1996 and 2008, employment changes in prioritised sectors were: 19.7% for energy and

environment, 12.4% in tourism and -15.9% in food. In 2008, employment and productivity in energy/environment, food and medico-health sectors were showing similar values in the two regions. In 2008 the medico-health sector represented 1.15% of total regional GVA for Central Denmark, energy and environment 8.7%, food 15.8%, and tourism 1.3%.

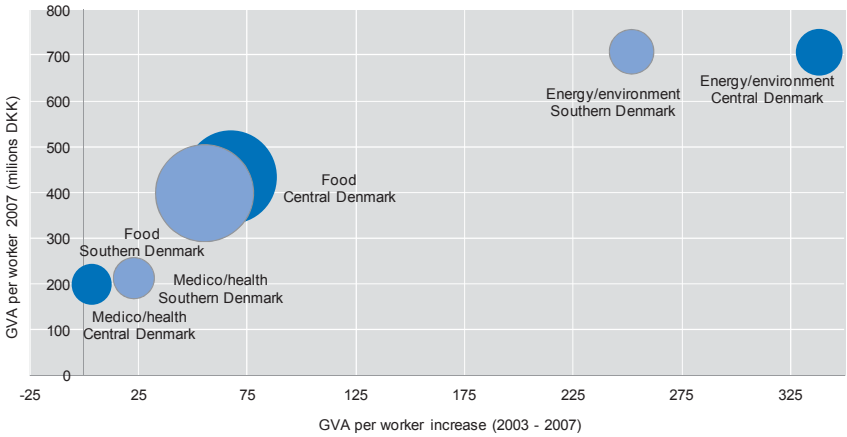
Figure 3.3. **Distribution of private sector employment by resource area (2008)**



Source: Data from Statistics Denmark as provided by regions.

Sectoral productivity and skill differences also show some variation by region. Productivity increases in the medico-health sector were higher in Southern Denmark than in Central Denmark, whereas both the food and the energy/environment sectors displayed higher gains in Central Denmark (especially in the latter) (see Figure 3.4). The skill level differences by sector are striking. In Central Denmark, energy and health have a more highly skilled labour force (39% with tertiary education in energy, 41% in medico-health) while food and tourism sectors had workers with a very low level of education (53% of workers with primary education only in food; 70% in tourism). These differences have important implications for the policy mix by priority area.

Figure 3.4. **Employment and value added in prioritised sectors**

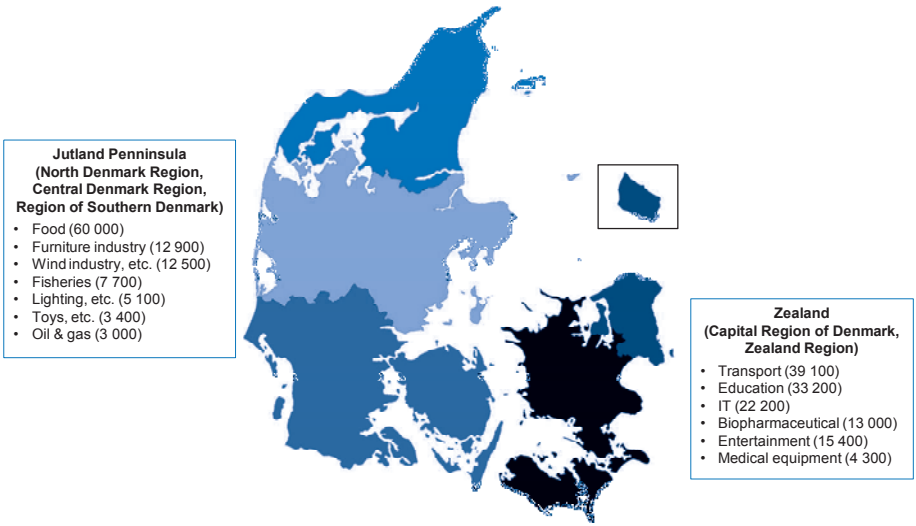


Note: The size of the bubble represents employment in 2008 in the corresponding sector. Data for the experience economy sector are not available. Medico-health does not perfectly correspond to the welfare technology sectoral definition.

Source: Statistics Denmark.

One of the challenges for the two regions within Denmark is the relatively lower level of clustering (in terms of employment specialisation) within the EU, a possible barrier to productivity growth. Based on an analysis using the EU Cluster Observatory data and matching with relevant regional peers, it appears that eastern Denmark (which includes Copenhagen) contains specialisations among the top ten in Europe in the education, transport, IT, entertainment and biopharmaceuticals (including the cross-border Swedish-Danish Medicon Valley cluster) sectors, for example (Figure 3.5). In the study regions, employment concentration in specific sectors is sparser, which were considered within an analysis of the Jutland Peninsula as a whole. However, there is a notable concentration of employment in specific sectoral niches such as food, toys and energy (oil and gas and wind energy). In other Nordic countries such as Finland and Sweden and in the United Kingdom, the gap in sectoral concentration between the capital and the rest of the country is less pronounced (FØRA, 2011).

Figure 3.5. **Danish areas of employment specialisation in an EU context**



Note: This map is based on the identification of areas of employment specialisation with respect to the EU as calculated by the EU Cluster Observatory using their classification into 41 categories. The country was split into two groups (Group 1: Copenhagen and Zealand; Group 2: the three regions on the Jutland Peninsula). Group 1 was compared to the 43 other EU regions that contain a city of at least 1 million inhabitants. Specialisations in the top ten within the EU were retained. Group 2 was compared with the other 193 EU regions. Specialisations in the top 30 were retained. This map is for illustrative purposes and is without prejudice to the status of or sovereignty over any territory covered by this map.

Source: Based on analysis in FØRA (2011), *Productivity in Denmark: the Danish Challenge for Growth*; map is based on Wikimedia Commons (2007), "Regions of Denmark".

Both regions have chosen to channel specific projects to transform their economies in part through prioritised sectors. Both regions prioritise energy and welfare technology that are also supported by national programmes. But their niches within these categories need to be more clearly communicated so as to show the unique regional contribution to national goals. Both regions have conducted studies, often on firms or other barriers to target their policy mix by sectoral priority. With rare exception, they do not tend to map both firm issues and research/skill competencies at same time or take into consideration global trends. Building the region's role within a national and international context requires recognition of such regional assets, their relationships in these networks, and communication and development of those niches. It should also build on branding and assets (HEI, firms) of Denmark overall, and not only the regions that have less international

visibility. Regional cluster organisations are already thinking national, and policy approaches need to follow so that regions better link their industrial and research assets to other regions where this makes sense.

In Southern Denmark, prioritising three sectors required considerable compromise within the region. The previous 4 counties each had 5 to 15 priority sectors before the municipal reform. Thanks to the work of the Growth Forum, the priorities were combined and consolidated to 17 priorities initially. A 2008 study commissioned by the region identified 87 cluster and networking initiatives in the region, among which 28 were emerging clusters in 10 broad cluster areas.[7] The list was therefore reduced to four priority sectors initially, and in the latest strategy only three were retained.

The policy mix for each sectoral priority should also be relevant to the type of transformation being sought and the cluster-specific barriers for growth. As noted in the literature on smart specialisation, the four principal types of transformation include: *i)* modernisation; *ii)* transition; *iii)* diversification; and *iv)* radical foundation (Foray, 2011; Foray et al., 2012). For the energy sector, the focus in Central Denmark is on transition. In Southern Denmark, this is transition and diversification through related variety (such as moving from black to green offshore energy). In the case of welfare-related technologies, the efforts are for diversification. In the case of tourism, initiatives appear to be more focused on basic modernisation as well as some areas of synergies with other areas (design and food for example). Food sector efforts in Central Denmark appear to be focused on modernisation and transition.

English regions (pre-2011) provide an interesting parallel with the Danish case for progressively prioritising areas for transformation investment. Initial strategies were very similar in their strategic priorities. For example, eight out of the nine regions all selected four of the same priority/cluster areas. Furthermore, national STI policy continued to seek greater alignment of funding between regions and national level to conform with national goals. Regions farther from the capital, like those in the North of England, struggled with developing assets they felt were sufficiently "world class" to be recognised as important for the United Kingdom overall (OECD, 2008). One of the most difficult strategies to develop was that for the Northeast of England, the English region most lagging in terms of resources and economic development. While the initial strategy was relatively bold and highlighted five sectors, over time this was reduced to three for greater focus on transformative drivers with massive investments (see Box 3.4).

Box 3.4. **Northeast of England: Strategy for Success**

The Strategy for Success was originally launched in 2002 by the Northeast of England Regional Development Agency, One NorthEast. Its initial design had four key elements: *i)* centres of excellence to support relevant technologies; *ii)* an exploitation company to support commercialisation of technology; *iii)* a cluster development programme focused on networking across regional assets; and *iv)* public-private leadership by a new institution the Science and Industry Council (ultimately created in all English regions). While funding was initially planned at around GBP 230 million, it is reported that ultimately from 2002-2003 through 2008-2009 that spending was around GBP 132 million as funds went to other key regional projects as well such as the Newcastle Science City, the Institute of Ageing, and the Northern Design Centre.

Initially, five different centres of excellence were proposed to drive this strategy; however, after a couple of years this was reduced to three given centre progress and a need to have more focus for greater impact. The New and Renewable Energy Centre (NaREC) with a focus on marine wind energy, and the Centre for Process Innovation (CPI) with a focus on the chemicals industry, are both capital-intensive facilities that support translational research and focused on lowering risk and the cost of R&D for local SMEs. The Centre for Excellence for the Life Sciences (CELS) focuses more on networking, as does Codeworks for digital media that was not retained as a top three priority. The Centre for Emerging Nanotechnology, Micro and Photonics Systems (CENAMPS) was merged with CPI. NStar, the early stage venture company, remained to support the centres. The legal structure of the centres, which required considerable planning to get approved, allowed the centres to separate their public role based on core funding from their commercial initiatives. The challenge with the prioritised sectors is that many are also prioritised by other English regions and internationally, notably energy and life sciences.

An evaluation in 2008 highlighted several positive factors with the programme and its results that it deemed had substantial benefits that could improve regional productivity. One thousand eight hundred new jobs were reported (13 per GBP million) and associated sales from those firms of GBP 1.3 million per GBP million spent) as well as 120 new business generating intellectual property. It was also praised for the use of innovative governance vehicles of the centres. It was thought that the programme should be renewed as the economic impacts would not come for another few years and require continued public investment, a concern for the future. However, another report suggested they be privatised and based more on project funding. To obtain national and international recognition of the centres, strategies were recommended (including international peer reviews). While there were concerns about the region's declining chemical industry, the transformative effects have resulted in GBP 3 billion in inward investment as well as a strategy and world-class facilities. CELS has perhaps had less of a transformative impact than process and energy sector investments.

Box 3.4. **Northeast of England: Strategy for Success** (*cont.*)

An evaluation noted that the types of indicators to measure success were under-developed. The high-level goals were already set: *i)* to change the industrial structure of the region by supporting strategic sectors with value added for significant future growth; and *ii)* to achieve regional economic growth through technology-led innovation. The evaluator worked with the region to develop a framework that included: activities, outputs, outcomes, and impacts.

It also highlighted that the projects did address legitimate market failures, particularly with respect to the indivisibility of research-led technological innovation and co-ordination failures that prevent sufficient functional critical mass. The asset-based approach of this strategy, which is capital intensive, is different from that of other English regions where the focus was more on the creation of hubs, linking institutions and advisory services. The need for transformation supports this asset-based approach, but there were concerns about the availability of ongoing funding for such initiatives in the future.

Source : OECD (2008), *OECD Reviews of Regional Innovation: North of England, United Kingdom 2008*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264048942-en*; Simmonds, P. and J. Stroyan (2008), "An evaluation of the One NorthEast Innovation Industry and Science Programme Strategy for Success", Technopolis Group, 22 October.

Energy: building on recognised strengths

Sector overview

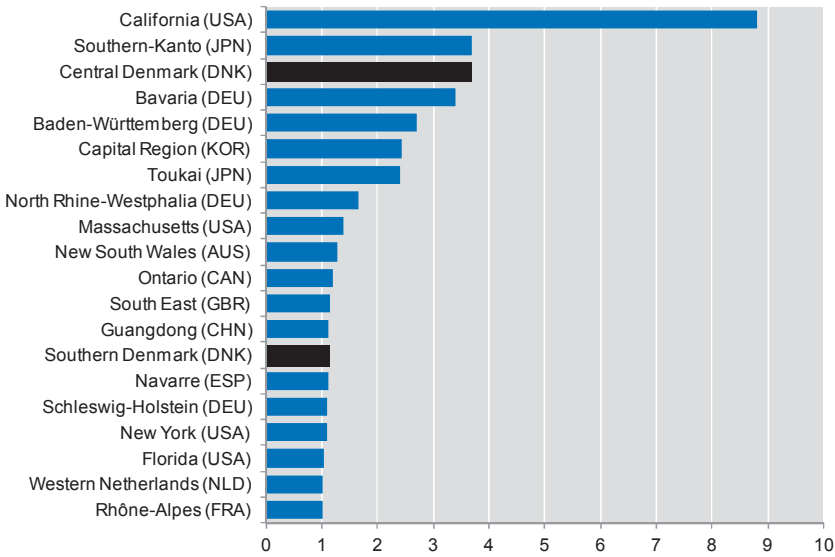
Since the 1970s, the green energy sector has been a national priority for Danish policy makers. This led to the establishment of some of the earliest R&D programmes for the renewable energy sector among OECD countries (IEA, 1985), that in combination with forward looking policy initiatives has made Denmark one of the hot spots for green energies, at the global scale (IEA, 2011; Kamp et al., 2004; Lewis and Ryan, 2007).[8]

In 2008, 55 000 persons were working in the energy and environment resource area (sector) in Denmark, 62% of them in Central and Southern Denmark. Exports in energy technology goods increased from 2000 to 2010 by almost 100%, making Denmark the biggest energy technology exporter within the EU-15 in relative terms (DEA et. al., 2010). In 2010, 9.5% of total Danish exports were energy goods, and Central Denmark accounted for 67% of energy and environment exports. In a global comparison, Denmark has a high degree of export specialisation in heating pumps, engines and cooling generators (Ehervsklimapanelet, 2008). They show a higher concentration in energy jobs than the national average (around 4% in both regions). Southern Denmark has a particularly high concentration of primary sector jobs in the energy sector (70% of national jobs in the primary sector within energy and environment), especially in the coastal municipalities of Esbjerg and

Sønderborg. Energy has been a growing sector for value added in Central Denmark (18.4%) and Southern Denmark (14%) (between 2003 and 2007). In 2008, the share of tertiary educated workers in energy was 12.5% in Southern Denmark and 14.8% in Central Denmark respectively (Region of Southern Denmark, 2010). Within the EU, Denmark shows one of the largest patent shares in renewable energies (IEA, 2011). Moreover, both Central and Southern Denmark Regions perform well in global regional patents rankings in the field of renewable energy (2005-2007): Southern Denmark accounts for 1.1% (14th ranked region) of PCT patents and Central Denmark 3.7% (3rd ranked region) (Figure 3.6).

Figure 3.6. **Central and Southern Denmark Regions among top 20 in renewable energy patents**

% of global share of PCT patents (2005-2007)



Note: Patents in "renewable energies" include patents in renewable energy generation technologies, as identified by the OECD. For more details, see *www.oecd.org/dataoecd/42/51/44387201.pdf.*

Source: OECD calculations based on OECD REGPAT.

Regional needs, assets and actions

Central and Southern Denmark host leading firms in the energy sector, both at the national and international level, with different and complementary niches of specialisation (Table 3.5).

- Central Denmark is specialised in wind, biomass and district heating, including large firms such as Vestas, Siemens Wind Power and Grundfos.
- Southern Denmark is strong in energy efficiency (mechatronics, energy systems and production techniques) and offshore energy, including large firms such as Danfoss, Dong Energy and LM Wind Power.

Table 3.5. **Regional goals for energy and environment/sustainable energy**

	Central Denmark (energy and environment: 2010-2020)	Southern Denmark (sustainable energy: 2012-2020)
Sectoral niche	Wind power, biomass, district heating	Energy efficiency/lean energy, offshore energy
Sectoral target	– Revenues should increase by 12% per annum – Exports should grow by 15% per annum – Value added should increase by 10% per annum – Employment should grow by 2% per annum	– 15% growth in productivity (by 2020) – 10% growth in technology exports (by 2020) **Subsidiary goals 2012-2013 (energy efficiency and offshore)** – 10% increase in admissions to engineering study courses in the region – increase in SME export share by 10%

Source: Regional business development and action plans, Central and Southern Denmark.

Both regions support energy-related networks and clusters as well as test centres (Table 3.6). The lean energy cluster in Southern Denmark is the result of a merger between the previously existing lean energy and cooling clusters. For most clusters and networks, the main responsibilities are: competence development through education and knowledge exchange (e.g. continuous education to attract foreign specialists); creating better framework conditions for companies; getting access to testing facilities; branding and communication to create visibility for the cluster; networking between business operators around process, product and project development (providing professional support to the projects). The regions financially support test centres for both wind and biomass power (in Central Denmark) and for offshore renewables (in Southern Denmark). These centres may be the reference testing locations at the national level, as in the case of the biomass centre. The regions could also consider their role in demand-driven innovation for energy (Box 3.5).

One of the most significant challenges reported in both regions in different aspects of energy-related clusters is the lack of appropriately skilled labour today, along with projected further shortages. Increasing global competition in the sector is another. Improved industry-higher education linkages would address several of the sector's challenges. In each

region higher education institutions offer academic programmes to address the demand of qualified students in the regional sectoral niches. Faculties in each of the two regional universities are involved in energy-related R&D activities. In addition, several research and innovation institutions active in the energy field are located in both regions. Exploiting the proximity to Germany (in terms of universities and students) is also being considered.

Table 3.6. **Energy – sector overview by region**

	Central Denmark	Southern Denmark
Related scientific and innovation bodies	– Aarhus University (Faculty of Agricultural Science, Aarhus School of Engineering, Institute of Business and Technology) – AgroTech A/S (Institute for Agro Technology and Food Innovation) – Samsø Energy Academy – Algae Center Denmark **Located outside Central Denmark but significant to the sector:** – National Centre for Environment and Energy – Aalborg University (Faculty of Engineering and Science) – Danish Technological Institute	– University of Southern Denmark (Faculty of Engineering, Health Sciences, Humanities, Science, Social Sciences) – Aalborg University – Esbjerg Institute of Technology – Force Technology (Esbjerg, Vejen, Middelfart, Odense) – Delta (in Sønderborg) – Mads Clausen Institute (in Sønderborg)
Cluster/network organisations	– Danish Development Center for District Heating: 3 employees, 75 members – INBIOM (Innovation Network for Biomass): 6/8 employees, around 150 members – Ve-Net (Sustainable Energy Network): 2/3 employees, around 300 members – MidtVind/Innovation Network for Wind Energy (analysis, understanding the new value chain; transforming/upgrading supplier´s competences for suppliers to the wind turbine sector) **Relevant national organisation** – The Danish Wind Industry Association (conducts lobbying for the wind turbine manufacturers, energy companies and the companies that provide components, services and consultancy).	– Lean Energy Cluster: 6 employees, 80 members – Mechatronic Cluster Denmark: 23 members – Offshore Center Denmark: 8 employees, more than 250 members (cluster organisation for oil and gas, offshore wind, the offshore maritime area and wave energy) – Green Offshore Center – LORC-Lindø Offshore Renewable Center: 19 employees, 18 members (foundation for windmills that has a test centre) – Alliance for Offshore Renewables: 5 employees, 18 members (lobby and attracting financing to Denmark for offshore wind turbines and wave power) – Energinet

Table 3.6. **Energy – sector overview by region** (*cont.*)

	Central Denmark	Southern Denmark
Regional initiatives	The current business development strategy supports actions grouped in four areas: – testing – energy saving and transmission to sustainable energy – technology and business development in energy and environment companies – climate and business development	The Southern Denmark Region has directly supported offshore energy and lean energy-related initiatives: –Alliance of Green Offshore Energy, to seek for international and EU contributions and collaborations – Active support of energy clusters to promote the development of the energy industry in the region and in the country and of the linkages between offshore energy and sustainable energy (Lean Energy Cluster, Offshore Center Denmark, LORC). 17 projects have been started with a budget of DKK 248 million, 50% of which has been directly funded by the region
Cross-regional initiatives		Southern Denmark Region co-operates with northern Germany and other Danish regions on energy efficiency related projects

Box 3.5. **Increasing energy efficiency standards: the case of Japan**

The Top Runner Programme was developed by Japan in 1999, under the Energy Conservation Law. This programme sets energy efficiency targets for product categories (such as cars, televisions, computers, etc.) and the most efficient model on the market is used to set the standard to be attained within four to eight years. The committee setting the standards is composed of stakeholders belonging to the manufacturing industry, higher education institutions, trade unions and consumer organisations, in order to ensure commitment to the regulation settings by a wide range of innovation system actors. Consumer perspectives are also taken into account by the framework. The Top Runner Programme has been successful at promoting the development of new energy-efficient equipment. In addition, a complementary energy-saving labelling system (orange labels for products not meeting the target, green label for products achieving the Top Runner standard) has been introduced to increase consumers' awareness on energy-efficient products.

Source: OECD (2011), *Demand-side Innovation Policies*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264098886-en*.

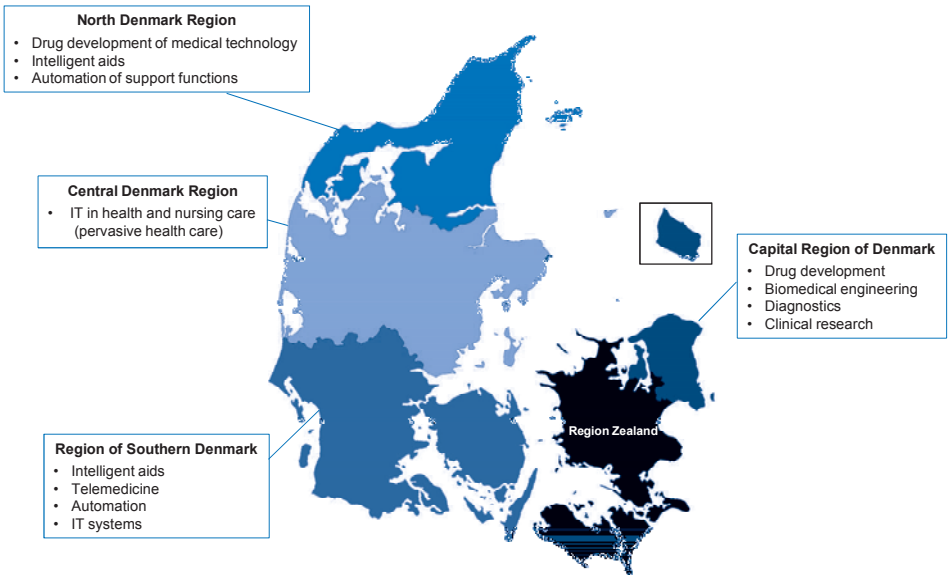
Welfare technology: building critical mass through a new market opportunity

Sector overview

Ageing and the increasing costs of health care and related service delivery are among the social challenges to be addressed by innovation policy. Nordic countries are particularly interested in innovation in this sector given their generous public welfare systems and resulting high levels of government spending as a share of GDP. As many of these services are provided by public sources, development of innovations may involve public-private innovation partnerships (PPIs) as well as a focus on user-driven innovation. Finland has a longer tradition in this field, but currently Denmark is the most active in promoting such PPIs (Weihe et al., 2011). The term "welfare technology" is commonly used in Nordic countries to describe technologies generally associated with health care and its related services. This involves not only medical devices but also improvements to other products that facilitate independent living and/or reduce the frequency of public service use.

All regions in Denmark have prioritised this sector, in part to respond to the biggest expense in regional budgets: health care. This sector is also promoted in a 2009 Danish Growth Council report, which recommends five key actions for developing welfare technology solutions.[9] Denmark has therefore been taking active policy measures to encourage the development of welfare technology through national initiatives of the Danish Agency for Governmental Management and the Public Welfare Technology Foundation as well as the Ministry of Business and Growth (see also Chapter 2).[10] However, there is no one common definition of health technology or welfare technology in Denmark. Health technology is perhaps more focused on patients and doctor care, while welfare technologies can be conceived of more broadly to encompass technology solutions that support welfare in health, social, education and labour applications.[11] In that sense, Central Denmark could be more characterised as focusing on health technology and Southern Denmark on welfare technology, with a clear area of overlap in the telemedicine area. However, other regions may respectively also share common niches with other Danish regions, such as intelligent aids in Southern and Northern Denmark (see Table 3.7 and Figure 3.7).

Figure 3.7. **Welfare technology niche by Danish region**



Note: This map is for illustrative purposes and is without prejudice to the status of or sovereignty over any territory covered by this map.

Source: Copenhagen Economics (2008), "Velfærdsteknologi og –Service i Region Syddanmark; En Erhvervsklynge i Udvikling", 23 September; map based on Wikimedia Commons (2007), "Regions of Denmark".

Regional needs, assets and actions

Regions are taking many actions in this field, through cluster initiatives and different policy instruments. They include: networking activities, investment funds, public procurement development, and product testing opportunities (see Table 3.8). They are also reaching out internationally. For example, there is a co-operation agreement between Panasonic (Japan) and a series of actors from both regions (including Odense municipality, the University of Southern Denmark, Aarhus Municipality and the Alexandra Institute) for testing welfare technology products. Opportunities to further integrate the different other specialties in the region (food, design) are additional possibilities. In short:

- Central Denmark distinguishes itself for its commercialisation support, notably through cluster initiatives such as MedTech, and public-private co-operation with hospitals through MTIC;
- Southern Denmark has been strong in developing the demand for technologies in public hospitals and for seeking application in the social sector, such as assisted living for the elderly.

Table 3.7. **Regional goals for welfare innovation/health and social innovation**

	Central Denmark (welfare innovation: 2010-2020)	Southern Denmark (health and social innovation: 2012-2020)
Sectoral niche	ICT-related health care; biotech/medtech firms; and IT system development (ex. EPR, tracking, logistics)	Telemedicine, automation, intelligent aids, and IT system development
Sectoral targets	– Revenues should increase by 12% per annum – Exports should grow by 8% per annum – Value added should increase by 10% per annum – Employment should grow by 5% per annum	– 30% growth in productivity, corresponding to an average annual growth rate of 3%-3.5% through 2020 – 25% higher share of exports (from 44% to 55% by 2020) **Subsidiary goals 2012-2013** – 25% increase in turnover among firms in the business area – 20% increase in growth companies in the business area

Source: Regional business development and action plans, Central and Southern Denmark.

Both regions have conducted a battery of studies to address health and welfare technology, pre-dating the national level initiatives in this area. Central Denmark has, and continues to be, focused on the business development and commercialisation support for firms providing technology solutions to the health sector (through MedTech). There is a particular focus on software development, including the linkages with research expertise and the health service providers. Central Denmark evaluations have noted firm needs for commercialisation support. Southern Denmark's reports have sought to fully understand the potential and needs for regional action in the field. These studies cover both the existing set of firms, their barriers to defining opportunities and scaling-up for export, as well as the barriers for demand-driven procurement and adoption of welfare technology solutions.[12] The reports led to the development of cluster-driven programmes with firms and health care institutions (such as training programmes on public procurement). The example of the Health Information Technology Programmes in the United States, that include interactive software development, may be of interest (see Box 3.6).

Table 3.8. **Welfare technology – sector overview by region**

	Central Denmark	Southern Denmark
Regional facts	(2008 data) – 469 companies with 3 327 employees mainly located in Aarhus (36% of total firms) and Silkeborg (10%) – 41% of people working in the medico/health sector (not the same as welfare technology) have tertiary education – DKK 2 042 million is the GVA of the medico/health sector	One analysis commissioned by the region identified a possible core of 314 firms with 4 320 employees, with DKK 6.7 billion (69% of turnover and employment and 90% of exports in production firms).
Related scientific and innovation bodies	– Aarhus University (iNano, Department of Computer Science, Institute of Clinical Medicine, Aarhus School of Business) – Incuba Science Park – Delta – Alexandra Institute – Technology Institute (Aarhus centre) – FORCE Technology	– University of Southern Denmark (Faculty of Science, The Maersk Mc-Kinney Moller Institute) – Technology Institute – Centre for Robotics – Delta
Cluster/network organisations	– MedTech Innovation Center: six employees, until now companies are not members – BioMedNet: 25 member companies	– Welfare Tech Region: 12 employees and about 70 members
Regional initiatives	The **MedTech Innovation Center** has been created by Central Denmark Region, with a total investment of DKK 32.6 million. It is a regional innovation centre that works jointly with bio and welfare technology companies. It also offers training, assistance in the development of SWOT analysis, market plan and strategy definition. It also works actively within the clinic in joint ventures with hospital personnel in creating co-operations with industry, giving them the possibility to test, develop, and implement products and services. **Caretech Innovation** is the regional venture focusing on ICT for health care. The Central Denmark Region and the EU have granted more than DKK 37 million to the venture to promote business development in the welfare technology sector. **Centre for Telemedicine** is working with a focus on scaling telemedical solutions and creating an infrastructure in co-operation with industry. **Simulation and Innovation Center** located in the Horsens Regional Hospital in co-operation with VIA University College. Focus on educating personnel on the use of welfare technology and simulation tools – making it a part of the testing environment for industry products.	Southern Denmark applies this model to welfare technologies for the social and health sector. The Region and the Growth Forum have promoted the establishment of **Welfare Tech Region**, the core regional initiative in this sector. It is a platform to promote dialogue and interaction among firms, citizens, patients, health care professionals, public officials, research and education institutions. Welfare Tech Region implements projects, organises conferences, promotes networking and matchmaking activities. **G10 Innovation Center:** unique centre in Europe where it is possible to test the hospital design before the building phase. It is a workshop for testing and developing solutions for building hospitals in Denmark in the future. **Invia:** it is the regional welfare innovation unit. Invia collects ideas and suggestions from employees and patients. **Fund for Southern Growth Promotion:** it is a venture capital fund for entrepreneurial projects in the welfare technology sector, mainly through equity investments and to a lesser extent equity loans (DKK 75 million for investments: DKK 50 million from the EU Social Fund and DKK 25 million from the Southern Denmark Region).

Table 3.8. **Welfare technology – sector overview by region** (*cont.*)

	Central Denmark	Southern Denmark
Cross-regional initiatives	– **OPI Lab:** it develops models for collaboration and innovation for public-private partnership in welfare technology in different regions and municipalities. – **UNIK** is jointly supported by Central and Southern Denmark Regions and the Danish Agency for Science, Technology and Innovation. UNIK has two main goals: the creation of better public welfare services to patients with chronic disease and the support to economic growth and innovation in the welfare technology sector. – The five Danish Regions collaborate in the ***Regionernes Sundhedsit*** **(Regions' Healthcare ICT Forum).** This forum co-ordinates and performs ICT investments in the health care system.	

Source: Regions of Central and Southern Denmark.

Box 3.6. **Health Information Technology Programmes in the United States**

In 2010, the United States issued new regulation norms regarding IT in the health care sector, the Health Information Technology for Economic and Clinical Health Act (HITECH). It introduced incentive payment programmes and it defined criteria for "meaningful use" of electronic health records (EHRs). In order to support the use of EHRs, the government has funded the establishment of health information extension centres where physicians and hospital employees are assisted in learning how to better use electronic records and how to demonstrate their "meaningful use". In addition, the government funded programmes to foster regional heath information exchanges, where hospitals and care providers located in a particular geographical region may securely exchange information. The government also introduced other supply side measures: the Strategic Health IT Advanced Research Projects (SHARP) Programme and other health information technology programmes at the National Institutes of Health, the National Science Foundation, and the National Institute of Standards Technology.

Source: OECD (2011), *Demand-side Innovation Policies*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264098886-en*; Blumenthal, D. and M. Tavenner (2010), "The 'meaningful use' regulation for electronic health records", *New England Journal of Medicine*, Vol. 363, pp. 501-4; *http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__sharp_program/1806.*

In terms of new actions, both regions could be more active in moving beyond hospitals to tackle other welfare technology needs. The imperative to address hospitals is of course directly related to regional budgets and makes sense as a first priority. Therefore next steps include greater synergies between health and other sectors beyond IT, as well as this broader approach to welfare technologies. Southern Denmark has already supported technology for social services, such as assisted living for the elderly, in conjunction with the municipalities that are responsible for this policy area.[13]

Experience industries (tourism and design): in and beyond peripheral areas

Sector overview (tourism)

Tourism is one of the six areas of activity which the 2005 Business Development Act defined as statutory for the RGF. It is also a sector that addresses the more peripheral western coast of the Jutland Peninsula that experiences more significant economic development challenges and to which a significant share of regional development resources need to be allocated. The definition of tourism as an economic sector has been subject to debate given its complex nature. Different analyses have highlighted tourism as a service which can entail a vast number of components (e.g. transport, accommodation, catering, shopping facilities, man-made attractions, natural sights), many of which are also used by local residents for non-touristic purposes (e.g. commuting, family events, education, leisure).[14]

The sector is not a large share of employment for the regions, and is mainly in unskilled jobs. In 2008, the sector accounted for 3.8% of private employment in Central Denmark and 2.1% in Southern Denmark, both below the national average of 4.4%. While Central Denmark has experienced a long-term decrease in international visitors like Denmark in general, Southern Denmark has experienced growth in leisure tourism and a performance in business tourism above the Danish average even during the recent financial crisis (VisitDenmark, 2010a,b,c; Syddansk Turisme, 2010). This may be due to the combined impact of higher petrol prices and the development of a new mega-resort in Billund that make German leisure tourists stop earlier on their way towards the north.

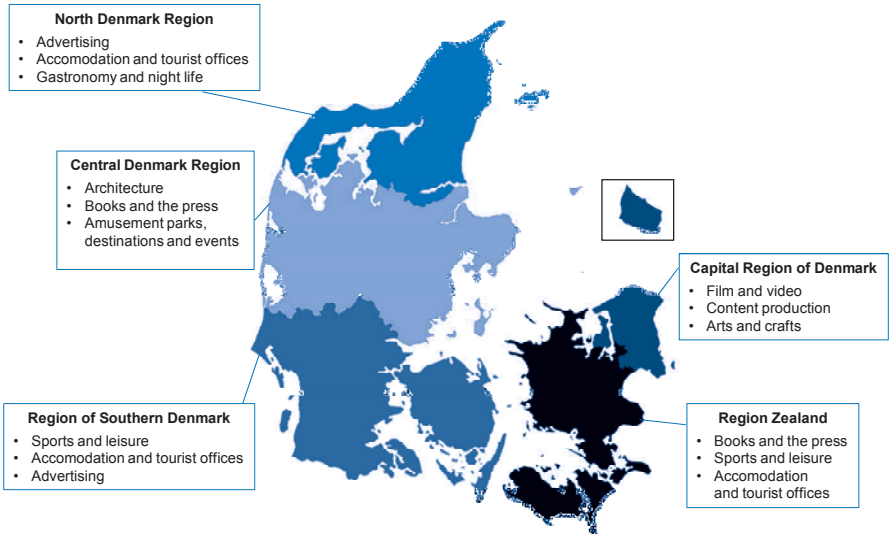
Sector overview (experience economy, including design)

In recent years tourism has become increasingly associated with the notion of the "experience economy". This highlights the grey zone between tourism and leisure. In terms of political discourse, it helps to modernise the image of an industry often seen as a low-tech and low-innovation area of economic activity (Weaver and Lawton, 2002; Hjalager, 2000). However, while the notion of experience is undoubtedly central to many forms of (leisure) tourism,[15] using it as a defining characteristic of tourism as such would seem to exclude many other forms, such as business travel, which are driven by external commitments rather than expectations of individual experiences. Denmark's experience industries represent around 10% of national value added and employment. Employment in experience industries is particularly concentrated in the Danish Capital area, Aarhus area and the

eastern part of the Jutland Peninsula (both in Central and Southern Denmark) (Figure 3.8). The most innovative experience industries in Denmark are located in the North Denmark Region, followed by Central and Southern Denmark and the Capital Region (DEACA, 2008).

Figure 3.8. **Specialisations by region: creative and experience industries**

Top three measured in terms of employment concentration (2005)



Note: This map is for illustrative purposes and is without prejudice to the status of or sovereignty over any territory covered by this map.

Source: DEACA (2008), "Growth through Experiences – an analysis of Denmark in the experience economy", DEACA, Copenhagen; map based on Wikimedia Commons (2007), "Regions of Denmark".

The creative industry (design, fashion, architecture, etc.) is an important component of the wider experience industry sector. The government has established a growth team for creative industries with a focus on design, that will develop recommendations in late 2012 to prepare an action plan aimed at strengthening growth in those industries. Around 85 000 people are employed in creative industries in Denmark, representing 6% of total jobs in the private business sector. Creative jobs represent an important source of innovation and productivity for companies and involve greater productivity and higher salaries than the Danish average. Some of the leading Danish firms in fashion, design or leisure are located in the two regions: the global

toy company Lego is located in Southern Denmark, and Central Denmark hosts one of the leading Danish firms in fashion and design: Bestseller.

Regional needs, assets and actions

The tourism sector is a priority for action in the strategies of both regions (Table 3.9). They have similar types of economic activity, through three main types of touristic experiences (coastal leisure, business and – albeit not priorities – city breaks). National policies have promoted tourism in both the leisure and the business sectors, and a large host of local initiatives have also taken place at municipal level. The new regions have progressively filled the gap between national and local initiatives, by focusing their support on tourist management operators. Both fund a regional tourism development body.[16]

Table 3.9. **Regional goals for tourism and the experience economy**

	Central Denmark (tourism: 2010-2020)	Southern Denmark (experience economy: 2012-2020)
Sectoral niche	Coastal tourism, business tourism	Coastal tourism, rural tourism, tourism for children, business tourism
Sectoral target	– Revenues should increase by 7% per annum – Value added should increase by 7% per annum – Employment should grow by 3% per annum – Share of tourism that is business tourism should grow to 35% by 2020 – Number of tourist overnight stays is to grow to 11.3 million in 2020 – Tourist daily consumption to DKK 1 000 by 2020	– 25% growth in productivity, corresponding to an average annual growth rate of 2.5%-3% through 2020 – 15% growth in employment by 2020 (from 2003-2008, rate around 10%) **Subsidiary goals 2012-2013: tourism** – 10% rise in average daily consumption among tourists – 5% increase in overnight stays among commercial tourists – 10% increase in admissions to tourism sector courses in higher education **Subsidiary goals 2012-2013: design** – 10% greater share of companies using design in business and strategy development – 10% greater turnover in the field of design – 10% increase in admissions to design sector courses in higher education

Source: Regional business development and action plans, Central and Southern Denmark.

In short, while many of the actions are similar:

- Central Denmark focuses more on a geographic prioritisation and an increased professionalisation of the sector.

- Southern Denmark has made experience development more prominent.

Actions taken by the regions tend to address several areas. They include: *i)* developing stronger tourism destinations through support for local and sub-regional organisations; *ii)* business tourism development, targeting the major earner in economic terms within the region's tourism sector; and *iii)* development of new experience offers in order to increase both the attractiveness of the region for leisure tourists and increase their expenditure during the stay. Additional prominent efforts include education programmes and the national Knowledge Centre for Coastal Tourism that is located in Central Denmark but supported by the state and other regions. Southern Denmark is seeking to develop a food tourism niche (see section on food below) as well as linkages with sports and leisure, such as through the establishment of a centre for sailing tourism. It also seeks to build skills through courses of higher education in tourism and its Experience Academy. Other synergies to cite could include tourism and the environment. The OECD has developed some good practices with respect to tourism policy to extract value from economic linkages (Box 3.7).

Both regions are supporting some aspects of design, more so in Southern Denmark where there are explicit regional targets in its strategy and action plan. Among its regional assets is the Kolding Design School. To promote design, the region aims to increase the number of students in the design field and to promote the use of design in firms. The region has established a platform, Design2Innovate, that facilitates the use of design instruments by companies and organisations. The region also plans to brand its strengths with a North European Knowledge Centre for the Utilisation of Design. In the future, design will be increasingly incorporated in cross-sector projects, involving multiple business areas. Central Denmark hosts the national innovation network related to design, fashion and architecture, Innonet Lifestyle – Interior and Clothing. The network focuses on innovation and design, new materials, fashion and clothing, ideas for future living. It promotes cross-disciplinary work in firms and organises matchmaking events for private sector stakeholders.

Box 3.7. **OECD recommendations on tourism policies**

According to OECD (2010c), it is not enough to develop and apply tourism-specific policies, but it is important to pay attention to both the horizontal and vertical linkages within an economic system that may be related to tourism. Governments need to regard tourism as a cross-cutting sector that concerns a wide range of activities. Therefore in order to maximise the economic potential of tourism, it is necessary to develop an integrated approach to policy development across levels of government and government departments. The most important actions to be taken may be summarised as follows:

- **Investment in quality and skills.** It is important to raise the quality and the productivity of tourism labour force. Raising skills in the tourism sector is a means to raise the attractiveness of tourism as a whole and to improve career perspectives.
- **Marketing and branding.** Tourism strategies must include a focus on destination marketing and national or regional brands.
- **Environmental sustainability for green growth.** It is crucial to raise the awareness of the importance of environmentally friendly tourism.
- **Product development and innovation.** Governments recognise the importance to renew and diversify the range of tourism products, services and facilities.
- **Long-term strategic industry planning.** Tourism has been placed on the agenda of many OECD governments as an economic sector that demands growing attention.
- **A culture of evaluation and capacity building.** It is important to monitor and evaluate tourism-related programmes and to develop the right set of indicators and quantitative intelligence.
- **Co-operation and partnership.** It is important to develop a more co-operative culture on tourism at many levels: internationally, with neighbouring countries and regions, across government departments, and between the public and the private sector.

Source: OECD (2010), *OECD Tourism Trends and Policies 2010*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/tour-2010-en*.

Other sectors (such as food)

The food sector is prioritised in Central Denmark, which accounts for 55% of Danish food exports. And within the region, the food "resource area" as tracked by Danish Statistics represented 16% of total employment

and 15.8% of regional GVA (2008 data). The sector has experienced notable job losses over the last 15 years but increasing turnover and exports. The region contains a concentration of some of the biggest food-related activities and firms in Denmark. Companies like Arla Food, Danish Crown and Dansk Supermarked are located there. Several scientific and research actors involved in innovation programmes related to the food sectors are found in the region, such as Aarhus University, VIA University College, VIFU, AgroTech, and science parks and incubators such as the Agro Business Park, Incuba Science Park, and Agro Food Park.

However, the sector needs to be modernised and diversified to build on current strengths in large manufacturing as well as processing and distribution companies. The main strategic approach in the action plan is to strengthen innovation competencies. Indeed, only 33% of Central Denmark food firms are actively innovative. This share is lower than the Central Denmark average of 45% and the food national average of 35% (2009 data). It is also a sector that has a very high share of unskilled workers (over half).

The region supports the development of clusters and networks in the food sector, and promotes knowledge transfer, training, research and innovation activities in food-related areas. The Smart Food Initiative, including the Future Food Innovation efforts, further promote innovation within the food sector by organising conferences and workshops, supporting industrial PhDs, providing matchmaking and networking opportunities and implementing other actions to promote innovative entrepreneurship in the sector. Regional efforts are reinforced through collaboration with the Danish Ministry of Food, Agriculture and Fisheries as well as other ministries, regions and organisations. Further synergies among the agricultural suppliers for suppliers and production are being pursued with the energy sector in terms of biomass. There are international examples of successful food-related niches in knowledge-intensive countries like Denmark. The Netherlands, for example has an initiative to promote international ties with food in India, focusing on their niche strengths such as agro-food machinery, refrigeration and logistics (Box 3.8).

For Southern Denmark, while food was previously prioritised and remains a large share of the economy, its growth prospects were deemed limited. Efforts to support food are now integrated into the experience economy and tourism support. The region does not have the same level of large firms with R&D capabilities, or the same level of scientific research and infrastructure as Central Denmark. Linkages between Southern Denmark actors and Central Denmark programmes could be considered. While the potential for integration of food and tourism is not a

solution to addressing the sector overall, there are some OECD examples in this specific area (Box 3.9).

Box 3.8. **Food Tech Holland: food sector in a knowledge economy with international outreach**

The Dutch food industry has a strong international dimension, with almost half of its revenue coming from abroad (40% for SMEs). In 2008, FDI in Dutch food companies amounted to EUR 44.4 billion (a higher volume than what Dutch companies invested abroad in 2007). Exports of machinery for the food industry rose by 39.5% between 2003 and 2008, with total exports accounting for more than EUR 1.2 billion in 2008. Approximately half of these exports are reaching the EU and 20% the United States and Asia. Food Tech Holland (FTH) is a public-private consortium grouping together innovation-intensive Dutch companies, active in the food sector, as well as several public stakeholders. FTH aims to increase and improve the involvement of Dutch food companies in the food processing and agro-logistic sector in India.

Firms affiliated to FTH are working in a broad range of food-related sectors such as: bakery, vegetables/fruit, meat/fish, refrigeration/logistics and education. In addition, both the agricultural sector and the food/nutrition industry work together with agro-food machinery producers. Other food-related niches include: climate control systems, refrigeration and freezing installations, warehouse logistics, transport systems and other machinery. This integrated approach is particularly important since the sustainability of food products, energy efficiency and minimisation of waste water as well as logistics and storage techniques are all becoming increasingly important and require innovative collaborative solutions along the production chain.

Source: www.foodtechholland.com.

Cluster policies: national and regional strategies

The regional priority areas are promoted through the use of cluster policies, combining programmes of a national origin with regional initiatives. Regional actions have long promoted clusters, pre-dating the 2007 reforms. At national level, the national innovation networks are the main vehicle for promoting knowledge-driven clusters throughout the country. The national authorities also fund training and exchange of experience programmes that help regional authorities and cluster managers improve the strategic management of clusters (Box 3.10).

Box 3.9. **Food and tourism: OECD examples**

Food is also increasingly becoming an important component of a tourism experience: it often comprises 30% or more of tourist expenditure. Moreover, as consumers become more aware and demanding, leisure and tourism markets are becoming more competitive, making it necessary for suppliers to innovate and develop new service concepts. Because of the strong linkages between tourism and other areas, such as agriculture, food production, country and regional branding, and cultural and creative industries, it is important to design an integrated, holistic approach to tourism-related policy development and implementation. Policy implications include: *i)* emphasising the authenticity of local food; *ii)* raising quality and consistency; *iii)* ensuring sustainability; *iv)* building networks; *v)* repositioning food as a creative industry; *vi)* marketing success; *vii)* developing a holistic approach; and *viii)* supporting research and knowledge development.

Several OECD countries and regions have successfully developed synergies between food, tourism and sustainability. New Zealand, for instance, has used regional branding connected to food for regional promotion. Synergies between food and tourism were created by developing the "clean" and "green" brand "New Zealand 100% Pure". Spain is becoming a leading gastronomic destination thanks to the development of regional gastronomic diversity and high-quality food experiences. Nordic countries have recently promoted innovation and linkages in the Nordic food, tourism and experience industries with the EXPLORE project (EXPeriencing LOcal food REsources in the Nordic countries). Italy has a refined gastronomic landscape and is at the origin of the Slow Food movement. In this context, Italian *agriturismi* (agro-tourism facilities) provide a very interesting example. *Agriturismi* are Italian farms and country side family-run B&Bs that offer gastronomic services and direct-to-consumer sales of agro-food products. They represent an important source of income for less-developed zones in the country and they offer the opportunity to develop more sustainable forms of touristic activities.

Source: OECD (2012), *Food and the Tourism Experience: the OECD-Korea Workshop*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264171923-en*; OECD (2011), *Italy: Review of Issues and Policies*, OECD Studies on Tourism, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264114258-en*; OECD (2009), *OECD Rural Policy Reviews: Italy* 2009, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264056237-en*.

Box 3.10. **Denmark and cluster promotion: two decades of differing approaches**

Denmark was one of the first countries to promote cluster policies of various forms that have been replicated around the world. Yet today, Denmark has no flagship national cluster policy *per se*, but does have a number of policies to encourage innovative co-operation and to help regions promote projects that serve to develop regional specialisation and clusters. Such policies are promoted by national and regional authorities.

Past initiatives

- **Inter-firm co-operation and networking.** In 1989, the Ministry of Trade and Industry initiated a three-year programme for the development of inter-firm co-operation and networking. Brokers were trained to create networks and groups of companies were funded for the conceptualisation, planning and implementation of joint projects.

- **Resource areas (mega-clusters).** In 1994, the Ministry of Trade and Industry initiated the so-called resource areas (mega-clusters). Inspired by Porter's cluster studies, eight resource areas covering 90% of the Danish industry were identified: services, agro/food, construction, environment/energy, transport/communication, medico/health, consumer goods, and tourism/leisure. The initiative consisted of analysis and dialogue with companies and other relevant stakeholders to inform policy making. As a result, the government promoted 170 new policy initiatives.

- **Clusters of competence.** Even though the resource areas (mega-clusters) approach resulted in numerous policy initiatives, they were seen as too broad. Therefore, from 1999-2002, the Ministry of Industry and Trade initiated a narrower concept of cluster activities, the so-called clusters of competence. Using a mapping and analysis, 29 clusters of competence were identified. With a new government in 2001, the national level focus changed from what was seen as "picking winners" to favour developing general framework conditions and strengthening innovative co-operation between business and knowledge institutions on a regional level.

- **Seventeen regional growth centres (2001):** to strengthen and develop the framework for regional co-operation and knowledge-sharing among companies, knowledge institutions and other relevant stakeholders.

- **Action Plan for Public-Private-Partnerships on Innovation (2003):** strengthen co-operation between various players in research, trade and business and facilitate access to knowledge for SMEs.

- **Action Plan for Regional High-tech Development (2004):** centres of expertise (*regionale teknologicentre*) and regional knowledge pilots, as well as activities to further strengthen existing programmes such as technology incubators, innovation consortia and the Industrial PhD Initiative.

Box 3.10. **Denmark and cluster promotion: two decades of differing approaches** (*cont.*)

Current initiatives

Today, the Ministry of Business and Growth invests in general framework conditions and does not have a stated cluster policy, but does support regional initiatives that do promote clusters (see REGX below). The Ministry of Science, Innovation and Higher Education refers to its Innovation Networks Programme as clusters. Regions are also promoting clusters via their growth strategies and prioritised sectors given that, since 2007, they have new competencies in regional development.

- **Innovation networks and Netmatch:** seeks to strengthen collaboration between R&D institutions and companies within various technologies and disciplines based on initiatives that began more regionally. It currently supports 22 national networks (down from a greater number of initiatives in the past) that play a key role in helping companies with project development as well as matchmaking activities such as contact to relevant researchers/experts. The 22 networks serve companies all over the country, but the organisation is based in a region with a strong research environment and/or a strong industry base within the specific business sector or field of technology. All innovation networks have a national scope and provide their services to companies from all over the country. To facilitate international recognition, comparable to branding of the German competence networks, the ministry refers to these entities as clusters. Netmatch is an organisation developed in 2010 to help co-ordinate across the different innovation networks and is housed within the REGLAB organisation.

- **REGX:** this initiative seeks to provide training and knowledge sharing to support the development of clusters. It is funded by the Ministry of Business and Growth, and co-funded by the Region of Southern Denmark, private funds and the Structural Funds. Central Denmark, as well as the Ministry of Science, Innovation and Higher Education are also represented on the steering committee. Its focus is on providing cluster actors (cluster organisation managers as well as regional policy makers) with the right competences. This occurs mainly through a Cluster Facilitator Training Programme and an Executive Policy Programme focusing on regional development, including cluster development. Related projects focus on networking (within Denmark and internationally) as well as knowledge sharing. The programme is housed in the University of Southern Denmark.

In addition to these nationally promoted efforts, each region's growth strategy highlights key sectors for prioritisation of projects funded by the regions via their own funds and EU Structural Funds, generally supported by a regionally funded cluster organisation. In some cases, these prioritised sectors are the same as those prioritised by the Ministry of Science, Innovation and Higher Education for research and technology-related funding.

Source: OECD (2007), *Competitive Regional Clusters: National Policy Approaches*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264031838-en* with updates.

Studies of OECD cluster policies indicate that generally there are different timeframes for public support, ranging from three to five years to support initial networking activities up to ten years for more long-term R&D-related investments. They also increasingly focused on innovation, as opposed to basic business support. But they share common pitfalls, such as being too heavily public sector driven, and potentially promoting lock-in within regions on sectors that may need restructuring (OECD, 2007b). The latest trends in cluster policies are those that promote cross-cluster linkages, to move beyond the first generation approach of sectoral-type associations focused on lobbying. Another trend is to better link industrial and knowledge generation institutions in cluster work. Cluster organisations can be very useful in providing the public sector with a proposed policy mix adapted to firm needs. A recent benchmarking study of cluster programmes in Nordic countries delivered eight policy recommendations, which should be applied to regional initiatives in Denmark (Lämmer-Gamp et al., 2011).[17]

Addressing other bottlenecks and opportunities

Many bottlenecks and opportunities are raised in the business development strategies, others in the regional development plan (RUP). These broader regional development plans consider other areas of regional competence, including health, culture and transport for example. They seek to provide an overarching plan for a holistic, long-term sustainable regional growth and development strategy. They are thereby broader in scope than the regional business development plans developed by the RGF. The RUPs constitute the basis for activities and plans concerning regional growth, and for co-ordination of initiatives with both municipal and state levels.[18] Although they serve as a tool for regional-national dialogue, they are not subject to national partnership agreements like the business development strategies, but they are subject to partnership agreements for instance cross-border with *Land* Schleswig-Holstein in Germany (Southern Denmark).

Each region is required to prepare an RUP every fourth year since the municipal reform in 2007. The latest plans are summarised below (see Table 3.10 and Box 3.11). For example, Southern Denmark highlights both recent trends in promoting a more comprehensive approach to well-being (the Good Life), and it also highlights the importance of different place-based priorities in the footprint of the former four counties that merged into the region. Central Denmark has a strong accent on climate change, the environment and greater linkages between towns and the countryside. While the first plans largely focused on establishing a shared vision for each of the new regions, the new plans prioritise ongoing dialogue and shared action in areas of strategic importance to their development. An

important dimension of the work on the new generation of RUPs has been to create broad understanding that growth cannot be generated solely through traditional business development policy measures involving business services and initiatives designed to promote cluster development and company innovation.

Table 3.10. **Regional development plans: Central and Southern Denmark**

	Central Denmark	Southern Denmark
Dates	2012–2030	2012–2015
Vision	In 2030, the Central Denmark Region is to be an international growth region in a coherent Denmark.	The Good Life (supported by a new Good Life Index that uses five sub-indices centred on security, health, relationships, self-fulfilment and surroundings, i.e. general environment)
Focus areas	– **Climate adaptation:** aggressive efforts to tackle problem, also while developing new business opportunities – **Environment and energy:** prevent climate change, including through renewable energy – **Education:** making available opportunities for all citizens, including promotion of a more coherent system across different levels of education – **Towns and countryside, mobility, culture and health:** focusing on interaction between cities and countryside, as well as between cities – **Commerce and tourism:** implemented in large part by the regional growth forum efforts	**Four thematic focus areas with several associated actions:** – **Knowledge:** develop common knowledge to promote co-operation – **Education and training:** raise the general level of education to meet the increasing demand for skilled labour – **Infrastructure and mobility:** ensure a comprehensive infrastructure that can make Southern Denmark more attractive for relocation and investment – **Environment:** develop effective solutions and prevent environmental issues **Four geographic focus areas with associated actions:** – **Western area:** urban roles and tourism – **Southern area:** transport along the Danish/German border area – **North-east area:** focus on cities and infrastructure – **Funen Island:** knowledge development

Source: Regional Development Strategies of Central and Southern Denmark.

A few additional areas for action by regions seem to be important for continued growth. Some of these areas could be addressed by the regional development strategies if not considered under the domain of the business development strategies so as to mutually support regional growth. Note that a detailed analysis of health and transport are out of the scope of this study. However, some areas for greater regional efforts include:

- maintaining vibrancy in peripheral areas.
- meeting skilled labour shortages.
- innovation in public services (or driven by the public sector) beyond hospitals.

Box 3.11. **Regional Development Plans: Central and Southern Denmark**

The overriding vision of the **Region of Southern Denmark's Regional Development Plan (2012-2015)** is "The Good Life". The plan focuses on four areas that are of significance to good life and growth in all areas of the region: knowledge, education, infrastructure and mobility, and the climate. Input in each of these four areas is defined in relation to the opportunities and challenges particular to Southern Denmark. Although specific activities have been identified for each area, the organised working relationship is to be maintained and give rise to new activities throughout the plan period.

Within the region itself, challenges and opportunities are subject to the effects of geographical differences. Drawing inspiration from traditions of collaboration and opportunities, four different sub-regions have been created. Within each of these sub-regions, collaborative platforms have been set up to focus on the development topics that the region and the local authorities have agreed to work on jointly. While it could be said that the four area initiatives may well lead to subsidiary regional development plans intended to cultivate the special aspects of the areas, they may also provide a basis for collaboration and inspiration regarding the regional initiatives that apply to Southern Denmark as a whole. In addition, the area initiatives promote the integration between the National Plan, the Regional Development Plan and the Municipal Plan strategies.

To support the vision of "The Good Life", measurement tools must be used to clarify the status of the good life, what is significant to the good life, and where there are opportunities for improvement. The Southern Denmark Good Life Index presents a fast and comparable image of the development frameworks in the Southern Denmark areas. In the same way as the OECD's Better Life Index, the Southern Denmark index focuses on key factors by applying socio-economic variables and measurements of the citizens' subjective assessment. The results can be used to supplement the more conventional financial measurements and can highlight the strengths that distinguish the various local authorities. At the same time, they provide the local authorities with an indicator of development elements which may require the application of additional knowledge or new initiatives.

Box 3.11. **Regional Development Plans: Central and Southern Denmark** (*cont.*)

The overriding vision of the **Regional Development Plan of the Central Denmark Region (2012-2030)** is for the Central Denmark Region to be an international growth region in a coherent Denmark in 2030. The consistent themes and values are interaction, knowledge and sustainability. Over and above the legislatively required content, the Regional Development Plan also addresses the issues of mobility and health. Eight subsidiary visions have been formulated, one for each of the following areas of initiative: climate adaptation, the environment and energy, education, towns and countryside, mobility, commerce and tourism, culture, and health.

Follow-up on the Regional Development Plan is carried out in several ways. In part, it involves entering into partnerships with and between regional operators so as to implement the recommended actions. It also involves launching development and information activities. For example, the region has set up a project group that co-ordinates the climate adaptation initiatives related to water. The first generation Regional Development Plan for the Central Denmark Region achieved success in making recommendations to the state authorities in Denmark, for example. The second generation of the plan seeks to do the same for more coherent planning.

Source: Regional development plans of Central and Southern Denmark.

Promoting vibrancy in peripheral areas

The RGF have a responsibility per the Business Development Act to develop peripheral areas in their regions. The outflow of residents from peripheral and under-performing regions needs to be addressed, for instance through a decision to either maintain those areas (through growth or transfers) and/or to facilitate the population decline. This issue is a political choice for Denmark and its regions. Studies of OECD regions by type indicate that rurality is not necessarily synonymous with decline, as many of the growing regions are predominantly rural (OECD, 2011c). In Quebec province (Canada), certain peripheral areas recognised a possibility of growth opportunities that also involved population decline (OECD, 2010b). Given that cities serve as the economic anchors for rural areas, rural-urban linkages and partnerships regarding service delivery need to be explored. In Denmark, this is already being discussed. Municipalities also have to be more proactive in targeting the right amenities that attract and retain both firms and residents.

One important barometer of regional health is the retention of young people. They bring activity, demand for public services, and enthusiasm for their place of residence. Strengthening of local universities to retain students is one important consideration. There is some "brain drain" to Copenhagen, Aarhus and beyond. If those students returned, it would bring back greater knowledge for the region's benefit given their specialised qualifications; however, many do not migrate back. And there are additional barriers to attracting foreign students. Supporting school-to-work transition and entrepreneurship are further avenues, among others, for maintaining a skilled young population (Box 3.12).

Box 3.12. **Guidelines to encourage skilled young population to remain in rural areas**

According to the US Rural Policy Research Institute (RUPRI) and the associated programme Energizing Young Entrepreneurs (EYE), rural communities can promote a series of actions to benefit from the full potential of their young population:

- Invest time and resources in youth priorities and make communities more attractive for young people to live, work and develop activities.
- Improve the school-to-job transition by strengthening interactions between regional higher education institutions and firms.
- Map the community's assets in order to match educational and training programmes with career opportunities.
- Promote the development of a good business framework able to offer small business ownership and high-level job opportunities to young people.
- Provide entrepreneurial education within the school systems or as an extra-curricular training programme, in which students can meet local entrepreneurs and gain hands-on knowledge.
- Offer access to technical assistance and business coaching for young entrepreneurs.
- Consult and involve young people in every phase of the economic activities in the region, to develop a sense of ownership and vested interest in their communities.

Source: OECD (2012), *OECD Territorial Reviews: Småland-Blekinge, Sweden 2012*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264169517-en*; RUPRI Centre for Rural Entrepreneurship, *www.energizingentrepreneurs.org*.

The region could also be more creative with respect to growth in peripheral municipalities in terms of firms, as well as retaining residents. There are some aspects of priority sectors located in the peripheral municipalities, but the general approach in both regions is to support tourism (see previous section). In OECD countries more generally, improvements in tourism are really ways of improving local amenities that are not only useful for tourists, but also the populations living there. Manufacturing is another area of competitive advantage for rural areas generally.

Another area of concern is that of sufficient labour market opportunities for not only one partner in a couple, but both. With a high rate of female labour force participation, local labour markets need to have opportunities for both partners. Innovation in work methods could also help, that allow for different forms of flexibility either in terms of teleworking, or time of hours worked. For example, given the very early closure of childcare facilities, parents do not have sufficient time to commute back if they travel longer distances. There is also a general resistance to long commutes in Denmark. Innovations in labour practices and in social service delivery (as well as reduced transport times) can all facilitate the retention of residents in these areas, whether or not they work there. Regions also raise the concern of withdrawal by national government of skilled public sector workers from these areas, which has consequences for their growth trajectories.

Meeting skilled labour shortages

Skilled labour shortages, such as noted by clusters in the energy sector in both regions, are a bottleneck to regional growth. University programmes adapted to industrial needs are an urgent priority for the region, as are different competence building initiatives by sector. Attracting foreign talent requires additional efforts for regional attractiveness, programmes to facilitate integration (often provided by private firms), or other relevant local amenities (like an international school placed in Central Denmark). The Basque Country (Spain) has a provincial effort in Biscay Province to support relocation of foreign workers to their region, mainly around Bilbao (OECD, 2011d). And Catalonia has heavily promoted the attraction of foreign research talent through its well-reputed ICREA Programme (OECD, 2010a). For talent attraction in universities or firms, there are a range of options used by OECD regions. They include: credentialing potential immigrants in their country of origin (as promoted in Canada), attracting citizens of foreign countries that have national ancestry (as promoted in Japan), or encouraging foreign students to conduct PhDs with regional firms (as promoted in Wales, United Kingdom) (Box 3.13). Central Denmark, with the advantage of Aarhus, has made foreign talent attraction an area for regional action. Temporary outward mobility of regional

residents to gain useful skills and return to the regions (particularly for researchers) is also an opportunity to bring knowledge back to the region and support its innovation system. Central and Southern Denmark could explore such options in the context of the different approaches to meeting their skilled labour gap.

Box 3.13. **Mobility grants and talent attraction-retention schemes**

Programmes are used in OECD countries to support geographic mobility, including student exchanges as well as mobility grants and attraction-retention schemes for researchers and other skilled employees. A further distinction can be made between outgoing schemes (i.e. those which provide support to the mobility of nationals or resident professionals to travel and work in other countries temporarily) and incoming schemes (i.e. those designed to attract foreign professionals to visit/work in the country). Training and mobility of researchers is also a longstanding and rapidly expanding priority within the OECD member countries. Many schemes are targeting the attraction of both young and more experienced researchers through financial incentives (e.g. PhD grants and fellowships, post-doctoral fellowships, research grants) and other non-financial incentives (e.g. tax incentives, entrepreneurship training programmes). Barriers include visas and residence permits, language and costs. Examples from OECD countries cover a wide range of approaches. Moreover, there exist instruments to reverse brain drain and promote the reintegration of highly qualified researchers who have been working abroad.

- **Attracting skilled migrants, Toronto (Canada):** Toronto has been successful in attracting and integrating immigrants into the metropolitan labour force: its population has the largest proportion of immigrant residents (46%) of all OECD metropolitan regions. The city has put in place a series of initiatives devoted to attract and integrate foreign workers such as language courses, bridging programmes for newcomers, websites with relevant information about the possibility of working in Canada, written examinations to pre-test the skills and capabilities of potential immigrants (especially engineers) overseas. Other services offered in the Toronto metropolitan area include job searching and matchmaking, as well as cultural, education and counselling services for newcomers.

- **Research Groups for Young Investigators, Vienna (Austria):** Vienna Research Groups for Young Investigators is an instrument jointly designed by the City of Vienna and the Vienna Science and Technology Fund to promote talent in scientific fields of importance to Vienna. The main objective is to attract top talent to Vienna and build long-term relationships with local research organisations. As a thematic programme, it concentrates on projects and endowed chairs in the research fields of biology, biotechnology, medicine, veterinary medicine, pharmacy, bioengineering and related fields. The measure consists mainly of two instruments: endowed professorships and financial support for the founding of junior research groups.

Box 3.13. **Mobility grants and talent attraction-retention schemes** (*cont.*)

- **The Three-year Programme, Piedmont (Italy):** the programme of Piedmont implements the 2006 national law, entitled "Three-year Programme" (Law No. 4/2006 Art. 5). According to the law, a university may, within certain budgetary and administrative conditions, confer grants for research activity. The programme foresaw the launch of activity in four key areas: *i)* containment of brain drain; *ii)* repatriation of Italian researchers; *iii)* attracting foreign researchers; *iv)* attracting Italian or non-Italian visiting professors. By 2009 all partners had announced and granted support in all the above-mentioned lines of action. For instance, in 2008 the University of Turin announced 160 grants (out of the 335 allocated in 2009 for the first line of action: brain drain) across 16 research areas for a total of 282 projects.

- **Exchange for persons of Japanese descent abroad, Fukoka (Japan):** with the purpose of aiding emigrants from Fukuoka, the Fukuoka International Exchange Foundation supports international exchange between the Fukuoka region and the emigrants' respective countries. Thanks to this initiative, descendents of Fukuoka immigrants have the possibility to study in a university in Fukuoka Prefecture for one year. In addition to acquiring knowledge and skills of their specialisation, the aim is that these students will interact with Fukuoka residents and learn about Fukuoka's culture and society.

- **Prince of Wales Innovation Scholarships (POWIS), Wales, (United Kingdom):** the aim of this initiative is to improve the level and the amount of cutting-edge research, development and thinking in Welsh firms, thus promoting the creation of new commercial products, processes and services as well as creating an international network of excellence. POWIS offers generous scholarships for completing PhD programmes in the business environment in Wales and access to a wide range of people, business and universities in Wales, the United Kingdom and worldwide (for instance POWIS scholars have membership in MIT's Industrial Liaison Programme). Selected students work for three years in companies where they develop their research project jointly with the business sector. POWIS is already working with more than 30 companies with different characteristics: from multinationals to high-tech start-ups.

Source: RUR@CT; European Commission (2011), "Regional policy for smart growth in Europe 2020", European Commission, Brussels; *www.wales.ac.uk*; OECD (2009), *OECD Territorial Reviews: Toronto, Canada 2009*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264079410-en*; OECD (2011), *Regions and Innovation Policy*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264097803-en*.

Innovation in public services (or driven by the public sector) beyond hospitals

Both regions have been actively promoting innovation in the health sector given their mandate for regional hospitals. Southern Denmark has taken several actions to identify ways for innovation-driven public procurement as well as adoption of health technologies in hospitals (see section on welfare technologies). However, the definition of welfare technologies can cover a much wider range of services that could be exploited by the regions, both for spurring innovation and addressing bottlenecks for growth. Southern Denmark's approach has, for example, including the application of welfare technology in elderly assisted living.

Many OECD countries and emerging economies are using public procurement, regulation and standards to stimulate innovation in many sectors beyond health (Box 3.14). Governments can implement schemes able to spur demand for innovation and to promote a broader diffusion and adoption of innovations in specific sectors. However, it is important to consider whether the initiatives designed are efficient from a market point of view and whether they improve social well-being. Therefore actions undertaken must be targeted to carefully selected policy objectives and their impact should be evaluated *ex ante*. In addition, co-ordination between the regulators and stakeholders is essential.

Box 3.14. **Innovation-oriented procurement across sectors: Germany and Finland**

Germany has recently adopted an Agreement on Public Procurement of Innovation under the co-ordination of six federal ministries (Interior, Economics, Defence, Transport, Environment, and Research) in order to promote innovation-oriented procurement. The six ministries will undertake demand forecasts and market analysis to identify new solutions, offer professional training, encourage dialogue among procurement agencies, industry and users both at the national and sub-national level.

In 2008, Finland adopted a broad Innovation Strategy that also emphasises the role of the public sector in promoting the development, the introduction and the adoption of innovations. The 2010 Action Plan includes several proposals regarding public procurement such as the development of central and local procurement procedures and methods and the examination of different incentives and risk management models. The Finnish Funding Agency for Technology and Innovation (Tekes) manages a procurement funding scheme aimed at promoting innovation. Initially, Tekes focused on areas such as energy, environment, construction and health, since these sectors were prioritised to address future challenges and societal changes. However, the eligibility for funding has not been restricted to these sectors only.

Source: OECD (2011), *Demand-side Innovation Policies*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264098886-en.*

Low-skilled labour remains a growth barrier in Central and Southern Denmark, as job losses due to the crisis reveal weaknesses in the industrial structure. In the past, there were not necessarily sufficient incentives to invest in further education given the availability of well-paid low-skilled jobs and the low returns to tertiary education (the lowest in OECD). There is a national goal to ensure that 95% of an age cohort completes secondary education. Identifying job opportunities for the low-skilled, as well as strategies for upgrading those skills, are needed but are generally the responsibility of other levels of government. Such issues are nevertheless raised in the RGF business development strategies. Additional regional actions can be taken to address this bottleneck for growth, in particular through innovation in the education sector. For example, second-generation immigrants show very little improvement in their educational performance in Denmark. And male students have a more difficult time with theoretical education and therefore need more applied opportunities. One example of an innovation in education delivery is from VIA University College. The university restructured its curriculum to ensure that applied internships occurred earlier in one of their programmes to better maintain male students who were dropping out. Innovations to make pathways for students to vocational and technical education options are another opportunity for innovation in public services. The question of low-skilled labour is a problem to be tackled by all levels of government in Denmark. Regions and municipalities could promote experimentation adapted to their specific context for tackling this growth bottleneck.

Policy intelligence, monitoring and evaluation to improve impact

Bottom-up and top-down project selection approaches

Given the institutional frameworks for regional institutions in Denmark, regional innovation support must take the form of project-based funding through external operators. The RGF have to consider both the nature of projects and the capacity of different types of operators to implement them. The RGF strategy development, knowledge of the actors in their region, and convening power, are extremely important for success in this project-based funding context. They appear to conduct their business in a fair and transparent mode. However, as regional agencies are not operators, this implies a greater need for policy intelligence and feedback on projects for effective monitoring and continuous improvement of RGF-funded projects.

Central Denmark takes a more top-down approach to project origin than Southern Denmark. The RGF's philosophy is that the projects should be driven by strategy and not applications. The project process therefore begins with a definition by the RGF with support from its secretariat, often in

discussions with potential operators during the proposal definition process. The posting of a project proposal and search for an operator result in proposals that are then selected by the RGF along with the recommended operator that is submitted to the regional council for final approval. In many cases, the operator is the region's Growth House. The risk with this model, even if the RGF is a public-private entity, is that the public sector plays too dominant a role in project conception, to the exclusion of good ideas held elsewhere. This risk is mitigated somewhat given that regions don't generally deliver ongoing policy instruments like regional innovation agencies in other regions. But in international comparison it does appear a bit more public-sector driven.

Southern Denmark appears to take a more bottom-up approach to the origin of proposals, and has instituted a quantitative yardstick for project evaluation (the "effect" model). Project applicants can seek input from the RGF secretariat for guidance, particularly those staff specialised in the sectoral area. This model seeks to link projects to regional goals by considering the potential effect of the project as well as jointly the time and cost (complexity) to achieve the goals. While this development is certainly welcome, the tool should not be over-used as a false quantification that implies greater exactitude than can be determined *ex ante*. Other commonly used indicators could also be considered for project selection (and later monitoring and evaluation), such as cost per job created.

Despite the different approaches, both regions play an important role in project application development and are organising the project selection procedures, with a stronger public sector role in Central Denmark. Hence, there might be in some cases a mixing of roles as the Secretariats of the Growth Fora in both regions help in the application process, although often on formal requirements, and also evaluate them. This same kind of mixing of roles with respect to applications and funding was noted in an evaluation of the Central Denmark Care Tech project. EU funding requirements are another reason why the public sector has to play such a significant role in project development. As with strategy development more generally, peer review (domestic and international) and independent accreditation are possible considerations, albeit given that the regions do not focus on funding R&D *per se*, there is less of a need than for other OECD regions with significant R&D-related investments.

Achieving greater impact through monitoring and evaluation

The two RGF regularly assess the implementation of projects supported, within the framework of the general strategic orientations and in view of the targets assigned to the strategy. In both regions, projects are monitored through semi-annual reports and there are recent efforts to move beyond the

audit-based monitoring approach. Reporting requirements associated with EU-funding may limit incentives for policy learning (see Chapter 2). Southern Denmark had been tracking projects based on spending criteria (not quality of the project progress) as well as "milestones" and "effects". The monitoring approach is nevertheless undergoing revision. Ongoing monitoring and evaluation seems a bit more developed in Central Denmark. Project status reports are self-reported and described in terms of targets and milestones as pre-defined in the project contract (which can vary by project), with such reports being available on the web. There is also an effort to emphasise processes and qualitative targets where this makes sense.

Policy intelligence from analyses and evaluation could be strengthened. Both regions commission external evaluations of specific projects with substantial funding. They also conduct directly, or benefit from, regular surveys of the current situation of the companies in the region generally and by sector. Both regions produce interesting reports on trends in their regions. In the case of Southern Denmark specifically, the volume of analysis publications in Danish language only could be redirected towards fewer more targeted publications on topics serving the needs of different stakeholders (RGF, clusters, etc.) as well as in English if there is a goal to use this to attract international actors.

In addition to some different types of analyses and project-based evaluations, there are some additional avenues to consider. Foreign experts could be called upon to participate in the strategy development process. Evaluations of regional action more generally could be considered. An agreement between the Danish Business Authority and the Danish regions to evaluate the results of EU Structural Funds investments is one likely fruitful example. Policy learning through projects is yet another option, particularly to overcome the disincentives for reporting associated with EU projects. VINNOVA in Sweden has proven innovative in using this policy learning approach. Longer-term impact evaluations are another area to develop as regions have greater history in project implementation.

Regions like Flanders (Belgium) with more competencies in STI and a longer history of evaluation have more evolved systems. Some elements could inspire Danish regions, particularly the use of a Logical Framework Analysis. This tool for strategic planning includes a series of inter-linked steps: *i)* translate a mission/challenge into objectives; *ii)* translate objectives into practical actions; *iii)* nominate the input needed for activities (funding, manpower); and *iv)* measure achieved outputs and results and impact. Flanders was also active in the project SCINNOPOLI (Scanning Innovation Policy Impact) (see Box 3.15).

Box 3.15. **Guidelines for Monitoring and Evaluating Regional Innovation Policy from SCINNOPOLI**

A set of 12 policy recommendations have been formulated as a result of the project SCINNOPOLI "Scanning Innovation Policy Impact". The nine project partners exchanged numerous experiences on the monitoring of the impact of regional innovation policy. These policy recommendations are not a story-telling or philosophical approach to monitoring, but a set of practical recommendations for the implementation of an effective monitoring system for regional innovation policy.

1. SMART policy objectives and SMART indicators: policy objectives as well as monitoring indicators need to formulated. SMART: Specific, Measurable, Attainable, Relevant and Timebound.
2. Monitor what you can INFLUENCE: a lot of information is nice to know but for monitoring purposes one should monitor only indicators that can be influenced by the downstream party.
3. Integrate FEEDBACK-LOOPS in the monitoring system: monitoring results should be used to improve the regional innovation policy. Monitoring is not the end of a process.
4. PROCESS ORIENTATION: a key step in the development of an evaluation culture is to recognise the evaluation process as part of a cyclical process of policy design – policy implementation – policy learning.
5. CONSENSUS: the concept of the monitoring system needs to be set-up in consensus with all stakeholders (policy makers/practitioners/programme owners/project leaders) and existing monitoring systems need to be considered.
6. Concise COMMUNICATION and promotion of results: the message and language should be adapted to the targeted public (policy makers, companies, large public, innovation actors). Communication on the innovation policy monitoring process as a whole (objectives, targets, indicators, results) is a condition *sine qua non* of a successful innovation policy.
7. Monitoring is a POLICY TOOL: monitoring innovation policies are only useful when the monitoring results are used by policy makers.
8. EMBED monitoring in the regional innovation system: monitoring should be embedded in the regional innovation strategy from the start of its implementation. Adding a monitoring system as an add-on to the regional innovation strategy is not leading to good results.

Box 3.15. **Guidelines for Monitoring and Evaluating Regional Innovation Policy from SCINNOPOLI** (*cont.*)

9. Create a WIN-WIN situation: all groups involved in the monitoring process should find a benefit in the monitoring system.
10. RESOURCES need to be budgeted: resources for the specific support actions defined in the framework of the regional innovation policy as well as resources for the monitoring system itself should be budgeted.
11. LONG-TERM perspective and continuity: one should search for sustainable indicators, even if the regulatory environment is unstable.
12. COHERENCE: an innovation policy monitoring system should be based on a solid, transparent and clear logic. This logic must be maintained from the lowest level (individual innovation support actions) to the highest level (innovation policy design).

Source: www.scinnopoli.eu.

Conclusion

There remains some ambiguity in the regions regarding the nature of their growth goals to be addressed by the business development strategies: growth or growth everywhere. This is a matter of political choice that needs to be addressed in part with national policy makers. If growth is then desired in the peripheral areas, as national policy would imply, more creative forms than tourism should be explored. More attention is also needed for urban-rural linkages and partnerships as well as more proactive efforts by those municipalities for attracting firms and residents. Furthermore, innovation in public services may in part address certain growth bottlenecks in peripheral municipalities as well as the regions more generally; such as addressing high school drop-out rates or creating a greater sense of "accessibility" for these peripheral areas. These matters are also a consideration in regional development strategies more generally, that in both cases speak of balance and cohesiveness.

Danish regions have achieved significant progress since their 2007 creation towards smart specialisation-type strategies, supported by the new public-private regional growth fora. While the steps currently outlined by the European Commission for smart specialisation strategies are taken in both regions, further actions are needed to achieve the "best in class" with respect to each step. Principally, this includes greater scanning of their international positioning in prioritised sectors, and greater communication and branding to national and international audiences of such niches (the

result of unique combinations across clusters in the region). It also requires a strategy development and project selection process that is even more private sector driven and that involves greater civil society outreach to achieve the so-called quadruple helix. The policy mix promoted in each region should address the sector's absorption capacity, particularly given the early stages of the welfare technology clusters, as well as needs for commercialisation and in general non-STI forms of innovation.

To support greater clarity with respect to the regional innovation system landscape and reduce programme proliferation, several actions can be taken. Any efforts in co-operation with national level, to replace one-problem, one-instrument approaches with more flexible multi-purpose instruments, would in part reduce this complexity. Regional clusters can provide guidance on the unique combination of policy measures most relevant for their advancement where specialised services are relevant. And where centralisation makes sense to make stronger nodes in the regional innovation system, those could be pursued. The different measures to make each system more understandable would be facilitated by greater clarity on the functional role of different innovation system actors and the regional variations.

Having a skilled workforce remains a key development challenge, especially with projected labour force shortages. In a context of high labour costs, there are few alternatives. Problems visible at primary education level, become greater challenges at secondary level (including high school dropout). The tertiary level faces difficulties in supplying the skilled manpower adapted to company needs, as already observed in priority sectors like energy. Innovation in education provision that could address problems early in student education careers, such as bridges to vocational and technical training or the integration of young immigrants, are needed. For attraction and retention of high-skilled workers, universities must move faster to adapt curricula to regional needs, without neglecting cutting-edge international research activities in selected relevant areas, perhaps with national and regional support. Municipalities and regions need to continue to promote attractiveness. Regional instruments may consider support for international recruitment of students, research talent and employees, with inspiration from numerous OECD region examples.

Finally, the policy intelligence for strategy development as well as monitoring and evaluation for project implementation can be taken to the next level. Both regions demonstrate a political willingness to move from a fragmented and input-oriented approach, towards a more result-oriented, strategic and integrated policy. They are also seeking to upgrade an audit-oriented approach based on funds use to one that considers project milestones and impact. Several initiatives with national actors to develop joint evaluations (such as for business services in Growth Houses or overall

use of EU Structural Funds) are excellent examples. Harmonised data approaches across regions when appropriate, including budgeting and project data, will only facilitate such joint efforts needed in a small country context. Policy-oriented regional scoreboards are not systematically available, notably at the level of clusters or priority domains. The question of strategic policy intelligence could receive growing attention, by upgrading data descriptions to more targeted reports. Given the recent establishment of regions in charge of innovation-based growth policies, progress on this front is nevertheless remarkable. The appetite for measurement and impact evaluation found in regional bodies needs to be nurtured by international practices and training opportunities.

Recommendations for regional strategies

- Achieve greater clarity on the growth bottlenecks and growth expectations in different settings:
  - use more creative approaches than tourism if economic growth is desired in peripheral areas;
  - capitalise on innovation in public services to address other growth barriers (social services; education e.g. high school dropouts; labour market e.g. to promote living in peripheral areas).
- To achieve the level of international best practices for smart specialisation as currently defined, adjustments include efforts to:
  - promote next-generation cluster policy approaches (cross-border and cross-cluster), with greater communication and branding on international positioning of prioritised niches (including through peer reviews);
  - cultivate a strategy and project development process that helps trigger new ideas with greater private and civil society engagement (e.g. *ad hoc* working groups including "unusual" suspects, openness to good ideas in non-prioritised sectors);
  - build critical mass through greater linkages with other Danish regions and national priorities as well as international firm and research connections;
  - ensure that the policy mix promoted in each region: matches the absorption capacity of the prioritised sectors; pays sufficient attention to commercialisation; and addresses non-STI forms of innovation.

- Strengthen the most relevant innovation system actors and system relations:
  - seek with national government to prevent actor or programme proliferation as is common with "one-problem, one-solution" instruments;
  - develop functional mappings of innovation actors relevant for regional (and national) systems, highlighting the areas for improvement by actor, including universities.
- Develop and attract regionally needed skills to meet current and future labour shortages:
  - low-skilled workers: improving bridges to vocational and technical training and integration of immigrants;
  - high-skilled workers: through attractiveness, international recruitment, and more tailored university programmes.
- Use policy intelligence and learning to complement existing project selection and evaluation mechanisms (including with national government, which is facilitated by greater harmonisation of programme data across regions).

Notes

1. From the outset, the strategic orientation of the RGF was defined in the 2005 Business Development Act through the six priority areas and the policy instruments through which they can be pursued. Moreover, when for party-political reasons central government promoted the setting up of so-called "temporary RGF" in advance of the original preparation schedule for the new partnership bodies, all regions (except Copenhagen) responded positively and became engaged in a fast-track strategy process (Halkier, 2008; Larsen, 2011).

2. Various factors drive the participation rate, influenced by policies and practices outside of the regional domain, which require a wide range of levers to address. Such factors concern delayed entry into the labour force due to long periods of study and travel, causes for early retirement, and other factors for those that are not either working (employed) or searching for work (unemployed). Given the already high (in international comparison) participation rate of women, continuing to improve the participation rate will be a challenge.

3. As reported in a graphic in presentation by Southern Denmark on the Effect Model, 2011.

4. For further information on this study based on the United Kingdom, please see Economic and Social Research Council (2011).

5. The findings of a survey to firms every six months display volatility in results that make it difficult to draw clear conclusions over time and across regions.

6. Areas of mismatch concern the fact that environment jobs are included with energy, design is not included, and welfare technology includes many IT firms, albeit the welfare technology total is likely smaller than the medico-health category even if there is little overlap. In 2008, for Central Denmark there were around 8 100 employees in medico/health and a lower 3 300 in welfare technology (and not likely a sub-set but rather coming from other categories possibly related). Furthermore, Southern Denmark considers housing and construction in its estimates for the lean energy priority and also includes social services in its health and social innovation category. Southern Denmark therefore estimates that 20%-25% of its economy is in some way targeted by its priority sector choices.

7. These categories include: energy, food, steel, plastic, tourism, environment, health care, transport and logistics, safety and security, and experience and adventure.

8. Denmark's feed-in tariff system is one of the first and most successful in the world. Additional policies that contributed to the success of the development of green energy in Denmark have been for example tax incentives and subsidies (Lewis and Ryan, 2005; Meyer and Koefoed, 2003).

9. Those five recommendations for Denmark are: *i)* a national knowledge bank; *ii)* innovation through public demand; *iii)* matchmaking between public and private partners; *iv)* use of service design to optimise work flows and processes; and *v)* better framework conditions for innovation in the public sector.

10. A 2009-2015 EUR 400 million programme sponsored by the Danish Agency for Governmental Management was developed to promote the sector with the support of the Public Welfare Technology Foundation (*ABT-fonden* in Danish). The goal of the programme is to: increase efficiency in related public sector services, making these public sector jobs attractive, promoting independent living and user-centred services. From the Ministry of Business and Growth, the Business Innovation Fund (*Fornyelsesfonden* in Danish) of approximately EUR 102 million for 2010-2012 promotes development of green and welfare-related business efforts, as well as providing support for change-over to exploit new business and growth opportunities in less-favoured areas of the country.

11. Per a 2012 report by the Danish Society of Engineers, health technology is referred to as (English translation) "technologies that help man as a patient. For example, technologies that are part of a hospital treatment and where patients are under medical supervision by hospital doctors through the use of medico-technology or telemedicine solutions. If the same solution is initiated and driven by local authorities or the citizen herself, the solution will be considered to be a welfare tech solution" (p. 25). Welfare technologies are described as "a generic term for technologies and intelligent communication solutions used by people with special needs to promote their welfare. Welfare technology can be used in connection with services related to care, practical solutions to everyday life, aids, home furnishings, treatment, rehabilitation, maintenance, special education and employment. Welfare technology is not limited to a certain sector, but cuts across all different sectors including health, social, education and labour. Welfare technology can make people safer and more secure, more self-reliant and capable of taking care of their own rehabilitation, body and psyche" (p. 33). See *http://ida.dk/News/Dagsordener/sundhedsteknologi2020/Sider/forside.aspx*.

12. For example, two studies conducted by Accenture highlighted that development and implementation of welfare technology solutions at the hospitals were modest and driven by a few enthusiasts, which implies greater training of clinical personnel (for acceptance and competency to use the technologies) as well as middle managers who play a crucial role in the implementation phase.

13. Municipalities are involved in the following projects: Welfare Tech Region; *Den stærke hand*; Patient@home; UNIK; *Viden- og innovationspartnerskaber*; Protech; OPI-Lab; *Demens i hjemmet*; *Tele-hjertesvigt*; *Sund Vækst*.

14. See for example, Kvistgaard (2006); Hall (2000); Therkelsen and Halkier (2004); Hjalager (2001); Debbage and Daniels (1998); Tremblay (1998).

15. See for example O'Dell (2005); Kvistgaard and Smed (2005); Mossberg and Johansen (2006).

16. These organisations are Midtjysk Turisme (*www.midtjyskturisme.com*) and Syddansk Turisme (*www.syddanskturisme.dk*) in Central and Southern Denmark respectively.

17. Those eight lessons are : *i)* improve co-ordination of cluster programmes and other relevant funding programmes; *ii)* tailor-made assistance for clusters should have a high relevance in the programme strategy; *iii)* programmes should put emphasis on cluster management excellence; *iv)* cluster programmes should develop world-class clusters in industry sectors that are internationally competitive; *v)* long-term, but flexible support of clusters is required; *vi)* monitoring and evaluation of the results and impacts of a programme is important and should be done in a smart and purposeful manner; *vii)* technical assistance instruments are important for the promotion of international activities of clusters; and *viii)* different industry sectors need different support for internationalisation activities.

18. "On the basis of a holistic assessment, the Regional Development Plan is to describe desirable future development for the urban areas, rural districts and outlying areas in the Region, and for nature and the environment. This is to include an evaluation of recreational objectives, commerce, tourism, employment, education and culture. The Regional Development Plan is to present the relationship between future development and the national and municipal plans for infrastructure, relevance to any working relationships that the Region may have entered into with authorities in bordering countries in areas relating to planning and development, and the actions the Regional Council intends to take to follow up on the development plan." (§ 10 a of the Danish Planning Act).

Bibliography

Barca, F. (2009), "An agenda for a reformed cohesion policy: a place-based approach to meeting European Union challenges and expectations". Independent Report prepared at the request of Danuta Hübner, Commissioner for Regional Policy

Blumenthal, D. and M. Tavenner (2010), "The 'meaningful use' regulation for electronic health records", *New England Journal of Medicine,* Vol. 363, pp. 501-4.

Copenhagen Economics (2008), "Velfærdsteknologi og –Service i Region Syddanmark; En Erhvervsklynge I Udvikling", 23 September.

Danish Growth Council (2007), "Det Grønne Guld" (The Green Gold), Danish Growth Council, Copenhagen, December.

Danish Growth Council (2009), "Velfærdsteknologi – på vej til ny vækst" (Welfare technology – a road to new growth), Danish Growth Council, Copenhagen, November.

DAMVAD (Danish Science and Technology Agency) (2011), "Afdækning af erhvervsfremme- og innovationssystemet i Danmark", DAMVAD, Copenhagen.

Danske Regioner (2011), "Mapping of the cross-regional collaborations of the growth fora" (English translation prepared by REGX of summary note).

DEA (Danish Energy Agency), the Danish Industries Federation under the Confederation of Danish Industries and DEACA (Danish Enterprise and Construction Authority) (2010), "Energy industry analysis 2010", presentation, May 2011.

DEACA (Danish Enterprise and Construction Authority) (2008), "Growth through experiences – an analysis of Denmark in the experience economy", DEACA, Copenhagen.

DEACA (2011), "Evaluation of the growth houses: awareness measurement of the growth houses 6th evaluation cycle, February 2011", English translation prepared by REGX.

Debbage, K. G. and P. Daniels (1998), "The Tourist Industry and Economic Geography: Missed Opportunities", in D. Ioannides and K.G. Debbage (eds.), *The Economic Geography of the Tourist Industry*, Routledge, London.

Department for Business Innovation and Skills (n.d.), "Solutions for business: simplified business support", BIS, London, *www.bis.gov.uk/policies/enterprise-and-business-support/solutions-for-business-simplified-business-support.*

Economic and Social Research Council (2011), "South-East universities turn their knowledge into wealth", ESRC, Swindon, United Kingdom, 7 September, *www.esrc.ac.uk/news-and-events/press-releases/17220/south-east-universities-turn-their-knowledge-into-wealth.aspx*.

Ehervsklimapanelet (2008), "Copenhagen 15 Danske styrkepositioner på klimaområdet", 25 August, for COP15, Copenhagen.

Erhvervs –og- Byggestyrelsen (2008), "Design skaber værdi– Udbredelse og effekter af design", Copenhagen.

Eurada (2011), "Directory of 'no-nonsense' activities to build S3-minded regions", scoping document for Agorada 2011, European Association of Development Agencies, Brussels.

European Commission (2011), "Research and innovation strategies for smart specialisation", European Commission, Brussels, *http://ec.europa.eu/regional_policy/sources/docgener/informat/2014/smart_specialisation_en.pdf.*

European Commission (2011), "Regional policy for smart growth in Europe 2020", European Commission, Brussels.

FØRA (2011),"Produktivitet I Danmark. Den danske vaekstudfordring", Copenhagen.

Foray, D. (2011), "Smart specialisation: the concept", presentation to the Applied Policy Seminar 4th session of the UNECE team on Innovation and Competitiveness Policies, Palais des Nations, 12 May.

Foray, D. et al. (2012), "Guide to research and innovation strategies for smart specialisation (RIS3)", European Commission, Brussels, March 2012 version, *http://s3platform.jrc.ec.europa.eu/s3pguide*.

Halkier, H. (2008), "Regional development policies and structural reform in Denmark. From policy segmentation towards strategic synergy?", in Bukve, O., H. Halkier and P.D. Souza (eds.), *Towards New Nordic Regionalism. Politics, Administration and Regional Development*, Aalborg University Press, Aalborg, Denmark.

Hall, C. M. (2000), *Tourism Planning: Policies, Processes and Relationships*, Harlow, Prentice Hall.

Hjalager, A.-M. (2000), "Tourism destinations and the concept of industrial districts", *Tourism and Hospitality Research*, 2, 199-213.

Hjalager, A.-M. (2001), "Den teoretiske referenceramme - en kort gennemgang", *Nordregio Working Paper*, pp. 11-24.

Huggins R., H. Izusho and D. Prokop (2010), *University-Industry networks: interactions with large R&D performers*, DRUID paper presented at the Conference "Opening Up Innovation: Strategy, Organization and Technology", Imperial College London Business School.

IEA (1985), *Wind Energy Report*, International Energy Agency, OECD Publishing, Paris.

IEA (2011), *Deploying Renewables, Best and Future Policy Practices*, OECD Publishing Paris, *http://dx.doi.org/10.1787/9789264124912-en*.

Kamp, L.M., R.E.H.M. Smits and C.D. Andriesse (2004), "Notions on learning applied to wind turbine development in the Netherlands and Denmark", *Energy Policy*, 32, pp. 1 625-1 637.

Kerndrup, Søren (2006), "Supporting the contribution of higher education institutions to regional development, self-evaluation report: Jutland-Funen, Denmark", OECD/IMHE, March, *www.oecd.org/dataoecd/15/41/36309139.pdf.*

Kortlaegning af virksomheder der producerer velfaeurdsteknologi og -service: Udarbejdet af DAMVAD til Odense Kommune og Region Syddanmark. 30 July 2010.

Kvistgaard, P. (2006), *Problemer og magt i regional turismepolicy*, Aalborg, Aalborg Universitetsforlag.

Kvistgaard, P. and K. Smed (2005), "Oplevelsesprofil for feriedestination Møn. En undersøgelse i tre dimensioner af ferieoplevelser på feriedestination Møn i sommeren og efteråret 2004".

Lämmer-Gamp, T., G. Meier zu Köcker and T.A. Christensen (2011), "Clusters are individuals. Creating economic growth through cluster

policies for cluster management excellence", Danish Ministry of Research, Innovation and Higher Education, Copenhagen.

Larsen, P.W. (2011), "Partnerskab og Regional Erhvervsfremme i Danmark", *Culture and Global Studies*, Aalborg University, Aalborg, Denmark.

Lewis J.I. and H.W. Ryan (2005), "A review of international experience with policies to promote wind power industry development", Energy Foundation China Sustainable Energy Program, final report.

Lewis, J.I. and H.W. Ryan (2007), "Fostering a renewable energy technology industry: an international comparison of wind industry policy support mechanisms", *Energy Policy*, 35, pp. 1 844-1 857.

Lodberg, H. (2010), "Sammenhængen mellem de Regionale Vækstforas erhvervsudviklingsstrategier og Danmarks Vækstråds anbefalinger" (English summary prepared by REGX).

Lundvall, B-A (2008), "A note on characteristics of and recent trends in national innovation: policy strategies in Denmark, Finland and Sweden".

Meyer, N.I. and A.L. Koefoed (2003), "Danish energy reform: policy implications for renewable", *Energy Policy*, 31, pp. 597-607.

Ministry of Science, Technology and Innovation (2009), *Mapping of the Danish Knowledge System with a Focus on the Role and Function of GTS*, Ministry of Science, Innovation and Higher Education, Copenhagen.

Mossberg, L. and E.N. Johansen (2006), *Story-telling. Marknadsföring i opplevelsesindustrin*, Lund, Studentlitteratu.

O'Dell, T. (2005), "Experiencescapes. Blurring Borders and Testing Connections", in T. O'Dell and P. Billing (eds.), *Experiencescapes. Tourism, Culture and Economy*, Copenhagen Business School Press, Copenhagen.

OECD (2001), *The New Economy: Beyond the Hype, the OECD Growth Project*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264033856-en*.

OECD (2007a), *Higher Education and Regions: Globally Competitive, Locally Engaged*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264034150-en.*

OECD (2007b), *Competitive Regional Clusters: National Policy Approaches*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264031838-en*.

OECD (2008), *OECD Reviews of Regional Innovation: North of England, United Kingdom 2008*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264048942-en*.

OECD (2009a), *OECD Rural Policy Reviews: Italy* 2009, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264056237-en.*

OECD (2009b), *OECD Territorial Reviews: Toronto, Canada 2009*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264079410-en.*

OECD (2010a), *OECD Reviews of Regional Innovation: Catalonia, Spain 2010*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264082052-en*.

OECD (2010b), *OECD Rural Policy Reviews: Québec, Canada 2010*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264082151-en*.

OECD (2010c), *OECD Tourism Trends and Policies 2010*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/tour-2010-en.*

OECD (2011a), *Demand-side Innovation Policies*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264098886-en*.

OECD (2011b), *Italy: Review of Issues and Policies*, OECD Studies on Tourism, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264114258-en.*

OECD (2011c), *OECD Regional Outlook 2011: Building Resilient Regions for Stronger Economies,* OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264120983-en*.

OECD (2011d), *OECD Reviews of Regional Innovation*: *Basque Country, Spain 2011*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264097377-en*.

OECD (2011e), *Regions and Innovation Policy*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264097803-en*.

OECD (2012a), *Food and the Tourism Experience: the OECD-Korea Workshop*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264171923-en.*

OECD (2012b), *OECD Territorial Reviews: Skåne, Sweden 2012,* OECD Publishing, Paris, Paris, *http://dx.doi.org/10.1787/9789264177741-en*.

OECD (2012c), *OECD Territorial Reviews: Småland-Blekinge, Sweden 2012*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264169517-en*.

Region of Southern Denmark (n.d.), "Fokus: energy and environment", Region of Southern Denmark.

Region of Southern Denmark (2010), Videntung, grøn produktion inden for energisektoren i Region Syddanmark, Afsluttende rapport Søren Houmøller, 1st Mile Jon Wulff Petersen, TTO, November 2010.

Region Midtjylland (2011), "Ny vækst i turismen – En strategi for en mere fokuseret og professionel turisme i Region Midtjylland frem mod 2020 (udkast)", Viborg, Region Midtjylland.

Simmonds, P. and J. Stroyan (2008), "An evaluation of the One NorthEast Innovation Industry and Science Programme Strategy for Success", Technopolis Group, 22 October.

SSTI (State Science and Technology Institute) (2006), "A resource guide for technology-based economic development: positioning universities as drivers, fostering entrepreneurship, increasing access to capital", report prepared for the Economic Development Administration, US Department of Commerce, August.

Syddansk Turisme (2008), "Samvær med indhold - Strategi for udvikling af turismen i Syddanmark med fokus på oplevelser, der giver mening", Middelfart, Syddansk Turisme.

Syddansk Turisme (2010), "Den syddanske turisme i tal - Turismens betydning for Syddanmark", Middelfart, Syddansk Turisme.

Therkelsen, A. and H. Halkier (2004), "Umbrella Place Branding. A Study of Friendly Exoticism and Exotic Friendliness in Coordinated National Tourism and Business Promotion", *Spirit Discussion Papers*.

Tremblay, P. (1998), "The Economic Organisation of Tourism", *Annals of Tourism Research*, 25, 837-59.

VisitDenmark (2010a), "Denmark's tourism performance in Europe 2000-2009", VisitDenmark, Copenhagen.

VisitDenmark (2010b), "Det nye VisitDenmark. Strategi mod 2017", VisitDenmark, Copenhagen.

VisitDenmark (2010c), "Turismen i tal. Den samfundsmæssige betydning af turismen i Danmark", VisitDenmark, Copenhagen.

Weaver, D. and L. Lawton (2002), *Tourism Management, 2nd edition*, Milton, Wiley.

Wiehe, G. et al. (2011), "Strategic use of public-private co-operation in the Nordic region", Nordic Council of Ministers, Copenhagen.

Annex 3.A1

Table 3.A1.1. **Innovation-related instruments used in Central and Southern Denmark**

Instruments	SD	Comments	CD	Comments
Strategy and foresight				
High-level strategic advisory body	X	In three strategic business areas	X	Selected initiatives (e.g. Competency Council)
Technology foresight exercises			X	Future competency needs
R&D investment				
Institutional R&D funding				
Competitive R&D funding				
Human capital investment				
Post-graduate scholarships	X	PhD scholarships in the three strategic areas		
Targeted human resource training	X	Human resource training within the three strategic areas	X	Education and competency development in prioritised areas; emphasis on further training for blue collar workers
Technology transfer and innovation support services				
Quality control/metrology services				
Innovation advisory or support services (publicly provided, vouchers, subsidies, student placements)	X	University of Southern Denmark serves a brokering function for each strategic area, to link researchers and students to firms.	X	General innovation support services; support to collaborations between students and business (and encourage SMEs to employ graduates); specific innovation initiatives for target sectors, e.g. innovation grants for foodstuffs companies.
Advisory to spin-off and knowledge-intensive start-up firms	X	The Growth House runs projects in the three prioritised areas. The University of Southern Denmark runs a programme called Spin-off Factory.	X	Entrepreneurship a prioritised area in strategy, special focus on growth entrepreneurs; Advisory Programme through the Growth House.
Other technology transfer centres and extension programmes	X	The Engineering Faculty of the University of Southern Denmark runs a programme called TEK Momentum, aiming to promote university-SME collaborations.	X	Aarhus University e.g. administers a programme for increasing university-SME collaboration.
Innovation networks and collaboration				
Cluster initiatives	X	A cluster organisation exists for each prioritised area: WTR, Lean Energy, Offshore Energy, Design2Innovate.	X	Growth House administers a general Growth Forum Network and Cluster Programme which supplements the four targeted sector/cluster initiatives (foodstuffs, energy and environment, welfare innovation, tourism).

Table 3.A1.1. **Innovation-related instruments used in Central and Southern Denmark** (*cont.*)

Instruments	SD	Comments	CD	Comments
Branded excellence poles or hubs	X	Network and hub organisation.	X	E.g. branding of the wind power hub – and energy and environment hub in general.
Multi-disciplinary technology platforms	X			
Other physical infrastructure for innovation				
Science and technology parks	X	Syddansk Teknologisk Innovation (not funded by the region).	X	Not directly funded by the region. Specific projects in S&T parks are, however, supported.
Incubators for new firms	X	Incubators and student growth houses.	X	Incubators for student start-ups
Financing for innovative firms				
Public development banks				
Public venture capital	X	Welfare Tech Invest is a venture capital fund (DKK 75 million) launched in 2012 and investing in welfare technology businesses. The capital fund (DKK 20 million) provides loans to entrepreneurs in rural areas of the region.	X	A new venture capital fund is being implemented in 2012 – financed by a combination of EU structural funds and private funding
Guarantees				
Promotion of global networks				
Scientific co-operation			X	Collaboration with Shanghai Province on energy/environment and health/life science.
Foreign firms eligible for public projects				
International trips to develop innovation networks			X	Delegations have visited e.g. Belgium, China, Italy and the United States.
Public sector innovation				
Innovation-driven public procurement	X	NVIA, to help identify and clarify the needs for welfare technology solutions at regional hospitals.	X	In particular for health care and large investments in new regional hospital construction.
Innovation awards				
Other				
Describe	X	For welfare technology, initiatives for user-driven innovation; G10 Innovation Center: test centre for health innovation (e.g. recreated temporary operating rooms). OPI-LAB – a trans-regional project to collect and disseminate knowledge about public-private innovation for welfare technology.		

Source: Regions of Central and Southern Denmark.

Table 3.A1.2. **Types of innovation system actors**

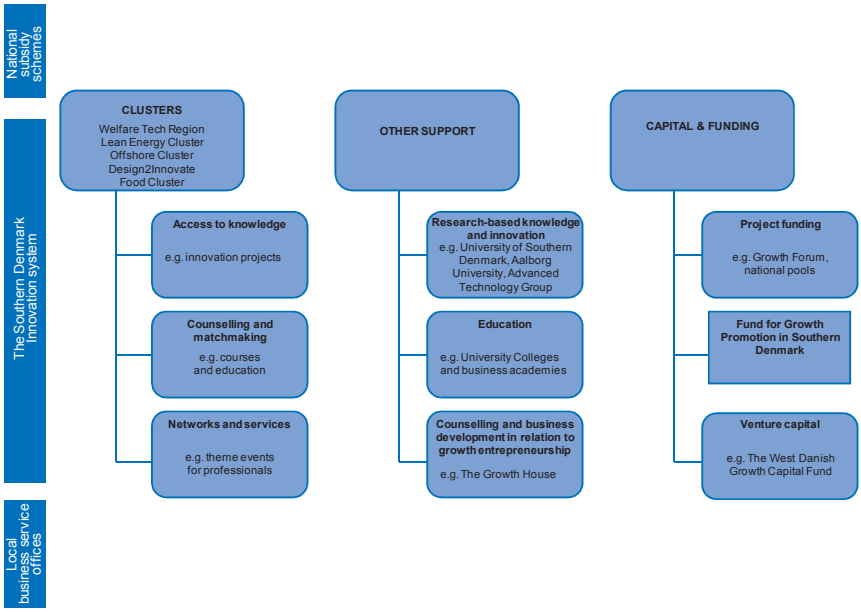
Category	Type of actor (total number in Denmark)	Central Denmark	Southern Denmark
Public research institutes	– Eight universities	University of Aarhus	University of Southern Denmark
	– Three university hospitals	1 in region	1 in region
Other education institutions	– Ten university colleges	– Danish School of Media and Journalism – VIA (degrees in the fields of technology and business; education and social studies; health sciences; and media, arts, and design)	– University College Lillebaelt (education in the welfare sector) – University College South Denmark (degrees in the fields of educational sciences, health sciences, social sciences and communication sciences)
	– 14 other university-level institutions of fine and performing arts, design and architecture	– Aarhus School of Architecture – Royal Academy of Music, Aarhus/Aalborg	– Kolding Design School – Academy of Music and Dramatic Arts Southern Denmark – Funen Academy of Fine Arts
	– Nine business academies	– Business Academy Aarhus – Danish Academy of Business and Technology – Dania – EAMV - Erhvervsakademi MidtVest	– Business Academy Aarhus (located in south-western Denmark) – Lillebaelt Academy of Professional Higher Education – International Business Academy Kolding
Technology centres	– Nine GTS Centres (ATS: advanced technology centres)	– Danish Technological Institute (Aarhus location) – AgroTech – Alexandra Institute – DELTA (Aarhus, Them location) – FORCE Technology (Aarhus location)	– Danish Technological Institute (Kolding, Odense, Soender Stenderup locations) – DELTA Danish Electronics, Light and Accoustics (Nordborg test centre)
Regional and local actors	– Growth Houses	Central Denmark Growth House (with two locations)	Southern Denmark Growth House
	– 76 local business development councils	One per municipality with possible exceptions	One per municipality with possible exceptions
	– Seven science parks (members of association FOIN)	– Incuba Science Park – AgroBusiness Park	– Science Park of Southern Denmark
	– Six incubators (members of association FOIN)	– Innovation MidVest – Ostjysk Innovation	– Syddansk Teknologisk Innovation Ltd.

Table 3.A1.2. **Types of innovation system actors** (*cont.*)

Category	Type of actor (total number in Denmark)	Central Denmark	Southern Denmark
Innovation networks	22 in Denmark (a few have multiple regional locations)	**Six with locations in region** – Animation hub – Innovation network for biomass – FoodNetwork – Holstebro – Innovation network for lifestyle, housing and fashion – VE-Net – Green Energy Solutions – Service platform Aarhus	**Seven with locations in region** – FoodNetwork - Kolding – Offshore Center Denmark – PlastNet – innovation network for plastics – RoboCluster – AluCluster – Innovation network for market, communication and consumption – UNIK – solutions for chronic patients

Source: Ministry of Science, Technology and Innovation (2009), *Mapping of the Danish Knowledge System with a Focus on the Role and Function of GTS*, Ministry of Science, Innovation and Higher Education, Copenhagen with updates.

Figure 3.A1.1. **Southern Denmark: innovation system approach**



Source: Region of Southern Denmark.

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where governments work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The European Union takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

OECD PUBLISHING, 2, rue André-Pascal, 75775 PARIS CEDEX 16
(04 2012 09 1 P) ISBN 978-92-64-17873-1 – No. 60217 2012

OECD Reviews of Regional Innovation

CENTRAL AND SOUTHERN DENMARK

Contents

Assessment and recommendations

Introduction

Chapter 1. Innovation and the economies of Central and Southern Denmark

Chapter 2. Danish governance and policy context for regional strategies

Chapter 3. Regional strategies for innovation-driven growth

Please cite this publication as:

OECD (2012), *OECD Reviews of Regional Innovation: Central and Southern Denmark 2012*, OECD Publishing.
http://dx.doi.org/10.1787/9789264178748-en

This work is published on the *OECD iLibrary*, which gathers all OECD books, periodicals and statistical databases. Visit ***www.oecd-ilibrary.org***, and do not hesitate to contact us for more information.

OECD publishing
www.oecd.org/publishing

ISBN 978-92-64-17873-1
04 2012 09 1 P