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OECD Reviews of Regional Innovation
Central and Southern Denmark

INTRODUCTION, ASSESSMENT AND RECOMMENDATIONS

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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. Countries and regions are trying 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:

- 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 and OECD, 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; and
- **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.

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Assessment and Recommendations

Review context

National growth goals require effective contributions of 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. Public funds to support innovation are increasingly recognising the importance of an economic and social return to these investments, requiring 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 Denmark overall. Future growth will need to come from innovation in the context of a knowledge-intensive economy with an aging 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.

Figure 1. Central and Southern Denmark

Central Denmark
Population (2011): 1 253 000 inhabitants
Surface: 13 000 Km2
GDP per capita (2009): EUR 38 000
Largest municipality (of 19): Aarhus (315 000)

Southern Denmark
Population (2011): 1 200 000 inhabitants
Surface: 12 000 Km2
GDP per capita (2009): EUR 36 000
Largest municipalities (of 22): Odense (188 000), Esbjerg (115 000), Vejle (105 000), Kolding (88 000)

Danish context

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

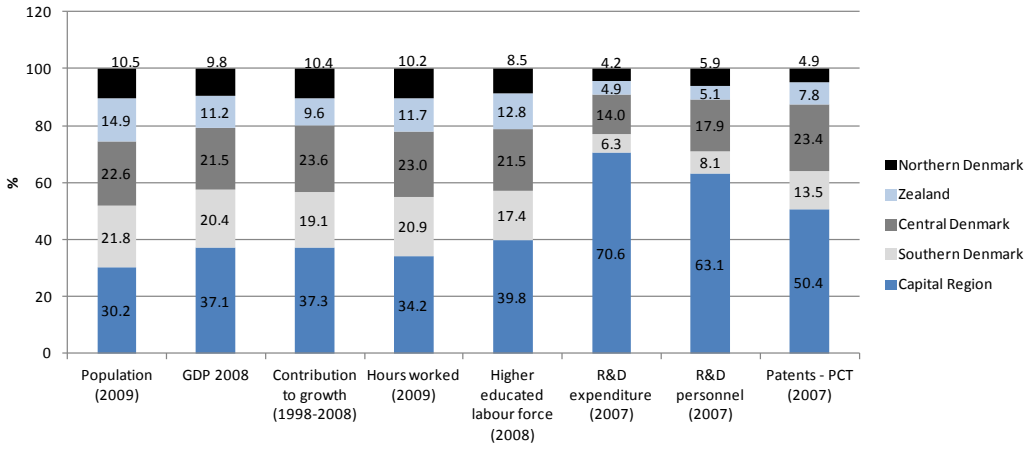
Denmark maintains generally high wealth levels and ranks high on quality of life measures, being for example top in the OECD for work-life balance. There exist generally strong framework conditions for firms, with the exception of one of the highest taxation rates in the OECD. The stagnant labour productivity 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 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 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. `

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

Denmark displays the lowest income disparities across regions, as compared to 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 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 type of future growth paths.

Figure 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 other OECD regions

Denmark has had traditionally low unemployment for the OECD area pre-crisis (2008), 3.4% versus an OECD total 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 aging 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 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 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 crisis resulted in layoffs from major regional employers such as Danfoss (global producer of refrigeration, heating, and water management products), Lindø (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

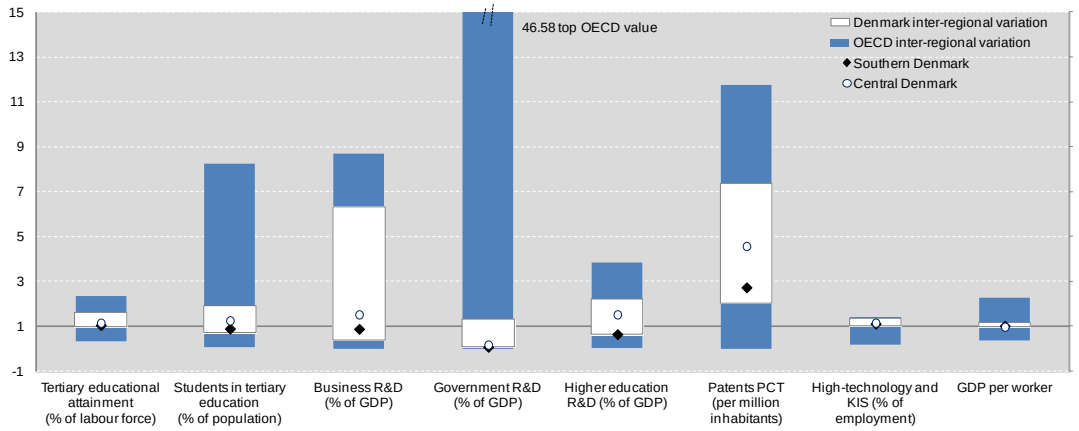
Central Denmark is home to Aarhus, Denmark's second city, a growth pole in this region of 1.25 million inhabitants. The region is located in the middle of the Jutland peninsula. It accounts for 22.6% of Denmark's population and 21.5% of its GDP for a total of EUR 107 billion. It exports around 60% of 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 UK (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 3).

Figure 3. Innovation snapshot: Central and Southern Denmark

Data for 2007 or latest available year; left axis normalised to an OECD regional median of 1



Notes: The white bands represent the range of values for the country. The dark blue band represents the range of values for OECD regions. The diamond and circle are the values for Southern and Central Denmark respectively. 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 based on 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 the EU. 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 cooperation with the RGF (and an RGF advisory group with members of organisations similar to the formal RGF). They also serve to coordinate with municipalities in the region. The existence of sub-regional units in Southern Denmark, corresponding generally to the four former counties, attest to a different "politics of place" than other Danish regions, rendering horizontal coordination 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 (2007-13) and was 26% in Southern Denmark (2009-11). 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 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 of much smaller amounts 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 include a functional area split by administrative boundaries, or common challenges or 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 in tenders to involve more than one region as a condition for competition.

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 cooperation. However, the regions need to go beyond the EU-funded programmes to better integrate international networks of firm relationships and knowledge flows.

Inter-departmental coordination at national level a challenge 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 coordination for regional development have been limited. There are several OECD examples for either top-down or bottom-up approaches to such coordination. 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 coordination 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 coordination 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 coordination 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 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 their growth goals to be addressed by the business development strategies: growth overall 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 the regions more generally; such as high-school drop-outs 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.

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 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, for the strategy quantitative targets, it is not clear what is really achievable and what is aspirational. The sectoral priorities share several commonalities but there are clear areas of distinctive specialisation within each region.

Table 1. SWOT of 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 & 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 aging -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 actors are created or supported by public and private efforts as well as 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 cooperation with national level, to replace one-problem, one-instrument approaches to 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 pro-active partner in the region's innovation system due to RGF use of the Growth House as a lead partner in several funded projects and its 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 preceding four counties that comprise the new region. For the implementation of its business development strategy, these existing groups with specialised knowledge were deemed a more effective delivery mechanism of targeted business development services. The logic of specialised services 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 for the large share of public sector jobs, future demand for such labour 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 a gateway to the world (through joint research and publications, foreign student and researcher attraction) 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 its economy outside of the priority sectors. 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 to implement the policy mix, there are fewer used at regional level in Denmark than 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 EU15. In 2010, 9.5% of total Danish exports were energy goods. Approximately 55 000 persons 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 tech 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 cooperation 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 are needed to support this strategy. 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 professionalization 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, representing 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 that 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 are visible at primary education level, which generate further challenges at secondary level (including high school drop-outs). 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 curriculum 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, 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 joint 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 coordination 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 specialization 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 drop-outs; 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:

  - Promote next generation cluster policy approaches (cross-border and cross-cluster), with greater communication and branding on international positioning of prioritized 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 "un-usual" 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).