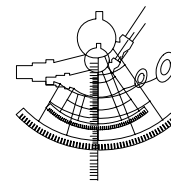


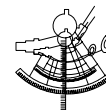
European Trend Chart on Innovation



Annual Innovation Policy Trends and Appraisal Report

Denmark

2006



Innovation is a priority of all Member States and of the European Commission. Throughout Europe, hundreds of policy measures and support schemes aimed at innovation have been implemented or are under preparation. The diversity of these measures and schemes reflects the diversity of the framework conditions, cultural preferences and political priorities in the Member States. The 'First Action Plan for Innovation in Europe', launched by the European Commission in 1996, provided for the first time a common analytical and political framework for innovation policy in Europe.

Building upon the Action Plan, the *Trend Chart on Innovation in Europe* is a practical tool for innovation organisation and scheme managers in Europe. Run by the Innovation Policy Directorate of DG Enterprise and Industry, it pursues the collection, regular updating and analysis of information on innovation policies at national and European level.

The Trend Chart serves the "open policy co-ordination approach" laid down by the Lisbon Council in March 2000. It supports organisation and scheme managers in Europe with summarised and concise information and statistics on innovation policies, performances and trends in the European Union (EU). It is also a European forum for benchmarking and the exchange of good practices in the area of innovation policy.

The Trend Chart products

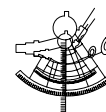
The Trend Chart on Innovation has been running since January 2000. It now tracks innovation policy developments in all 25 EU Member States, plus Bulgaria, Iceland, Israel, Liechtenstein, Norway, Romania, Switzerland and Turkey. It also provides a policy monitoring service for three other non-European zones: NAFTA/Brazil, Asia and the MEDA countries. The Trend Chart website (www.cordis.lu/trendchart) provides access to the following services and publications, as they become available:

- a database of innovation policy measures across 33 European countries;
- a news service and related innovation policy information database;
- a "who is who" of agencies and government departments involved in innovation;
- annual policy monitoring reports for all countries and zones covered;
- background material for four annual policy benchmarking workshops;
- the European Innovation Scoreboard and other statistical reports;
- an annual synthesis report bringing together key of the Trend Chart.

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This document has been prepared within the framework of an initiative of the European Commission's Enterprise and Industry Directorate-General, Innovation Policy Development Unit. Official responsible: Christophe Guichard (Christophe.guichard@cec.eu.int).

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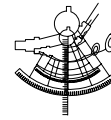
CONTENTS

Executive Summary	i
1 The Innovation governance system	6
1.1 Overview of the innovation system	6
1.1.1 The national innovation system	6
1.1.2 National innovation policy making and delivery structures.....	9
1.1.3 Governance of regional innovation systems	13
1.2 Appraisal of the governance system	16
1.2.1 Policy making and evaluation practices	16
1.2.2 Policy benchmarking and transnational learning.....	18
1.2.3 Overall appraisal and SWOT of innovation governance	19
2 Developments in Innovation policy	23
2.1 Overview of trends in performance and policy	23
2.1.1 Recent trends in innovation performance and competitiveness	23
2.1.2 Objectives and targets of innovation policy.....	27
2.1.3 Key developments in innovation policy measures	33
2.2 How well does policy meet the innovation challenges ?	37
2.2.1 Policy responses to identified challenges	37
2.2.2 The Lisbon National Reform Programme (NRP) and innovation: an appraisal	40
3 What lessons can be drawn from policy implementation ?	44
3.1 Lessons from the evaluation of innovation policy measures	44
3.2 Review of good practice	48
Annex 1: Overview of innovation policy documents	49
Annex 2: Overview of innovation policy measures	50
Annex 3: European Innovations Scoreboard: country pages	64
Annex 4: Sources of further information	66

Exhibits

Exhibit 1: Selected key organisations within the National Innovation System	9
Exhibit 2: Organisational chart of the innovation governance system	12
Exhibit 3: Regional governance of innovation policy matters.....	15
Exhibit 4: Overall appraisal of policy making and evaluation practice	17
Exhibit 5: Overall appraisal of policy benchmarking and learning initiatives.....	18
Exhibit 6: Innovation governance SWOT overview	21
Exhibit 7: Comparable indicators of economic performance	23
Exhibit 8: Main innovation policy challenges	25
Exhibit 9: National innovation policy objectives.....	29
Exhibit 10: New Innovation Policy Measures over last 12 months	35
Exhibit 11: Innovation challenges and policy responses	37
Exhibit 12: Innovation challenges, policy responses and impact.....	39
Exhibit 13: Policy Measures relevant to Lisbon guidelines n°8 and 15.3.....	41
Exhibit 14: Summary of good practice cases in Denmark	48

European Trend Chart on Innovation



Executive Summary

1. Introduction: innovation performance and policy objectives

The Danish economy is performing very well at the moment, reaping the benefits of 25 years of economic reform. In 2005 growth picked up to a level of 3.1 percent. Even though unemployment has declined to a historical low, inflation remains subdued and there are no signs yet of accelerating wage levels. This supports the strong economy with a high surplus in the public sector economy.

With regard to the European Innovation Scoreboard indicators Denmark appears to have some strengths regarding human resources, knowledge creation, innovation cooperation and venture capital to innovation. It also appears that Denmark has some weaknesses in the high-tech manufacturing sector, SME innovation and especially in innovation activities in general. However, when attempting to assess the strengths and weaknesses of the Danish innovation system, which frequently relies on innovation and learning in 'low technology' activities to boost the overall performance of the economy, these figures should not be overemphasised.

Regarding human resources, Denmark has an above EU25 average, but with respect to tertiary education and especially S&E graduates, it only just reaches the level of the countries usually used for a comparison. The development of human resources in general is an area that causes great concern in Denmark and it is seen as a key challenge to improve this area.

In general, Danish competitiveness has been ranked very positively in a number of recent assessments. All these assessments share the conclusion that framework conditions for innovation and private enterprises are very positive. In general, Denmark's high position is explained by a combination of a well-functioning society with quite an efficient public sector, limited bureaucracy, a fair and transparent legal system and a low level of corruption and crime

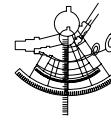
Even though the Danish economy is strong and the Danish innovation system is perceived as well-functioning, policy priorities focus on improving the Danish system to meet the challenges of globalisation. Innovation is seen as a key element in the response to these challenges. As a consequence, the Danish government has formulated a number of ambitious objectives:

- Denmark as a leading knowledge society: The objective is for public and private sector enterprises to jointly boost efforts in the area of research and development so that Denmark's R&D total expenditure exceeds three per cent of gross domestic product by 2010.
- Denmark as a leading entrepreneurial society: The objective is for Denmark to become one of the societies in the world where most growth enterprises are launched by 2015,.
- World-class education: The objective is for pupils in primary and lower secondary schools to be among the best in the world in reading, mathematics and science. The government also intends to raise the share of young people completing post-secondary education to a minimum of 85 percent by 2010 and to 95 percent by 2015. Furthermore, the government aims to raise the rate of pupils completing a course of further education to at least 45 percent by 2010 and to 50 per cent by 2015.
- The most competitive society in the world: the objective is for Denmark to be the world's most competitive society by 2015.

2. Major innovation challenges and policy responses

In Denmark there are three particularly important challenges for the future innovation environment. Two of them are well recognised and have been highlighted by the government as well as all major stakeholders in a number of recent documents, including the National Reform Programme. The third

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challenge is more controversial. The two first challenges are related to the Danish educational system and labour supply, while the third challenge is related to the current innovation policy mix in Denmark.

Challenge 1: To improve education at all levels of the educational system

Denmark has made surprisingly slow progress in human capital formation. Despite large public investments in early childhood care and compulsory education, Denmark seems to have substantial difficulties mobilising the talent of all young people, and a large share - including many second-generation migrants - seem to be “lost”, leaving school with only limited literacy skills. Another major weakness of the Danish education system is that too few Danes go on to further education. Among the 25-34 year olds, only 86% have at least upper secondary education, compared to 89%, 91% and 95% in Finland, Sweden and Norway respectively. The tendency to delay tertiary studies is also part of the challenge. All in all, skill formation is not sufficiently effective for a high income country.

The government therefore wants to improve the primary and lower-secondary school system by strengthening evaluation and quality development processes. It also aims to increase the number of students who complete a secondary education programme and, at a later stage, a tertiary education programme. To reach these objectives a number of initiatives have been proposed, but none has been implemented yet.

The policy response to this challenge is very comprehensive and ambitious. It is too early to analyse whether the means to achieve the objectives are the right ones. It has, however, been argued, that the proposed initiatives have a very strong focus on formal competencies and not enough emphasis on improving abilities such as creativity, collaboration and learning by doing, using and interacting, where Denmark has historically done well.

Challenge 2: To increase supply of labour

Labour supply is another challenge identified by the Danish government. The threat of labour shortages is a significant risk for Denmark's business environment and the innovation system. Denmark's population is growing very slowly and the already high level of labour force participation, as well as a tendency of workers to take early retirement, means that labour supply will be squeezed in the next decade

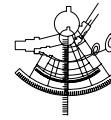
The government has presented a comprehensive policy response to this challenge in the welfare strategy which was presented in April 2006 (Fremtidens velstand og velfærd). The aim is to increase the number of working years for all individuals by reducing existing delays in people entering the labour market, and by increasing the age of retirement.

A number of important proposals target incentives to start and finish education as quickly as possible. It is for example proposed that the support system should create incentives not to delay the overall length of education. With regard to the retirement issue, the government's proposes to increase the age thresholds for early retirement by three years and for age pension by two years for citizens who are currently under 50.

In addition, the government aims to improve access to the labour market for people who are currently out of a job. Many efforts target the large group of people with a foreign background, where unemployment rates are alarmingly high. Finally, the government also proposes to improve access to the Danish labour market for well educated and highly qualified foreigners. Among the proposals is an improved Green Card system.

So far, the government proposals have been welcomed by most stakeholders in the innovation system, although quite a few seem to believe that more ambitious and radical reforms are needed. However, the political opposition believes that the proposals are too drastic and wants to soften the consequences. The forthcoming political negotiations will decide the exact shape of the proposals, but more far-reaching reforms than the ones already proposed seem unlikely and impossible to realise in the existing political landscape.

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Challenge 3: To strengthen conditions for all modes of innovation

The third important innovation policy challenge is to seek a more balanced policy mix, where all modes of innovation are emphasised. There is currently a tendency in Denmark to focus on science-based sectors and 'high technology research' in fields such as nanotechnology, information technology and biotechnology. It is argued that this strategy fails to sufficiently take the characteristics of the Danish innovation system into consideration. There is a strong focus on the universities as deliverers of new ideas and new inventions, and little emphasis on the innovative capabilities of firms and their need for research-based competences.

The government is aware of the need to improve the conditions for all modes of innovation, but this challenge has so far not been given a very high political priority. Most of the emphasis so far has been on the science-driven mode of innovation.

However, there are counteracting tendencies. One of the most important attempts to address this challenge is a recent proposal in the Globalisation Strategy to improve the conditions for user-driven innovation. The government intends to develop a special programme for user-driven innovation and dissemination of knowledge based on market demand in fields where the enterprises locally and regionally have special competences.

In general, however, it must be concluded that the efforts to work out the full implications for policy of low-tech firms and knowledge intensive service firms remain limited. This seems to be an area where there is still room for significant improvement. Nonetheless, the Globalisation Strategy seems to suggest that the focus on science-based innovation and on technical innovation – and the relative neglect of innovation in the low tech and service sectors – are set to remain the dominating features of the Danish innovation policy mix for some time.

Summary table: Innovation challenges, policy responses and impact

Challenge	Relevance of policy response	Evidence of impact
To improve education at all levels of the educational system	3	Too early to appraise
To increase supply of labour	4	Too early to appraise
To strengthen conditions for all modes of innovation	2	Too early to appraise

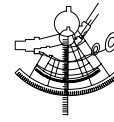
Policy response ranking scored from 1 to 5 : 1 No specific measures addressing the challenge (possibly a debate but no evidence of any real policy development); 2 Policy development under way to respond to challenge (policy debate or design launched, e.g. announced in National Lisbon Reform Plan, etc.); 3 Specific measures existing for some time but insufficient to respond fully to challenge; 4 Existing measure plus one or more newly launched measures (during last 18 months) 5 A comprehensive set of measures which potentially responds fully to the challenge.

3. Innovation governance and policy trends

3.1 Innovation governance: key changes and issues

The Danish research and innovation system is currently undergoing a major restructuring process, which has gathered even more momentum in 2006 following the presentation of the Danish Globalisation Strategy. The overall aim of the various reforms and initiatives in the Danish system is to bring about institutional changes and create governance structures that are better suited for the coordination of and cooperation between the different actors of the national innovation system. Overall responsibility for research and innovation policy under the restructured system lies with the Ministry of Science, Technology and Innovation. Practically all innovation related policies and measures have been transferred to this ministry, thus providing the Danish governance system with a strong element of political and administrative coordination. At the same time, there is a clear political vision, innovation

European Trend Chart on Innovation



issues are given high political priority and stakeholder involvement in the formulation of innovation policy objectives is strong.

A potential weakness of the Danish innovation policy governance is the fact that there is still considerable uncertainty about the actual implementation and financing of the existing political objectives and proposed initiatives. On 4 April 2006, the government presented a funding plan within the framework of its "Welfare Initiative" (Velfaerdsudspil). At this occasion, the Minister of Science, Technology and Innovation promised DKK 10.9 billion to R&D for the period from 2007 to 2010 (EUR 1.5 billion). However, whether this funding plan will actually become a reality depends on the outcome of controversial political negotiations about a number of far-reaching welfare reforms, to which the funding plan is linked. The same can be said for a large number of other initiatives in the Globalisation strategy. The exact extent to which the proposals will be put into practice depends on these forthcoming political negotiations.

3.2 Trends in innovation policies

Currently, Danish innovation policy is made up of a broad mix of measures with a main focus on science based sectors and 'high technology research' in fields such as nanotechnology, information-technology and biotechnology, while other modes of innovation relevant for small and medium sized enterprises in low tech branches have received much less attention.

The most dominant recent policy tendency was to reorganise the system and to set up various funding and advisory councils as well as think tanks. The most important aims tended to be the identification of strengths and weaknesses in order to define Denmark's strategic needs to gain a competitive advantage in the coming years. As a consequence only a few new measures have been initiated.

Available statistical data suggests that there have been no significant changes in public funding from one type of activity to another. But as the current situation is characterised by a great deal of uncertainty related to the future funding of innovation and research activity, changes in the proposed priorities and funding volumes should be expected.

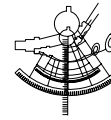
Those measures that have been initiated recently are small in scale. One example is the "**Proof of Concept**" pilot initiative, which aims to strengthen technology transfer from public research to private enterprises. The main objectives of the measure are to facilitate the process from research to business, to attract investors willing to take a risk; and to stimulate cooperation between public research institutions, innovation incubators and other relevant partners. Another example is the "**Regional technology centres**" measure, which aim to strengthen knowledge-based growth and development in regions outside larger cities. Regional Technology Centres focus on regional competencies and act as intermediaries between regional research and SMEs. The collaboration is based on business strength positions within a limited geographic area outside the Copenhagen area.

4. Conclusion: future actions and opportunities for policy learning

In general, Denmark performs well in terms of meeting most of the Lisbon targets. The Lisbon strategy is seen as a prolongation of Danish policy since the 1990's and the agenda of the Lisbon Strategy largely matches the national political agenda. However, as Denmark has already gone a far way towards meeting the Strategy's objectives, it is very difficult to directly link significant measures to the Lisbon Strategy. This does not mean that there is no political attention to the themes covered by the Lisbon Strategy or that no reforms are undertaken. On the contrary, significant political attention is paid to the policy fields defined as important by the Lisbon Strategy and very comprehensive reforms are carried out. However, where reforms pertain to the policy fields that are prioritised in the Lisbon Strategy, these reforms are mostly only very indirectly related to the Strategy.

In a Danish context, the importance of the Strategy is rather that it is seen as a tool for maintaining a focus on a series of important issues, both within the country and in the wider European Union. Another typical approach is to focus on the Lisbon Strategy as an instrument for knowledge-sharing and exchange of experience.

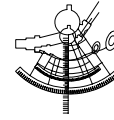
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It is, however clear, that policy initiatives in line with the Lisbon objectives have increasingly gained momentum after the change of government in 2001. The current Danish government has reformed and reorganised more or less all aspects of the Danish innovation system. A number of recent reforms have targeted the university-sector, the public research institutions, the technology service system, the advisory and funding structures and the regional system, just to mention the most important areas. At the same time new strategies and action plans have been formulated for national and regional growth, collaboration between the public and the private sphere, knowledge development, strategic research, etc.

In addition, a new and very ambitious Globalisation Strategy (Fremgang, fornyelse og tryghed), was presented in March 2006 in accordance with the so-called Globalisation Council. The main objective of the strategy is to make sure that "Denmark is to be among the countries where it is best to live and work – also in a ten to twenty years time." The strategy argues, that Denmark is to achieve this goal by developing a strong competitive edge and a strong "coherent power" (sammenhængskraft), with a strong interaction and collaboration among stakeholders. The means to achieve these objectives are a world class education system, strong and innovative research, more entrepreneurs and more innovation and change. The strategy includes an impressive 350 concrete proposals, even though not all of them are new. However, the exact shape of the strategy will be decided in an ongoing process of political negotiations. The strategy will not be negotiated as a whole, but rather in a series of independent negotiations. As a consequence, there is considerable uncertainty about the actual implementation of the strategy and about the final shape it is going to take.

European Trend Chart on Innovation



1 The Innovation governance system

1.1 Overview of the innovation system

1.1.1 The national innovation system

The following section describes and discusses the broad Danish national innovation system.

The public part of the national Danish research and innovation system has for many years been criticised of being too fragmented and uncoordinated. Even though a number of initiatives were taken to strengthen the function and coordination of the system (in particular after 1993, when the first Danish Ministry of Science and Technology was founded), the dissatisfaction among central stakeholders remained throughout the last decade and led to a number of recent initiatives. Accordingly, it has until recently been argued repeatedly that the system was too fragmented to act as a framework for a coherent and efficient use of research and innovation resources. There was also an impression that the Danish innovation system suffered from a low level of interaction between trade and business on the one side and knowledge institutions e.g. universities, public sector research institutions and technological service institutes on the other (Aagaard, 2000).

However, in July 2000, a Danish Research Commission was established to review the relevant legislation with a view to enhancing the efficiency of the entire research system. The results of this appraisal were presented in September 2001 (the Commission's report has been published online¹). Based on the Commission's recommendations the Parliament and the government embarked on a reform of the entire public research and innovation system in 2002, when a new Act on Technology and Innovation was passed. As a consequence the Danish innovation system has been restructured considerably in the last few years. To strengthen the coordination and the overall function of the research and innovation system, responsibility for both research and innovation has for the first time been placed given to a single ministry. Innovation related policies and measures were transferred from the Ministry of Economic and Business Affairs to the new Ministry of Science, Technology and Innovation. At the same time, some of the competences of the former Ministry of Trade and Industry regarding trade and business services and innovation related policies were placed with the Ministry of Science, Technology and Innovation. Similarly, the administration of the university sector was transferred from the Ministry of Education to the new ministry. In effect, this reorganisation moved practically all innovation related policies within the purview of the Ministry of Science, Technology and Innovation. Furthermore, a new body, the Council for Technology and Innovation, was set up to assist in the implementation of the new legislation. The council advises the Minister of Technology, Science and Innovation and is authorised to make decisions on a number of specific appropriation matters. The council, whose members are appointed by the minister, is composed in such a way that it includes competencies that are deemed essential for a viable innovation system.

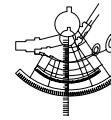
The research funding and advisory system has also been reformed in order to ensure an optimal use of research resources. The reform is an attempt to simplify the organisational structure of the system and to strengthen the management. The intention was to open up competition for research resources that are not allocated as basic appropriations to institutions, and to ensure that a larger part of appropriations are channelled through the advisory and funding system. Whether the reform has led to an actual simplification of the structure is, however, debatable.

Following the election of early 2005, the Danish government moved innovation policy and the coordination of the innovation system to an even more prominent position on its policy agenda. The Prime Minister established a high profile Ministerial Committee on the challenges of globalisation, which deals explicitly with a number of key innovation policy areas². The group was chaired by the Prime Minister and included the Minister for Economic and Business Affairs as deputy chairman, the

¹ <http://www.videnskabsministeriet.dk/fsk/publ/2001/danishresearchcommission/repport.pdf>

² See <http://www.statsministeriet.dk/Index/dokumenter.asp?o=160&n=1&d=2293&s=1>

European Trend Chart on Innovation



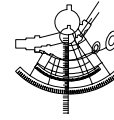
Minister of Education, the Minister of Finance and the Minister of Science, Technology and Innovation. In addition to this group, a so-called Globalisation Council was established, consisting of the same ministers mentioned above and of representatives of central stakeholder groups; e.g. industry, trade unions and knowledge institutions. This council contributed significantly to the government's vision and strategy of developing Denmark in to a leading, growth-, knowledge- and entrepreneurial society, which was presented in April 2006. The Globalisation Council seems to have institutionalised a new way of formulating innovation policy in Denmark, which systematically involves of a large group of key stakeholders in a very structured way.

Apart from the governing and advisory structures, the Danish STI-policy has two public sub-systems, a public research system and a technology service system. The major research units within the public sector research system are universities, government research institutes (*sektorforsknings-institutioner*) and hospitals. The core of the public research system is made up of 12 universities, five of which have several faculties. Five others only have one faculty and two are business universities (all included in the new University Act). Measured in expenditures, the universities carry out about 60 percent of public research, whereas government research institutes and hospitals carry out 20 and 15 percent respectively. Each government research institute is affiliated to a ministry, and its primary task is research and the provision of advice. The government research institutes have a board with members appointed by the sectoral ministry, the Ministry of Science, Technology and Innovation and members representing the employees. Each institute is headed by a director appointed by the board. There are currently 22 government research institutions run by nine ministries. There are also three university hospitals who carry out most of the research done by Danish hospitals and in the public health service sector.

The Danish government recently initiated a reform of the government research institutions and the university sector. The aim was to sharpen the profiles of individual institutions and to increase collaboration. The problem of low interaction between the actors of the research and innovation system has been a common theme of the reforms carried out in this sector in recent years, and is exemplified by new claims put forward for universities to formulate goals and strategies for cooperation with trade and business and by the introduction of external members in the boards of various knowledge institutions. Furthermore, an active role in knowledge exchange, technology transfer and mobility has been added to the mission of the universities - in addition to research and education. The new Bill on National Government Research Institutions as well as amendments regarding the individual institutions was presented in early 2003 and the new University Act came into effect at the beginning of 2004. With the presentation of the Globalisation Strategy these structures can be expected to see further changes in a very near future. The government has stated its intention to reduce the number of institutions merging universities and government research institutions. This plan would reduce the number of universities to less than 12 and would abolish all independent government research institutions. However, the government has not yet presented a concrete plan for the merger and observers expect that a very difficult process lies ahead. Nonetheless, the Minister for Science, Technology and Innovation has announced that the future structure will be decided before the end of 2006.

In the other subsystem, the technology service system, there are presently seven Approved Technology Service Institutes or GTS-institutes (*Godkendte Teknologiske Serviceinstitutter*) employing 3,000 people and with a total turnover of about EUR 302 million. They are independent, non-profit institutions which provide knowledge and competencies to Danish business and industry on a commercial basis to enhance the development and application of knowledge related to technological, managerial and market issues. The institutes are intended to encourage firms to take innovative action. The GTS institutes play a major role as producers and transmitters of application-oriented and technological knowledge, especially for small and medium-sized enterprises, which the Institutes are encouraged to pay special attention to. As the industrial structure in Denmark is characterised by a large number of small and medium sized companies which on average do not engage in large-scale research and development, it is essential that they have easy access to knowledge from knowledge institutions. A system of public certification enables the GTS-institutes to apply for 'basic funds', which co-fund parts of the institutions. This funding is directed towards the creation of a knowledge base and competencies on which the institutes draw to transmit information to private firms. The GTS-institutes cover a wide range of scientific areas and technological fields and operate on near market terms, since the largest share of their revenue comes from advisory services

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paid for by companies and public project means. The market exposure is also shown by the fact that approximately 31 percent of their revenue is generated by exporting technological services. The Council for Technology and Innovation provides funding through a set of three-year contracts. In recent years, the total amount of funding has ranged from DKK 250 million to DKK 300 million (or EUR 35 million to EUR 40 million).

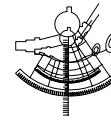
The Danish National Research Foundation (*Danmarks Grundforskningsfond*) which has the status of an independent fund, is another important institution in the Danish innovation system. It funds larger research activities based on researchers' own ideas, and contributes to the development of Centres of Excellence. The Foundation has a capital of DKK 2 billion (approximately EUR 270 million). Originally it was expected that only the income from the capital should be used to fund the Foundation's activities. However, a later revision of the relevant legislation enabled the Foundation to use of the capital itself. At present, 33 centres are funded. In addition a Foundation for High-Tech Development was established recently to give the Foundation a cash injection of DKK 2 billion (EUR 269 million) on average per year over the next 12 years. The proceeds from the Foundation will be allocated to strategic high-tech projects in which Danish research and industry have strong qualifications. To be eligible, projects must have an element of interaction between public knowledge institutions and companies.

The private sector elements of the Danish innovation system is marked by a predominance of small and medium sized enterprises (SMEs) and a small number of large companies (in international terms). The specialisation pattern is dominated by products with low R&D intensity. However, according to Lundvall et al, Danish companies are in general innovative (carrying out product innovations, processes innovations and organisational innovations), but the innovations mainly take the form of *local incremental change* in products and processes. Only a small number of Danish firms introduce products new to the world market. The innovations often reflect a practical and experience-based interaction between skilled labour, engineers and marketing people. Companies tend to build up competences by employing experienced workers on a flexible labour market and by intensive collaboration with their peers – especially with domestic and foreign customers and suppliers. There are of course exceptions from this general picture, such as the food industry, which has a high degree of standardisation and less focus on product innovation. Another exception is pharmaceuticals sector - a science-based industry with a high level of patent activity (Lundvall, 2005).

The last years have seen a number of innovation initiatives, institutions and organisations emerging from other sources than the central government and parliament. Besides the traditional private key actors such as the Confederation of Danish Industries, the major enterprises, the Danish Federation of Small and Medium-Sized Enterprises and the Danish Academy of Technical Sciences (ATV), a group of new actors has entered the Danish innovation policy scene. One of them is the Innovation Council, which was founded in October 2003 at the initiative of the House of Monday Morning (www.innovationsraadet.dk), a Danish think tank,. The Innovation Council is based on cooperation between private companies, ministries and public institutions (such as the Ministry of Economics and Business Affairs, the Ministry of Science Technology and Innovation, the Danish Ministry of Education, Danfoss, FUUU, Novozymes and the Danish Bankers Association). The House of Monday Morning and FORA, the analysis unit of the Ministry of Economics and Business Affairs, are responsible for running the Innovation Council secretariat. The Innovation Council aims to discuss and encourage innovation in the Danish economy. It is made up of an international network of 100 people from companies, public sector institutions and institutions for education and research. Their task is to identify and map Denmark's opportunities and objectives within the global knowledge society. The Innovation Council will accordingly provide specific recommendations as to how Denmark can develop new knowledge environments, which will ensure that as many jobs as possible are created in Denmark in the future. The key task of The Innovation Council is to help Denmark achieve its declared goal of becoming one of the world's most innovative societies within the next decade and to build and facilitate the partnerships and projects that will secure that Denmark develops in the desired direction. The Innovation Council has five broad lines of activity: identifying new agendas; establishing a close international sparring network; determining what Denmark does best; presenting proposals on how to become even better; and transforming visions into action.

Exhibit 1: Selected key organisations within the National Innovation System

European Trend Chart on Innovation



Type of organisation	Name of organisation (in English)	Website (where available)
Government and legislative bodies		
Ministry	Ministry of Science, Technology and Innovation	www.videnskabsministeriet.dk
Ministry	Ministry of Economic and Business Affairs	http://www.oem.dk/sw184.asp
	Ministry of Education	http://eng.uvm.dk/
Private sector organisations and entrepreneurship promotion		
Confederation	The Confederation of Danish Industries	www.di.dk
Federation	The Danish Federation of Small and Medium-Sized Enterprises	www.hvr.dk/english/
Federation	The Danish Academy of Technical Sciences	http://www.atv.dk/atveng/andet/body.html
Knowledge institutes (R&D and education bodies)		
Federation	The Danish Rectors' Conference	http://www.rektorkollegiet.dk/sider/english
Committee	The Coordination Committee	http://forsk.dk
Industrial research centres and innovation intermediaries		
Think Tank	The Innovation Council	http://www.innovationsraadet.dk/indhold.asp?id=205
Financial system		
Federation	The Danish Bankers Association	http://www.finansraadet.dk/english/toolkit/forside/

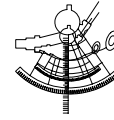
To sum up, the Danish research and innovation system is currently undergoing a major restructuring process, which has gathered even more momentum in 2006 following the presentation of the Danish Globalisation Strategy. The overall aim of the various reforms and initiatives in the Danish system is to bring about institutional changes and create governance structures that are better suited for the coordination of and cooperation between the different actors of the national innovation system. Overall responsibility for research and innovation policy under the restructured system lies with the Ministry of Science, Technology and Innovation. The government expects that these initiatives will contribute to a stronger and improved co-ordination of innovation policies in Denmark.

So far, most central stakeholders seem to be more satisfied with the institutionalisation and functioning of the innovation system than before. However, more or less all recent initiatives are still in a very early stage and the consequences of the reforms are consequently still difficult to assess. It therefore remains to be seen whether the recent changes will lead to a significantly better innovation-system.

1.1.2 National innovation policy making and delivery structures

In Denmark, policy objectives are traditionally defined in a parliamentary process involving members of parliament, political parties, government officials and stakeholders. However, the government has a decisive influence on this process as it has the initiative and the entire administration at its disposal to prepare reforms or bills. These characteristics have recently been institutionalised in the work of the Globalisation Council. A number of key stakeholders have taken part in discussions on how to prepare Denmark for the challenges of Globalisation, but the process as a whole was controlled by the government. All background material in the process, the programme and content of meetings and the invited speakers were determined by the government. This means that the strategy presented in April 2006 by the ministerial committee of the Globalisation Council with a vision and strategy of developing Denmark into a leading growth, knowledge and entrepreneurial society has an ambiguous status. On the one hand it is a document that is presented as the result of the work of the Globalisation Council. On the other hand it is a public document the majority of which was written by ministries and accepted by ministers, thus de facto turning it into an official policy document. A member of the Forum, Nina Smith, argued in Politiken (a Danish newspaper) that the government and its civil servants have controlled the Council's discussions and that the document must be considered as government product only (Politiken March 16 2006).

European Trend Chart on Innovation



Nonetheless, Danish research and innovation policy is and has traditionally been a policy area where consensus has been sought. Also outside the formulation of the Globalisation Strategy, it is customary that reforms and more far-reaching bills are circulated to a broad array of stakeholders who are invited to comment on the reform/bill. Based on this consultation the reform/bill will follow a fixed procedure before it eventually gets voted on in the parliament. The 'benchmarking model' has also increasingly been used to inform the policy making process in recent years in order to identify strengths and weaknesses in many policy areas. This seems to be particularly true for innovation policy, probably because of the lack of an exact causal relationship between action and performance. Benchmarking also seems to have played an important role in the work of the Globalisation Council.

As mentioned above, the Danish research and innovation system has for many years been criticised for being too fragmented and uncoordinated. As a result of the criticisms, the Ministry of Science, Technology and Innovation was created in November 2001 as an extension of the former Ministry of Information Technology and Research. Responsibilities for universities were moved there from the Ministry of Education and most responsibilities for innovation and high-tech business development were transferred from the Ministry of Trade and Industry. This gave the new Ministry an overarching responsibility from academic education and research to innovation and information technology. Furthermore, according to the inter-governmental foundation, the Minister for Science, Technology and Innovation co-ordinated all matters related to innovation policy. The ministry has a staff of around 250 and provides the secretariat supporting the Danish Council for Research Policy.

The Ministry of Science, Technology and Innovation is currently being restructured. It was initially divided into two departments: Research, Innovation and Education, and Information and Communications technology. The Department for Research, Innovation and Education was subdivided into three Centres: the Centre for Education and Research Institutions, the Centre for Research and Innovation and the Centre for Analysis and Policies. With effect from May 2006, this structure has been changed. In practice this means that some functions (and personnel) are to be moved to separate directorates under direct ministerial control. The three new directorates are:

- IT and Telestyrelsen (Directorate for ICT)
- Forsknings og Innovationsstyrelse (Directorate for Research and Innovation)
- Universitets- og bygningsstyrelse (Directorate for Universities and Infrastructure)

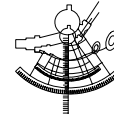
The main objective of the reorganisation was to improve goal-setting and prioritisation of resources by creating a simpler organisation. According to the Ministry, the new structure benefits from:

- a small department with a central policy centre
- a stronger integration of research and innovation
- a stronger ICT department
- a stronger administrative platform in the universities department

Even though formal responsibilities are concentrated in one Ministry, other ministries still deal with smaller areas that are relevant to innovation policy. The Ministry for Economic and Business Affairs is concerned with innovation issues in the traditional industrial sector, with an emphasis on supporting entrepreneurship and dealing with clustering policies and IPR issues. The Danish Patent and Trademark Office is also a part of the Ministry for Economic and Business Affairs, together with the Danish Competition Authority. The Ministry of Education deals with broader educational policies and aspects of lifelong learning. Furthermore, sectoral ministries such as the Ministry of Food, Agriculture and Fisheries deal with innovation policy in their respective areas.

At the moment the Ministry of Science, Technology and Innovation allocates approximately 75 percent of government appropriations to research and innovation. Other ministries with a substantial research budget are the Ministry of Food, Agriculture and Fisheries, the Ministry of Culture and the Ministry of Education. Coordination between sectoral ministries is done on an informal basis at the initiative of the Ministry of Science, Technology and Innovation. However, with the recent creation of the high profile ministerial group on the challenges of globalisation, chaired by the Prime Minister, it can be expected that the coordination of innovation policy issues will gain an even higher priority and will be dealt with in this forum.

European Trend Chart on Innovation



To further improve coordination and to assist in implementing the legislation of the various current reforms, a Council for Technology and Innovation has been established. The council advises the minister and takes decisions in a number of specific appropriation affairs (amounting to approximately DKK 525 million ((EUR 70 million) in 2004). Members of the Council are appointed by the Minister and cover expertise in science, technology and business.

Below the ministerial level, there is a system of research advisory and funding councils (www.forsk.dk). The main advisory council, the Danish Council for Research Policy (*Danmarks Forskningspolitiske Råd*), was established pursuant to a new Act on research advice on 1 January 2004. The Council replaces the former Danish Council for Research Policy (*Danmarks Forskningsråd*) and advises the Minister for Science, Technology and Innovation on matters concerning research policy. The parliament and other ministers may also ask for the Council's advice. Advice may be given upon request or at the Council's own initiative. The tasks of the council include giving general advice on Danish and international research policy for the benefit of society, including advice on:

- The framework of research
- Appropriations for research
- Major national and international research initiatives
- The development of national research strategies
- Denmark's role and position in international research cooperation
- Training and recruitment of researchers

The Council consists of a chairman and eight members all of whom must be recognised researchers (at least four members) or knowledgeable about research. The Minister for Science, Technology and Innovation appoints the chairman and the eight members in their personal capacity for a three-year term (members may be reappointed once). The secretariat of the Council is based at the Ministry of Science, Technology and Innovation.

In the latest reform, the funding aspects of the research advisory system have been divided into two subsystems. The Council for Independent Research (Det Frie Forskningsråd³) is the umbrella for five research councils and will support research projects based on the researchers' own research initiatives. It will also encourage Danish research to be as broad and of as high a quality as possible by carrying out open competitions based on independent assessments. In addition, the Council will give advice on research and technical subjects to applicants and other partners from all scientific domains. The Board of the Council is responsible for defining and putting together the research councils. It is also responsible for deciding the specific allocations of 'free research means' between the various councils. Recently the Council implemented a new structure of the research councils, thus reducing the number of councils from six to five and changing their areas of responsibility. According to the Council the new briefs better reflect the interdisciplinarity of modern research. Under the new structure, the councils are:

- The Research Council for Culture and Communication
- The Research Council for Nature and Universe
- The Research Council for Society and Trade
- The Research Council for Health and Illness
- The Research Council for Technology and Production

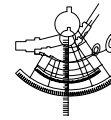
However, the new council structure is in reality very similar to the one it replaced. Apart from the merger of two councils into one, it is more a matter of new labels than an actual change of areas of activity. A more far-reaching and very radical restructuring of the council structure has been proposed, but has not yet been put into practice (nor are there any signs that it will be in the near future).

The other subsystem of the funding structure is made up of the Council for Strategic Research (Det strategiske forskningsråd⁴), which will support research based on politically defined programmes. It will also give advice on research and technical subjects to applicants and others within its scope of activities. The Council has an obligation to contribute to an increased co-operation between public and

³ http://forsk.dk/portal/page?_pageid=407,839232&_dad=portal&_schema=PORTAL

⁴ http://www.videnskabsministeriet.dk/cgi-bin/doc-show.cgi?doc_id=240850&doc_type=35

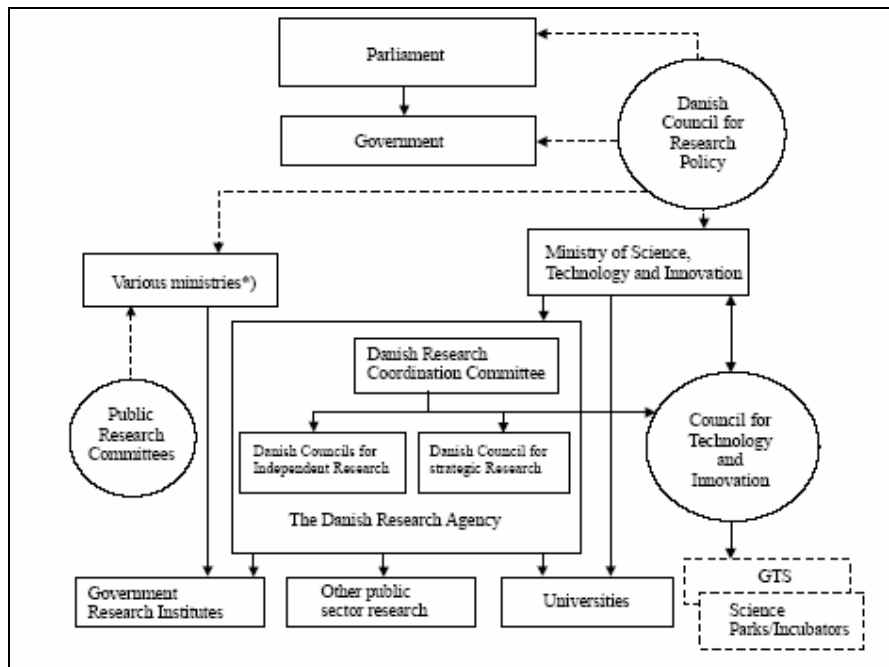
European Trend Chart on Innovation



private research. Furthermore, the Council evaluates applications for research appropriations from the individual ministries. The Strategic Research Council consists of a board and a limited number of programme committees. The board has a chairman and eight members. The chairman and the members are appointed by the Minister of Science, Technology and Innovation. To allocate the programme appropriations, ad hoc committees are set up. Members of the programme committee must be recognised researchers. To ensure the 'societal relevance' of projects, applicants must specify clear and immediate criteria of success for the project in order to be eligible for funding (such as the number of jobs created as a result of the project). Furthermore, a special follow-up group involving the business sector will be attached to each project to ensure that the goals are achieved. Taken together the research councils are in charge of approximately 10 percent of all R&D expenditure stipulated in the Finance Act (compared to DKK 1,231million (EUR 165 million) out of DKK 9,540 (EUR 1,280) in 2004).

Finally the advisory and funding system is coordinated by the Coordination Committee (Koordinationsudvalget for Forskning⁵), which is in charge of promoting co-ordination and co-operation between the research councils and between the research councils and the rest of the research and innovation system. The Committee has the status of a consensus organisation, without having an authoritative role vis-à-vis the research advisory system. The Research Coordination Committee is composed of the chairmen of the Council for Independent Research, the Council for Strategic Research, and the Danish National Research Foundation, two members nominated by the Danish Rectors' Conference, one member nominated by the Assembly of Director Generals of the Danish government Research Institutes (SEDIRK), and one member nominated by the Council for Technology and Innovation.

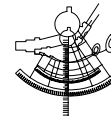
Exhibit 2: organisational chart of the innovation governance system



It can be concluded that the governance structure of the national Danish Innovation System has been strengthened significantly since 2001. Responsibilities have been concentrated in fewer hands and coordination efforts seem to have been strengthened. However, whether these steps are sufficient to secure a better coordination and stronger collaboration in the overall broad innovation system still remains to be seen, as most of the reforms are still in the early stages of implementation.

⁵ http://forsk.dk/portal/page?_pageid=407,860941&_dad=portal&_schema=PORTAL

European Trend Chart on Innovation



1.1.3 Governance of regional innovation systems

At the moment the Danish regions are organised in a two-tier system comprising 14 counties and 271 municipalities. The counties are responsible for the national health-service (including hospitals), secondary and higher preparatory education, the regional environment, sections of the public transportation system, part of the employment services and regional enterprise policy. The municipalities are in charge of a number of other areas including local enterprise policy and parts of employment services. Traditionally the local and regional authorities have had a high degree of autonomy within their respective areas (in economic terms they administer approximately 60 percent of total public spending). However research and innovation policy has so far not been an explicit responsibility of the regional and local authorities, except in the health sector. Regional and local authorities make approximately seven percent of the total national public appropriations on R&D, and 90 percent of these appropriations relate to activities within the health service (especially hospitals).

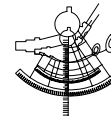
However, this situation is changing drastically at the moment. The government recently agreed on a reform on local and regional governance, the so-called Structural Reform⁶. According to the agreement the number of local authorities will be reduced by almost two thirds of the current number, and five 'regions' will replace the 14 counties. The main purpose of the reform is to benefit from efficiency gains of larger units and to create governance structures that are more suitable for the future. According to the plan, 2006 will be a transition period where the old and the new system will co-exist, but from the beginning of 2007 the new structure should be fully implemented.

Evidently, these changes are expected to affect the regional innovation system as well. One consequence already seems to be that the development of regional innovation systems has gained a much stronger position on the national, regional and local political agenda. Accordingly, the development of regional innovation systems is a main theme in the current structural reform. The intention is that each of the five future regions will be responsible for the development of regional trade and industry. The policy document emphasises that a key objective of the structural reform is to strengthen the development of local and regional growth conditions throughout the country and at the same time create a simpler and more coherent structure to minimise bureaucracy for the private sector. The government emphasises that regional development is a mutual responsibility shared by local actors and the government. Therefore maintenance and extensions of such regional issues as infrastructures, the educational system, business service, research parks and technology incubators will take place in a dialogue between the actors. The development of local conditions for growth will be based at the regional level with inclusion of local enterprises, municipalities, trade unions and knowledge institutions. The municipalities will be responsible for the local business service, while responsibility for regional innovation will be held by the five new regions. The establishment of so-called regional growth forums involving up to 20 representatives of central stakeholders responsible for the strategic planning, monitoring and development of initiatives in the region will be instrumental in this respect. It is emphasised that especially local business and knowledge institutions should be strongly represented in these forums.

Work on this aspect already started in 2005 when the first preliminary forums were established. By April 2006, the work was entirely transferred to the official permanent growth forum of each region. The growth forums are to formulate regional development strategies based on an analysis of regional strengths and weaknesses in relation to the enterprise structure and central growth conditions. These strategies will in turn influence the formulation of national growth strategies. The growth forums are expected to continually monitor the development of regional growth conditions to be able to adjust the formulated strategies. The growth forums are also supposed to make recommendations on the allocation of regional innovation related funds as well as on the allocation of the structural funds, which are administered by the central government, but they do not channel any funds themselves. The regions will receive a block grant in addition to the structural funds and other sources from local enterprises and knowledge institutions.

⁶ www.detnyedanmark.dk

European Trend Chart on Innovation



Each region will be able to set up more than one forum, and the forums do not necessarily have to follow the administrative borders of the new regions. The intention is that the regional effort has to be based on regional strength positions rather than administrative borders. However, the national government will continue to manage the overall innovation and growth-policy and the coordination between business-, education-, traffic-, employment- and other innovation related policy-fields in accordance with the national growth strategy, including the general administration and allocation of structural funds from the EU. In addition to the official Growth Forums a number of so called regional innovation councils were initiated by the House of Monday Morning. These councils were established in 2005.

The structural reform and the consequences for the regional innovation system should be considered in relation to the Regional Growth Strategy presented in 2003 and the more recent regional research and innovation action plan called "Knowledge moves out"⁷ presented in September 2004 by the Ministry of Science, Technology and Innovation with the purpose of strengthening research and innovation in regions with relatively low activities in this field.

The action plan has four key objectives:

- To put Research, Technology and Innovation on the regional political agenda
- To create strong regional collaborations on research and innovation
- To increase the level of innovation and competence in the regions
- To increase the number of knowledge-based entrepreneurs throughout the country

It is seen as a fundamental condition for achieving these objectives that they are based on a solid foundation of knowledge and analysis. In this context another new actor needs to be mentioned. By the beginning of 2005, "Reg.Lab", a new federation of actors, was founded⁸. Reg.Lab focuses on regional business development by gathering and disseminating information about methods and good practices. The idea is for Reg.Lab to inspire regional development by animating regions, municipalities, knowledge institutions, business' and enterprises. The federation offers benchmarking of results and framework conditions, access to knowledge on the design of successful initiatives, ideas for collaboration, general possibilities of knowledge-sharing and discussion of experiences among the members of the Reg.Lab-network. For further information of regional innovation policy see www.videnflytterud.dk.

Exhibit 3: regional governance of innovation policy matters

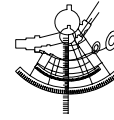
Level of regional / local government	Administrative authorities	Powers related to innovation policy
Counties: presently 14. From 2007 they will be replaced by 5 regions	The County Councils will be replaced by Regional Councils	Presently, the counties are responsible for the national health service (including hospitals), secondary and higher preparatory education, the regional environment, sections of the public transportation system, part of the employment services and regional enterprise policy. The new regions will be responsible for the development of regional trade and industry
Municipalities: Presently 271. From 2007 the number will be reduced significantly to less than 100	The Municipality Council	The municipalities are in charge of local enterprise policy and parts of employment services (among others). The new and larger municipalities will be responsible for the local business service.

Besides the initiatives originating from the Ministry of Science, Technology and Innovation, the Ministry of Economics and Business Affairs, especially the National Agency for Enterprise and Construction, is in charge of a number of initiatives focusing on the regional conditions for innovation and growth and development in general. The Danish government intends to make every region of the country to be attractive for development. Therefore, these initiatives partly take over the distribution of

⁷ www.videnflytterud.dk

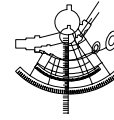
⁸ www.reglab.dk

European Trend Chart on Innovation



financial grants from the EU (Regional Fund) and other measures to promote regional development. One of these is the creation of so-called Regional Growth Co-operations between ministries and regions that intend to strengthen local business development. Another measure is the establishment of regional business-political co-operations between the Ministry of Economics and Business Affairs and different regions regarding the design of strategies for regional development. Tourism policy and entrepreneur policy and a number of other business policies are also relevant in this field. The state-supported business counselling system has recently been reconstructed, allegedly to secure a high level of quality and knowledge in the counselling. In this context, a number of schemes and actors have been closed or merged, so now a so-called business service centre exists in each county. Furthermore, the government has drawn up an action plan for the tourism sector within the framework of the "Growth with Will" initiative, focusing on strategic alliances and the realisation of new, innovative forefront projects (Nordic Innovation Centre, 2005).

With regard to regional efforts, it must be concluded that substantial changes have been made in the last few years, all of them following a tendency to put a stronger emphasis on improving the regional framework conditions for innovation. However, there is a remaining dilemma: to what extent should weak regions be given additional help to promote innovation? For many years, there has not been a targeted and selective effort promoting the development of particular geographical areas in Denmark. Rather on the contrary, the Danish welfare system has been used as a tool to equalising regional discrepancies. There are hardly any regionally differentiated measures or priorities aiming at innovation, for example with special support for companies situated in peripheral areas. Lately however, there has been some departure from this principle. However, the predominant attitude is still that regional policy should rather give incentives to regionally based activities than to subsidise directly. This has resulted in an ongoing debate about whether regional policy in Denmark primarily benefits the strong regions and whether more should be done for the development of peripheral areas. Criticisms emphasise the need for more resources and a conscious emphasis on a regional innovation policy combined with the promotion of entrepreneurship and development of competences (Nordic Innovation Centre, 2005).



1.2 Appraisal of the governance system

1.2.1 Policy making and evaluation practices

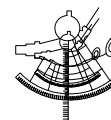
Danish innovation policy is characterised by a strong stakeholder involvement in policy formulation and a strong tradition of consensus. There is interaction with all key stakeholders and consultation and partnerships are increasingly put onto the agenda. There is coordination among the different organisations involved in policymaking related to innovation and recently inter-ministerial committees were established to further improve coordination. The most important recent example of stakeholder involvement is the establishment of the Globalisation Council, where stakeholder involvement has been institutionalised in a way that has not been unheard of in Denmark before. In general, there is no separation between policy design and policy implementation. The ministries involved in policy formulation are also in charge of the implementation in most cases.

Danish innovation policymaking relies to a large extent on international statistics and indicators as well as international reviews and evaluations, while national studies have previously been of a lesser significance. However, there have been systematic attempts recently to increase the role of evaluations in relation to innovation activity in the Danish system. The use of indicators and benchmarking seems to have played an important role in the work of the Globalisation Council. The Danish Centre for Studies of Research and Research Policy⁹ has become an increasingly frequently source of input into the policy process. Since 1997, this institute has carried out a number of studies for the ministry on the impact of investment in R&D. The institute collects the data for R&D statistics and for the national innovation survey and makes assessments of specific initiatives. It also continuously delivers data used by the ministry to assess research and innovation, both nationally as well as internationally. This data plays an important role in the policy process. FORA, a research and analysis division of the Danish Ministry for Economic and Business Affairs, which carries out business policy research and analysis, also carried out evaluations of concrete policy initiatives. Benchmarking based on OECD indicators serves as the basis for most FORA analyses. However, more qualitative national studies and background analyses as the foundation for reforms and restructuring have traditionally played minor roles in the policy process, a fact that has been criticised repeatedly. Criticisms were made of the formulation of the existing University Act and subsequently repeated with regard to the efforts of the Ministry of Science, Technology and Innovation to reduce the number of Danish knowledge institutions via large scale mergers.

Another instrument influencing the decision making process is technology foresight. The Danish government carried out a Technological Foresight pilot programme from 2001 to 2004 (www.teknologiskfremsyn.dk). The aim was to complete eight foresight exercises during this period and to identify issues of strategic policy importance for each of these foresight processes within the areas of science, technology, education, regulation and innovation. This includes, among others, experimenting with different ways of doing technology foresight in a Danish context. A main aim in this respect was to evaluate and conclude if foresight should be used on a more permanent basis as a future-oriented working method for identifying issues of strategic importance for Danish STI-policy. So far, seven foresight exercises have been concluded, covering pervasive computing, bio- and healthcare technology, future green technologies, hygiene, nanotechnology, the ageing society and ICT in the Agriculture and food production sector. It is the expectation that in particular the last phase of the foresight pilot programme will be linked to the establishment of the "High Technology Fund" for the development of generic technologies of future importance such as ITC, biotechnology and nanotechnology. Linked to this new initiative, a dialogue will be organised within the framework of foresight exercises in order to identify specific areas of strategic importance to Denmark that could be supported by the fund. Furthermore, it is the expectation that foresight will be recommended as an important future-oriented policy instrument that should be implemented in the Danish STI-system on a permanent basis.

⁹ www.cfa.au.dk

European Trend Chart on Innovation



Policy reviews of the overall innovation policy mix are not conducted at fixed intervals in Denmark. However, in the last couple of years, and in particular since the Globalisation Council started its work, there have been several systematic attempts to review the innovation system as a whole. This process has so far resulted in a number of far reaching recommendations for a new policy mix. However, the future policy mix is not yet fully decided and will be shaped in political negotiations.

Coordination takes place (and has been improved lately) to make sure that different initiatives work together. Again, the work of the Globalisation Council is an example of efforts to treat innovation as a cross-cutting issue influencing policy making in a number of ministries. In general, the coordination mechanisms and efforts have improved greatly since 2001. The most systematic and coordinated attempt to create a coherent innovation policy was made in 2005: in the work of the Globalisation Council, all relevant ministries and most key stakeholders have joined forces to formulate a long term strategy for the development of the Danish society – with innovation as one of the pivotal points.

In principle all research and innovation activities in Denmark are subject to regular evaluations, but evaluations of the innovation system as a whole is a new issue that has not been fully developed yet. Evaluations are currently carried out, but they are on an *ad hoc* basis at the requests of specific departments. A more systematic policy review is, however, under consideration. In particular, evaluation efforts for public research will be strengthened in the future. The government's Globalisation Strategy states that Denmark has no tradition of systematic evaluations of research quality. As a consequence, the government intends to create a quality barometer to monitor and evaluate development trends. Furthermore, the government requests a more systematic evaluation of all research programmes to make sure that allocation of funds is strictly related to quality. Finally, the research funding organisations must in the future ensure that evaluation methods are centrally developed in a systematic way, and that results and experiences are gathered and used.

Evaluations vary in nature. Some are made by independent foreign or national experts, some are opinions expressed by consultative bodies, some are internal reviews, etc. However, the government has signalled that the quality of evaluations should be improved in the future. Evaluations are almost always made public and the evaluation/review procedure is usually quite transparent.

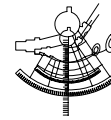
Exhibit 4: Overall appraisal of policy making and evaluation practice

Policy making/evaluation practice	Benchmark	Ranking (1 to 5)
Openness of the process of designing innovation policy (measures)	Policy development is undertaken through a partnership based approach involving consultation of key stakeholders at all stages	5
Quality of inputs to policy making (application of evidence based techniques, use of evaluation results):	Policy design is systematically evidence-based and account is taken of evaluation results	3
Regularity and transparency of policy monitoring and review processes	All major policy documents and instruments are the subject of a regular review involving stakeholder consultation	3
The impact on innovation of developments and regulations in other policy fields is appraised	A well-structured process exists for impact assessment of new regulations on innovation &/or innovation is taken into account as an issue in other policy documents.	3
Existence of coordination mechanisms (high-level councils, inter-ministerial committees, etc.)	Well organised coherent system of policy coordination at government and agency levels	5
Existence of an "evaluation culture" ¹⁰ in the field of innovation policy	Innovation policy measures are systematically evaluated at key milestones in their implementation.	3
External versus internal evaluations of innovation policy measures	Evaluations respect good practice criteria (involve systematically external experts, evidence based, quality appraisal of evaluation reports, etc.)	3
Transparency and publication of results of evaluations	All evaluations are published &/or discussed in a public forum.	3

Scoring: compared to the benchmark current practice in the country is judged to be: 1 completely unsatisfactory, 2 unsatisfactory (room for improvement) 3 satisfactory 4 above average compared to other EU countries 5 best practice in the EU.

¹⁰ An EVALUATION CULTURE (or culture of evaluation) is one in which evaluation, and the lessons drawn from it, form an important element of innovation programme management and policy formulation.

European Trend Chart on Innovation



1.2.2 Policy benchmarking and transnational learning

In Denmark as well as internationally it has been commonplace to emphasise how the formulation, design and implementation of research and innovation policy have been characterised by a high degree of convergence across the western countries. Elzinga and Jamison have, among other characteristics, pointed to a methodological conformity in identifying future priorities, and an increasing international agenda-setting and “orchestration” from above through intergovernmental bodies leading to conformity in issue-perception and management (Elzinga & Jamison, 1995). Similarly, it has been stressed that in spite of some national variations, there is a high degree of congruence in the core views and instruments. A theoretical explanation of this tendency can be found in the “new institutionalism” approach, which argues that in situations of great uncertainty, actors search for ready-made models of what to do and imitate what appears to be a successful measure by someone else in a similar situation. When this kind of imitation happens, it leads to a convergence of the belief-systems of policymakers and the political perception of problems, orientations and goals become more and more similar across countries (Senker et. al, 1999). This tendency towards convergence has also been observed in Denmark, where international reviews and statistics have played, and still play, a key role in the political debate of how to design the national research- and innovation system. In particular OECD-reviews have been used intensively as a political legitimisation of systemic changes. In addition, Eurostat- and OECD indicators are also often used as ‘ammunition’ in the political game. It is, however, argued that international reviews often lack a sufficient understanding of important national and cultural aspects of the Danish system.

Nevertheless, it is evident that Danish policy makers take some inspiration from international developments. There are, to the authors’ knowledge, no systematic mechanisms to tap into strategic information on innovation policies from other countries, but foreign experience is often taken into consideration when designing specific programmes. More generalised references to practices and policies in other countries also continue to play an important role in the Danish policy making process. Unfortunately, these references are rarely used in a systematic way, and international comparative studies of positive and negative experiences in relation to different ways of designing different parts of the innovation system often seem to be neglected in the policy making process. One explanation could be that researchers and analysts are often reluctant to give clear policy recommendations, while organisations such as OECD provide input that is far more suited to the political process.

Learning by hiring experts or staff from other countries is particularly important in the evaluation process. In relation to the actual policy formulation in the ministries, hiring or exchanging foreign experts does not appear to happen to any significant degree. However, a number of foreign experts were invited to the discussions of the Globalisation Council.

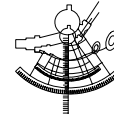
Denmark also participates in a number of European policy networks dealing with research and development as well as innovation policy. Denmark furthermore takes part in the Northern Dimension working group on innovation policy of the Nordic Council of Ministers. Among the latest developments in this collaboration is the objective of the Nordic region to become and remain a frontrunner in research and innovation, which was the theme of a conference hosted by the Nordic Council of Ministers, Iceland (its chair) and the Nordic Innovation Centre on 10 June 2004¹¹. Delegates included decision and policy makers in the Nordic innovation systems. An important aim of the conference was to discuss and generate feedback to the newly presented policy document: “Proposals for a collaborative Nordic programme on innovation policy 2005-2010. Denmark also participates in the Baltic Development Forum¹²

Benchmarking is also increasingly used as an instrument in the Danish policy process. In recent years, the ‘benchmarking model’ has increasingly been used as a tool to identify strengths and weaknesses in many policy areas. This seems to be particularly true for innovation policy, probably because of the lack of an exact causal relationship between action and performance. Benchmarking of selected innovation areas have been undertaken. In particular, FORA, a research and analysis division under the Danish Ministry for Economic and Business Affairs, which carries out business

¹¹ see www.nordicinnovation.net

¹² see www.bdforum.org

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policy research and analysis, appears to be widely used as a knowledge base for concrete policy initiatives. Benchmarking based on OECD indicators serves as the basis for most of the FORA analyses. However, the benchmarking approach sometimes appears to be taken too far. As Lundvall argues, innovation policy risks becoming too strongly based on a benchmarking methodology that goes directly against the logic of the system's perspective (Lundvall et. al., 2005).

For Denmark, the strongest policy cooperation on innovation happens at the Nordic level in the Nordic Council¹³. Apart from EU cooperation, general bilateral international policy cooperation seems to have limited impacts on Danish policy formulation and implementation.

Exhibit 5: Overall appraisal of policy benchmarking and learning initiatives

Tool for policy learning	Benchmark	Ranking (1-5)
Formal mechanisms for policy learning (studies, innovation observatories, study visits, joint events with other countries, etc.)	Exists on a permanent basis (e.g. observatory) or at least one occurrence on an annual basis	3
Application of foreign experience in designing measures (e.g. involvement of foreign experts in design phase)	Systematically (all new policy measures take into account foreign experience)	3
Exchange or hiring of innovation policy staff/experts to/from other countries (e.g. twinning programmes with new member states or candidate countries)	Long-standing and regular policy of exchange of staff	2
Involvement of senior policy makers /executives in trans-national networks (e.g. TAFTIE, OECD committees, etc.)	Key government or agency staff are members in such networks and play an active role (e.g. management committee, organisation of events, etc.)	3
Carrying out quantitative or qualitative benchmarking exercises to assess comparative innovation performance (scoreboards, etc.)	Benchmarking is a systematic process & results are incorporated into policy	4
Implementing policy co-operation with other countries: bilateral or multilateral programmes on innovation, etc.	Many long-term agreements operating (specifically in field of innovation, technology transfer, etc. as distinct from scientific research agreements)	3

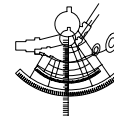
Scoring: compared to the benchmark current practice in the country is judged to be: 1 completely unsatisfactory, 2 unsatisfactory (room for improvement) 3 satisfactory 4 above average compared to other EU countries 5 best practice in the EU.

1.2.3 Overall appraisal and SWOT of innovation governance

The Danish innovation governance system is currently undergoing a major reform and restructuring process. The reforms are potentially suited to strengthening the innovation governance system, but they are also a main challenge for the government, which is to successfully implement the many reforms and thereby create a well-functioning coherent and coordinated national innovation system. Recent reforms targeted the university sector, the public research institutions, the technology service system, the advisory and funding structures and the regional system, just to mention the most important ones. At the same time, new strategies and action plans have been formulated regarding national and regional growth, collaboration between the public and private sphere, knowledge development, strategic research etc. In addition, a new and very ambitious innovation strategy has been launched recently, in accordance with the so-called Globalisation Council. This strategy points at further changes in almost all innovation related areas, but the exact shape of the strategy will be decided in an ongoing process of political negotiations. The strategy will not be negotiated as a whole, but rather in a series of independent negotiations. In general, the Danish innovation governance system is perceived as strong and rather well functioning with a number of strengths and only a few serious weaknesses.

¹³ www.norden.org

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The perhaps most important strength of the Danish innovation governance system is rooted in the social cohesion and the mode of innovation of the Danish society. It is often described as a paradox that a small high-income country with high wages, high taxes, a large public sector, a relatively low level of R&D activity and a relatively low proportion of people with a higher education in science and technology has been able to adjust to changing international market pressures and stay competitive and rich. Three particularly relevant interdependent explanatory factors have been put forward (Lundvall 2005). The first factor is a high degree of social cohesion including a relatively equal income distribution based on comprehensive redistribution mechanisms. The corporatist system of interactions between the state, the trade unions, and the employers has long been a central institution for the formulation and implementation of economic policies. This has created a labour market with a high degree of 'flexicurity' combining high flexibility for employers to hire and fire with high degree of income security for the employees.

A related aspect of the social cohesion model is the high labour market participation rate of women in combination with an extended publicly supported childcare scheme. However, in recent years the Danish social cohesion model has been under political pressure from more neo-liberal tendencies which are common in most of the Western world.

The third explanatory factor has to do with a 'mode of innovation' dominated by small and medium sized low-tech firms making local incremental innovations based on learning by doing, learning by using and a high degree of learning by interacting - especially with customers and suppliers - combined with 'efficient commercial ability' (Lundvall, 2005).

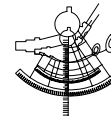
The Danish Innovation Council has tried to describe the intangible strength of the Danish system. In a strategy paper¹⁴ the Council argues that although the Danish corporate sector chiefly consists of many small businesses in low-growth industries, Denmark has, for decade after decade, been ranked among the world's 10 richest countries, alongside such economic superpowers as the United States and such research-powered 'globalists' such as Sweden. The Innovation Council argue that Danish prosperity is based on a culturally rooted ability to collaborate, to adapt to new requirements and to find new solutions. Throughout history, this human and social ability to innovate has created a number of movements and institutions that have provided – and continue to provide – a unique Danish competitive edge. Examples of these specific Danish strength positions include the fact that the popular high school movement secured political and, in turn, economic stability in a period of political revolution in Europe; that the cooperative movement was an effective response to America's cheap agricultural output; that the labour movement paved the way for an upgrading strategy that has produced the world's best educated workforce; and that the welfare movement activated women, so that Denmark today has the world's highest labour market participation rate. These are social innovations that all rest on a view of humanity involving respect, competence, and collaboration. Accordingly it is argued, that Denmark's top ranking in international competition surveys today is largely due to process strengths. Danes are good at cooperating both with each other and with customers, thus creating a Danish user-driven power of innovation.

One of the most important strengths directly related to the innovation governance system is the fact that responsibility for research and innovation for the first time lies with a single ministry. Practically all innovation related policies and measures have been transferred from a number of ministries to the Ministry of Science, Technology and Innovation. As a consequence the Danish governance system is characterised by strong political as well as administrative coordination. At the same time, innovation is a political priority and there is a clear political vision couples with good stakeholder involvement in the formulation of innovation policy objectives. Furthermore, the relatively efficient public sector in Denmark is another strength of the innovation system. Over the last decade most public sector actors were requested to increase their productivity by 2% per year. The low level of corruption is another positive feature that makes life easier for citizens and firms.

There is, however, a downside to the integration of most innovation related activities in a single ministry which historically always had its main emphasis on science and technology. This integration has so far resulted in a tendency to focus innovation efforts on science based sectors and on 'high technology research' in fields such as nanotechnology, information technology and biotechnology. The

¹⁴ See <http://innovationsraadet.dk/uplfiler/strategipap191004.pdf>

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recent Globalisation Strategy, for instance, primarily focuses on research and innovation for the small minority of large, high tech science-based firms, and to a lesser degree on the low and medium tech companies dominating the Danish innovation system. It is argued that this strategy fails to take the uniqueness of the Danish innovation system into consideration. There is furthermore a strong focus on universities as deliverers of new ideas and new inventions, and little emphasis on the innovative capabilities of firms and their need for research based competences. Indications are that this focus on science-based innovation and on technical innovation – and the relative neglect of innovation in the low tech and service sectors – is there to stay, although there are some counteracting tendencies (Lundvall, 2005).

Exhibit 6: Innovation governance SWOT overview

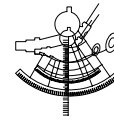
Strengths	Weaknesses
<ul style="list-style-type: none"> - Strong political vision - Strong political coordination - Strong administrative coordination - Good stakeholder involvement - Networking among stakeholders - Increasing awareness of barriers and opportunities - Emphasis on knowledge-sharing and PPP 	<ul style="list-style-type: none"> - Unclear implementation and funding of visions - Modest R&D investments compared to the Barcelona objective - Limited research co-operation between public and private sector
Opportunities	Threats
<ul style="list-style-type: none"> - Increased focus on innovation within services - Increased emphasis on user-driven innovation - Awareness of the potentials of globalisation - Increased consensus on the importance of continuing attempts to improve the system 	<ul style="list-style-type: none"> - Overload of political initiatives - Emphasis on a "Pick the winner" strategy - Convergence of target areas with most other countries - Cohesion under pressure

Another potential weakness is the fact that considerable uncertainty still is linked to the question of how the political objectives will actually be implemented and funded. Most key stakeholders expressed concern - especially about the funding of public R&D - prior to the presentation of the Globalisation Strategy. However, on 4 April 2006, the government presented a funding plan in its "Welfare Initiative" (Velfaerdsudspil) which satisfied most of the critics. The Minister of Science, Technology and Innovation promised DKK 10.9 billion to R&D for the period from 2007 to 2010 (EUR 1.5 billion)¹⁵. However, in order to reach the 1 percent objective Denmark has to attract increased EU funding. Whether this is realistic is unclear. Furthermore, a major political task still lies ahead before the funding plan becomes a reality, as the negotiations of the funding have been linked to a number of far-reaching reforms of the welfare state. The availability of sufficient funding will therefore apparently depend on the outcome of the negotiations. The same is true for many initiatives in the Globalisation Strategy as forthcoming negotiations will decide the exact shape of the proposals.

Limited public/private collaboration on research and innovation is another weakness of the Danish innovation system, which has been emphasised repeatedly. The government focuses strongly on this weakness and recent initiatives in research and innovation policy have been motivated by the need to increase the transfer and use of scientific results in the private sector. The starting point is that, according to benchmarking data, the interaction between universities and industry is less developed in Denmark than in many other national systems of innovation. However, according to Lundvall et al. national differences in the pattern of collaboration between firms and various knowledge institutions may reflect that various knowledge institutions play different roles in different national systems. For instance, the relatively high share of Norwegian firms collaborating with research institutions may reflect the fact that these institutes carry out some of the activities which in Denmark are carried out by the Danish technological service institutes. This illustrates that a broad system perspective including businesses, universities and research institutions, as well as the technological service system is needed to decide the 'optimal' frequency of collaboration between firms and universities. Lundvall argues that given the lower share of high technology in Danish production and trade, Denmark should be expected to have a lower rate of collaboration than some of its competitor countries (Lundvall et al., 2005).

¹⁵ See press release at www.videnskabsministeriet.dk

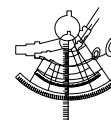
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A threat, which has also been identified by various independent actors such as the OECD and the Danish Bankers Association, is the emphasis of the strategy on “picking the winners”. This approach has been criticised for being a dangerous strategy because it only targets a few selected areas at the expense of broader growth potentials. The biggest danger lies in the impossibility to accurately predict future growth. Critics of the Danish approach argue that efforts should instead be made to create optimal frame-conditions. However, there is an equally strong body of opinion that the small size of Denmark and the limited funds available require a stronger focus on a number of selected areas. A related question is whether focusing on the same target sectors (Nanotechnology, IT and biotechnology) as many other countries should be seen as an opportunity or a threat.

Several actors, including the Innovation Council, argue that the strategic choices Denmark must make and the focus its policy requires do not in fact require a strategy based on picking the winners, but a strategy based on an ability to identify new global needs and develop the necessary solutions. This requires an intense focus on the unique core competencies of the companies, which are hard for others to copy. One of the most frequently quoted opportunities is - accordingly – the desire for Denmark to be known for its ability to think of solutions to complex challenges – a strategy that involves picking the needs and developing solutions. An increased emphasis on user-driven innovation is a possibility in this respect, as is an increased emphasis on partnerships between the private sector, public authorities, and research and education institutions, which would have the potential to become the driving force in building new, strong industries, according to the Innovation Council.

In conclusion, the general picture of the Danish innovation system is positive. The willingness to try and improve the system seems to be strong among policymakers in the government as well as in the opposition. At the same time most key stakeholders in the public as well as in the private sector are very much aware of the current agenda-setting possibilities and wish to contribute to the improvement of the system.



2 Developments in Innovation policy

2.1 Overview of trends in performance and policy

2.1.1 Recent trends in innovation performance and competitiveness

The Danish economy is performing very well at the moment, reaping the benefits of 25 years of economic reform. In 2005 growth picked up to a level of 3.1 percent. Even though unemployment has declined to a historical low, inflation remains subdued and there are no signs yet of accelerating wage levels. Since Denmark has been governed by the same coalition since 2001 (re-elected in February 2005), the general economic policy has been stable in that period. The beginning of the period was characterised by small growth rates which caused some concern regarding competitiveness and productivity. However, in 2004, a small labour income tax reduction was introduced and the compulsory pension payment on 1 percent of the gross salary in 2004 and 2005 was scrapped. In addition, there was a small reduction of corporate tax rates. These increases in disposable income together with a low unemployment rate and low interest rates has supported relatively high economic growth rates, mainly driven by private consumption. Exports have also remained stable although their share in overall domestic production weakened.

As shown in exhibit 7 below, the economic performance indicators show a similar picture, namely that in 2005, Denmark had an above EU25-average economic growth without significant increases in inflation. The inflation rate in 2005 was 1.7 percent, which is below the EU average. This again supports the strong economy with a high surplus in the public sector economy. This development is a continuation of government policy to reduce public as well as foreign debt. The policy to reduce debt is supported by a broad majority in the Danish Parliament.

Exhibit 7: Comparable indicators of economic performance

Indicator	National performance		EU 25 average	
	2000	2005*	2000	2005*
GDP per capita in PPS (EU25=100)	126.4	123.4	100	100
Real GDP growth rate (% change previous year)	3.5	3.1	3.9	1.6
Labour productivity per person employed (EU25=100)	105	106	100	100f
Total employment growth (annual % change)	0.4	0*	1.5	0.6*
Inflation rate (average annual)	2.7	1.7	2.4	2.2
Unit labour costs (growth rate)	-2.4	-1.4	-0.1	-0.3
Public balance (net borrowing/lending) as a % of GDP	1.7	2.3*	0.8	-2.6*
General government debt as a % of GDP	52.3	43.2*	62.9	63.4*
Unemployment rate (as % of active population)	4.3	4.8	8.6	8.7
Foreign direct investment intensity	N/A	N/A	2.4	0.9*
Business investment as a percentage of GDP	18.5	18	18.3	17.1

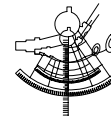
Source: Eurostat - Structural Indicators and Long-term Indicators <http://epp.eurostat.ec.eu.int>

* or latest available year (2004); key: (:) not available; (f) forecast, (e) estimated value

The employment situation in Denmark is steadily improving and the employment level is considerably higher in Denmark than in the EU25. This is mainly caused by an above-average female employment rate. Unit labour cost growth is below the EU25 level, but the labour unit cost level is one of the highest in the EU25. The high unit labour costs are caused by high wage levels, high average taxes and high marginal tax rates on labour and high energy and environmental taxes (cf. Globalisation Report 2005 from The Confederation of Danish Industries, 2005).

In the European Innovation Scoreboard indicators, Denmark shows some strengths regarding human resources, knowledge creation and innovation cooperation and venture capital to innovation. It also appears that Denmark has some weaknesses regarding the high-tech manufacturing sector, SME

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innovation and especially innovation activities in general. Compared to the countries Denmark is usually is compared to, the conclusion is less positive. However, as Lundvall et al. note, the indicators selected to rank innovation systems and to define strengths and weaknesses are biased towards science-driven innovation. Investments in R&D and in education are easier to quantify than the frequency of learning in organisations and the quality of user feedback. Consequently, the factors that support this mode of innovation tend to be relegated to secondary importance both in benchmarking exercises and on policy agendas. This is especially problematic when the strengths and weaknesses of the Danish innovation system are assessed, as innovation and learning in 'low technology' activities are important for the overall performance of the economy (Lundvall, 2005).

Denmark performs better than the EU25 average in terms of human resources, but with respect to tertiary education and especially S&E graduates, its performance at best matches the average of usual comparison countries. Consequently, there is significant room for improvement. Denmark has a long tradition of life long learning and holds a very high position in this indicator. However, a high level also reduces the space for growth. Under all circumstances, the development of human resources is an area of great concern in Denmark and improvements in this area are seen as a key challenge.

Denmark scores low on S&E graduates, which, together with the high labour unit cost, could be an explanation for the below-average score regarding medium/high-tech manufacturing employment. On the other hand, it could also indicate that Denmark has an industrial structure that does not need much medium/high-tech manufacturing employment. The corresponding indicator for the service sector is above average, although it is losing momentum.

All indicators on knowledge creation show Denmark as performing rather well, although the country is losing momentum with regard to US patents. In contrast, Denmark gains momentum with regard to EU patents. Business sector R&D expenditure in Denmark is above average and shows above average growth rates. Public R&D expenses are also above the EU25 average and have grown slightly in recent years.

For the remaining indicators, Denmark's is generally close to the average and shows average growth rates, both in terms of ICT expenditure and of high tech manufacturing value added. Denmark performs better than average but seems to have problems using innovation and R&D results in industrial production. The use of innovation and public sector R&D results in the service and production sectors recently became a policy issue in Denmark. As in many other countries, public sector knowledge creation and R&D expenses are now seen in a broader context where it is meant to be used to the benefit of the entire society through an active policy to set up a better framework, i.e. a more efficient national innovation system, for the use of the created knowledge and innovation.

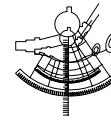
Finally, Danish competitiveness in general is rated as quite high. A number of different ratings have recently placed Denmark in top positions.

Denmark's rating in different indexes	
1. World Competitiveness Yearbook 2005 (IMD)	7
2. Growth Competitiveness Index 2004 (WEF)	4
3. Business Competitiveness Index 2004 (WEF)	4
4. Economist Intelligence Unit 2005 and 2006	1
5. A.T. Kearney/Foreign Policy Globalisation index	7
6. Economic Freedom of the World 2004	13
7. Index of economic freedom 2005	8

The different international indexes have different emphasises, and therefore the ratings vary. However, all of them rate framework conditions for innovation and private enterprises as very good. In general, Denmark's position is explained by a combination of a well functioning society with quite an efficient public sector, limited bureaucracy, a fair and transparent legal system and a low level of corruption and crime (Sekretariatet for ministerudvalget, 2006).

This tendency is also repeated in the Economist Intelligence Unit ranking in *Global Outlook (May 2006)*, where Denmark is ranked as having the best business environment in the world in 2006-10.

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The 2005 analysis came to the same conclusion. According to the EIU-study Denmark stands out for the successful balance it struck between the state and the market. Product markets operate efficiently and labour markets are flexible (with low non-wage labour costs and few restrictions on hiring and firing). Denmark compensates its high tax burden with the quality of its public goods, notably infrastructure and higher education. Denmark scores well across the whole range of categories of the business environment covered by the EIU. Among the most prominent ones are the political and institutional environment, macroeconomic stability, policy towards private enterprise, foreign investment policy, financing and infrastructure, and a labour market characterised by a highly educated and flexible workforce. In addition the financial system is transparent and diversified, with a strong banking sector. Denmark's highly developed infrastructure and institutions, skilled labour force, political and economic stability and its sophisticated financial sector are not unique for a developed EU Member State. However, Denmark stands out in that its business-friendly governments have strongly encouraged private enterprise and competition.

Denmark is also a global leader in the development of information and communications technology infrastructure. In a recent study by IBM and the Economist Intelligence Unit of web-savvy nations, Denmark remained in first place in terms of exploiting the advantages of the internet, both in terms of connecting citizens securely over broadband and wireless networks and in terms of using its possibilities for internet banking and government services such as tax returns. "E-procurement (for public services) is saving Danish businesses EUR 50 million (USD 62.1 million), while Danish taxpayers save as much as EUR 150 million per year. The rest of Europe is expected to follow Denmark's lead," the study concludes.¹⁶

Innovation policy challenges

In Denmark, there are three particularly important challenges for the future innovation environment. Two of them are well recognised and have been highlighted by the government as well as all major stakeholders in a number of recent documents, including the National Reform Programme. The third challenge is more controversial. The two first challenges are related to the Danish educational system and labour supply, while the third challenge is related to the current innovation policy mix in Denmark. However, all three challenges are multidimensional and are not easily captured by EIS indicators. Accordingly, the following discussion of the challenges is not based on EIS indicators, but rather on the Danish policy debate.

Exhibit 8: main innovation policy challenges

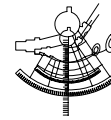
Description of challenge	Relevant EIS indicators
1. To improve education at all levels of the educational system	1.2 Population with tertiary education 1.5 Youth Education attainment level
2. To increase supply of labour	Not applicable
3. To strengthen conditions for all modes of innovation	Not applicable

Challenge 1: To improve education at all levels of the educational system:

A key innovation policy challenge for Denmark is to improve all levels of the educational system. This is a challenge that has been identified by a number of national as well as international actors; most recently OECD has emphasised this challenge (OECD, 2005). Under the headline "Enhancing human capital and using it better", it is concluded that a key weakness in Denmark is the surprisingly slow progress in human capital formation. Despite large public investments in early childhood care and compulsory education, Denmark seems to have substantial difficulties mobilising the talent of all young people, and a large share - including many second-generation migrants - is "lost", leaving school with only limited literacy skills.. Denmark has one of the world's most expensive primary school systems. In 2002, 8.5 per cent of the country's GDP was allocated to education and training, a figure which is well above the average within the EU. International comparisons of pupil performance indicate, however, that the results do not bear comparison with the economic investment, particularly in core subjects such as Danish, mathematics and science. Furthermore, the challenge is not only

¹⁶ See <http://www.investindk.com/db/filarkiv/722/Denmarkisno1intheworld.pdf>

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related to basic school education. According to Innovation-Monitor, one of the major weaknesses of the Danish education system is that too few Danes go on to further education - and many of those who do do not necessarily get an education in a subject that is relevant for business. Out of the 25-34 year olds, only 86% have at least upper secondary education, compared with 89%, 91% and 95% in Finland, Sweden and Norway respectively. The tendency to delay tertiary studies is also part of the challenge. In general, skill formation is not sufficiently effective for a high income country. The government intends to improve the primary and lower-secondary school system by strengthening evaluation and quality development processes. It also aims to increase the number of students who complete a secondary education programme and, at a later stage, a tertiary education programme

2. To increase labour supply:

Another main challenge is to maintain a sufficient supply of labour. Looking ahead, a significant downward trend in labour supply is looming that might reduce the potential growth rate. In the longer term, a declining workforce and age-related expenditure increases make the current public welfare system difficult to sustain. According to a number of observers the main risk for the favourable outlook for Denmark's business environment is the threat of labour shortages, which is aggravated by strict immigration policies. Denmark's population is growing very slowly and the already high level of labour force participation, as well as a tendency for workers to take early retirement, means that the labour supply will be squeezed in the next decade, especially if immigration rules remain tight. This has sparked a lively debate in Denmark about the ageing population and the crisis of the welfare state.

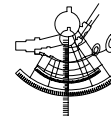
The fact that the Danish labour market has a low participation rate of workers without professional training and an even lower participation rate of workers with a non-Danish background is another aspect of the discussion. This poses a real dilemma for the future development of the Danish mode of innovation. The income distribution in Denmark is highly egalitarian and the mode of innovation is highly participatory. This is one of the reasons why the system promotes interactive learning within and between organisations. But the egalitarian income distribution and the participatory mode of innovation tend to exclude those who have difficulties to engage in interaction and informal communication. This weakness is perhaps the most difficult one to overcome. The high degree of 'social cohesion', which leads some commentators to define Denmark as 'a village economy' is a major factor explaining the performance of the economy as a whole. Even if the proportion of the population belonging to ethnic minorities is small as compared to other countries, it has become a kind of Achilles' heel for the Danish model and its innovation mode. (Lundvall, 2005).

3. To strengthen conditions for all modes of innovation:

The third important innovation policy challenge is to seek a more balanced policy mix, where all modes of innovation are emphasised. Danish innovation policy currently tends to focus on science based sectors and 'high technology research' in fields such as nanotechnology, information technology and biotechnology. The recent Globalisation Strategy, for instance, primarily focuses on R&D for a small minority of large, high tech, companies and not for the low and medium tech companies that dominate the Danish innovation system. It can be argued that this strategy fails to take sufficient account of the specificities of the Danish innovation system. There has been a strong interest in understanding and developing the 'knowledge-based economy' but, there is a bias in favour of formal knowledge, coupled with an insufficient understanding of the importance of learning by doing, using and interacting, according to Lundvall et al (2005).

Concrete initiatives have so far focused on making research more relevant and more accessible to the industry. In this context, a university reform was passed to bring universities closer to users in industry. In addition, several programmes intend to strengthen the interaction between universities and the small minority of science-based firms. Accordingly, there is a strong focus on the universities as deliverers of new ideas and new inventions, and little emphasis on the innovative capabilities of companies and their need for research based competences. When there is a discussion on the needs of users, the main focus is on how to adapt university research to company needs, not on research as part of company competence development in a broader sense. The recent Globalisation Strategy suggests that the focus on science-based innovation and on technical innovation - and the relative neglect of innovation in the low-tech and service sectors - seems to be there to stay for some time, , even if there are some counteracting tendencies (Lundvall, 2005).

European Trend Chart on Innovation



2.1.2 Objectives and targets of innovation policy

In recent years, innovation policy has moved to the forefront of the Danish political agenda. As a consequence, innovation policy objectives were put forward as a distinct theme in a number of key policy documents since 2001, when the current Liberal-Conservative government was elected for the first time. However, Denmark does not have an explicit stand-alone innovation policy. Innovation is rather seen as a cross cutting theme influencing a number of policy areas.

The overall objectives of the Lisbon Strategy match the overall objectives of the current Danish government. Even before the 2000 European Council, the Danish political agenda was already largely focused on the themes and priorities of the Lisbon Strategy. This means that a number of relevant reforms in relation to the Lisbon Strategy had already been initiated or implemented before the Strategy was passed at European level. Hence, the Lisbon Strategy's potential for affecting policy was limited from the beginning. It is, therefore, difficult to identify a specific impact of the Lisbon Strategy in Denmark, although policy initiatives falling in line with the Lisbon objectives have apparently gained momentum since the change of government in 2001. However, in the authors' view, it would be quite misleading to present this as a consequence of the Lisbon Strategy. In contrast, it appears that the Lisbon National Reform Programme in itself not has led to any modification of the overall policy framework for innovation (see also section 2.2.2).

A number of ambitious overall innovation policy objectives were presented following the early election in 2005 and the launch of the Globalisation Council. They are also in line with the so-called Government Platform¹⁷ published immediately after the election. In this document, the government announced that it planned to draw up an ambitious, holistic and multi-year strategy to turn Denmark into a leading growth-, knowledge- and entrepreneurial society. The plan has four key points:

- Denmark as a leading knowledge society: The objective is for public and private sector enterprises to jointly boost efforts in the area of research and development so that Denmark's R&D total expenditure exceeds three per cent of gross domestic product by 2010.
- Denmark as a leading entrepreneurial society: The objective is for Denmark to become one of the societies in the world where most growth enterprises are launched by 2015,.
- World-class education: The objective is for pupils in primary and lower secondary schools to be among the best in the world in reading, mathematics and science. The government also intends to raise the share of young people completing post-secondary education to a minimum of 85 percent by 2010 and to 95 percent by 2015. Furthermore, the government aims to raise the rate of pupils completing a course of further education to at least 45 percent by 2010 and to 50 per cent by 2015.
- The most competitive society in the world: the objective is for Denmark to be the world's most competitive society by 2015.

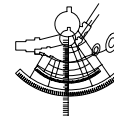
These goals have subsequently been acknowledged as a comprehensive, national task and it was perceived as necessary that all parts of the Danish society support this project. As a first step in this direction, the government appointed a Globalisation Council¹⁸ uniting a broad range of stakeholders from relevant sectors of society to assist a high profile ministerial committee chaired by the Prime Minister in formulating a precise strategy.

The result of this process, the final Globalisation Strategy (Fremgang, fornyelse og tryghed), was presented in March 2006. The main objective of the strategy is to make sure that "Denmark is among the countries where it is best to live and work – also in ten to twenty years' time." The strategy argues that Denmark can achieve this goal by developing a strong competitive edge and strong coherence (sammenhængskraft), supported by a culture of interaction and collaboration among stakeholders. These objectives are to be achieved by developing a world class educational system, a strong and innovative research sector, more entrepreneurs and more innovation and change. The strategy includes an impressive 350 concrete alternatives, even though not all of them are new. Some of the most important objectives are listed overleaf:

¹⁷ See http://www.stm.dk/publikationer/UK_reggrund05/index.htm

¹⁸ See <http://www.statsministeriet.dk/Index/dokumenter.asp?o=160&n=1&d=2293&s=1>

European Trend Chart on Innovation



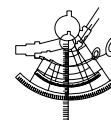
(1) World class educational system:

- Basic school pupils to be among the best in the world in reading, math, science and English
- All young people to complete a secondary education
- As a minimum 50 percent to obtain tertiary education in subjects that are relevant for society and industry.
- First year university teaching to become better structured and more transparent. Students to finalise their studies more quickly.
- Life long learning to be strengthened
- Teacher education to be reformed and teachers to become more specialised
- Top quality in all areas of education

(2) Strong and innovative research:

- The basic funding of universities is to be distributed according to the quality of research, meaning that universities that deliver high quality research will get more funding
- From 1 January 2008, basic funding of universities is to be based on an evaluation of the institution's ability to reach objectives stated in a development contract (i.e. the funding contract between the university and the ministry).
- The quality of university research is to be evaluated by international, independent, expert panels.
- University education is to be evaluated and controlled by a new external accreditation institution. The ministry will no longer give criteria for university courses.
- The number of Ph.D scholarships and so-called "industry Ph.D's" is to be doubled, especially in areas like natural science, technical development, ICT and health studies.
- Elite candidate bachelor courses are to be established.
- University teachers are to improve their teaching skills. Ph.D. students are to take teaching classes. Good teachers are to be rewarded financially.
- The universities are to be given more flexibility as regards recruitment of researchers (salaries, the number of professors and the possibility of recruiting "super professors" with their own budget).
- Universities are to develop concrete goals as regards the use of R&D in society.
- Universities are to compete on an annual basis for large, long-term, research projects.
- The research councils are to give priority to large investments in infrastructure, especially facilities that are used by several institutions.
- More public funding is to be allocated to strategic research of importance for the development of society, e.g. in the areas of environmental protection, energy and health care. Private co-funding will be encouraged.
- As much as 50 percent of public R&D funding is to become competitive by 2010 (as opposed to one third today). Moreover, this funding is to cover all costs, overheads included.
- Sector research (meaning applied, target oriented, research in government institutes) is to be integrated into the universities.
- Public R&D investments are to reach 1 percent of GDP by 2010. The private sector is expected to provide 2 percent of GDP.
- There is to be established a "quality barometer" for Danish research, based on internationally acknowledged indicators.
- The research councils will be allowed to fund international R&D co-operation, including support for industry and research institution participation in the EU Framework Programme.
- The funding for collaboration between research institutions and industry is to be gathered in one single source. This includes innovation consortia, high tech networks, Jynsk-Fynsk IT support and regional technology centres. The 150 percent deduction scheme is to be abandoned. Funding is to be divided into two categories: "targeted" and "open". Targeted funding is to be used for collaboration and interaction. (1) SMEs are to get a refund the first time they buy knowledge from a knowledge institution (universities and institutes); (2) SMEs that are co-funding projects with public research institutions will be eligible for more public support (SME: 50%, research institution 25% and the state 25%); (3) there will be appointed "matchmakers" to encourage and instigate collaboration between research institutions and industry.

European Trend Chart on Innovation



- The funding for the GTS institutes is to be more competitive, meaning that other institutions may compete for the same funding.
- The government will establish a new centre for e-business within the GTS system.
- There is to be one coherent programme for user driven innovation. Consortia may compete to become the national research environment for user driven innovation. Such consortia are to be trans-disciplinary and develop knowledge on user needs and the correlation between technological possibilities and the needs of users.
- The government will establish a new electronic market place for the sale of licences and intellectual property.

(3) More entrepreneurs

- Entrepreneurship to be part of primary education
- Denmark to be among the European countries where most new enterprises are established
- Denmark to be among the best in the world measured by the number of growth entrepreneurs

(4) More innovation and change

- Danish enterprises and public institutions to be among the most innovative in the world
- By 2015, Denmark is to be the most competitive society in the world.
- There is to be a partnership between public authorities, industry, organisations, universities, schools etc. on how to take part in and develop relevant projects and initiatives
- The level of competition in Denmark is to be at the same level as in other OECD-countries

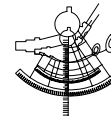
Exhibit 9: national innovation policy objectives

Objective	Quantitative target (if set)	To be achieved by (year)
Denmark as a leading knowledge society: The objective is for public and private sector enterprises to jointly boost efforts in the area of research and development	Three per cent of gross domestic product	2010
Denmark as a leading entrepreneurial society	To be one of the societies in the world where most growth enterprises are launched	2015
World-class education. Danish pupils in primary and lower secondary school shall be among the best in the world in reading, mathematics and science		
The government want all young people to complete post-secondary education, and at least 45 percent to complete further education by 2010 and 50 per cent by 2015 least 45 percent to complete further education by 2010 and 50 per cent by 2015	at least 85 per cent at least 95 per cent	2010 2015
Denmark to be the world's most competitive society	Not specified	2015

In general, only a few Danish innovation policy objectives are quantified, as stressed in the EU appraisal of the Danish National Reform Programme. This report concludes that even though quantitative targets with timetables are set in some areas (e.g. the target set for R&D investment is to exceed 3% of GDP by 2010), more concrete measures are needed and a number of the initiatives lack detail.

A government analysis following the recent Globalisation Strategy attempts to measure the current status of a number of key issues emphasised in the strategy. Based on a benchmarking approach the report seeks to answer how Denmark's competitiveness compares to that of other OECD countries in

European Trend Chart on Innovation



a number of areas that are particularly relevant for the country's overall international position *vis-à-vis* its peers. The report identifies strengths and weaknesses and attempts to quantify a number of objectives. In future, similar analyses will be carried out each year to establish whether Denmark is making progress towards the objectives. The report addresses a total of 14 broad objectives, including education, research, entrepreneurship, coherence and flexibility. It seeks to establish a number of indicators to measure the current Danish performance in these sectors and to quantify its progress towards meeting the government's target of becoming one of the top five OECD countries in all areas covered by the report. The report concludes that Denmark has a strong starting point and is well positioned in a number of important areas. However, the report also identifies a number of important weaknesses. Danish education at all levels - from primary schools to the universities - is considered a particularly important weakness¹⁹.

There are nevertheless a number of innovation policy objectives which stand out in most of the recent policy-documents. Key innovation policy objectives repeated in most documents include:

- Strengthening co-operation between knowledge institutions and the private sector;
- Strengthening the transfer of technology between knowledge institutions and the private sector
- Improving commercialisation of research results in public knowledge institutions;
- Increasing the investments in R&D, especially in the private sector;
- Strengthening entrepreneurship;
- Increasing the number of persons with a PhD.

Between 2002 and 2004 a number of important documents dealing with innovation policy were published. The most important ones are presented below:

The Growth Strategy:

In May 2002, the government launched its Growth Strategy, based on an analysis of national strengths and weaknesses. The strategy essentially focuses on improving the framework conditions for trade and business as a way to increase national competitiveness. Accordingly, the basic focus of the government is labour taxation, macroeconomic markets (labour and capital), strengthened competition, administrative burdens and frameworks for education and research. The strategy includes a number of action plans with direct implications for the Danish innovation system. For example it includes initiatives to strengthen cooperation between industry and knowledge institutions (developed further in a later 'Strategy for Public-private Partnership on Innovation' – see below), an action plan on regional growth and an action plan on entrepreneurship.

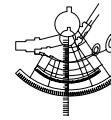
Act on Technology and Innovation:

Shortly after the Growth Strategy, in June 2002, an act on Technology and Innovation was passed by the parliament to strengthen technology development and innovation within trade and industry. The Act is a framework act for a number of initiatives carried out in the last couple of years, fostering innovation. These initiatives include: Technology Service – GTS, Technology incubators, Industrial innovator Scheme, Industrial researcher-scheme, Innovation Post Doc, Centre contracts, Regional growth centres and Technology foresight. The Act is a manifestation of the fact that policy responsibilities relating to technology and innovation are gathered in the Ministry of Technology, Science and Innovation. The Act specifically intends to facilitate:

- Co-operation and dissemination of knowledge between knowledge producing and knowledge using institutions and companies.
- Innovation, development, diffusion, utilisation, and commercialising of research results, new technology, organisational and market related knowledge.
- Start-ups and development of knowledge and technology-based companies.
- Provision of finance and competency for knowledge and technology-based companies.
- International co-operation on utilisation of knowledge and technology.

¹⁹ See www.konkurrenceevne.dk

European Trend Chart on Innovation



The Danish Knowledge Strategy:

In January 2003 the Ministry of Science, Technology and Innovation launched the government's plan to redesigning the Danish knowledge system. The strategy contained a number of initiatives or reforms with implication for the entire Danish Innovation System.

- A university reform (partly implemented May 2003)
- A reform of research advisory system (implemented May 2003)
- A reform of government research institutions (partly implemented May 2004)

The university reform included a change in university management, as universities will be managed by a board with an external majority. Knowledge exchange is also added to the university mission, in addition to research and education. The Act lays down that development contracts (agreements between universities and the ministry) include strategies for national and international benchmarking of the university concerned as regards research, education, knowledge exchange, technology transfer and mobility. The reform of the advisory system includes a clearer separation between bodies that advise on general research policy issues and bodies that fund and advise applicants and other partners on scientific questions. A Council for Strategic Research has been introduced explicitly to support research based on political defined programmes. A Committee promoting coordination and co-operation between the research councils and the other parts of the research and innovation system has also been established.

Action plan for Public-private Partnership on Innovation:

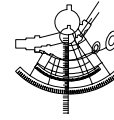
In September 2003 the government launched an 'Action plan for Public-private Partnership on Innovation', in which it sets as a goal for Denmark to become one of the best countries in the world in terms of cooperation and interaction between knowledge institutions and trade and business. With the plan, "New ways of interaction between research and industry - turning science into business", the government presented a number of initiatives to create a new and better framework for the interaction between the business and industry sectors and the knowledge institutions in relation to research and innovation. The need to strengthen cooperation has been a recurrent theme in various analyses and reviews of the Danish innovation system, and it has long been a matter of great concern in the trade and service sectors. Accordingly, the government puts great emphasis on strengthening cooperation between companies and knowledge institutions. Based on an analysis of strong and weak competencies in the Danish innovation system, the government highlights action areas and proposed new initiatives. This action programme focuses especially on opportunities and incentives to establish mutual co-operation both among and between knowledge institutions and business enterprises. Central issues are the future interface between the technological service system, science parks, incubators and the government research institutions on the one hand, and trade and industry on the other. In addition, instruments to strengthen company access to knowledge and competencies are given priority. The government attaches special importance to the requirements of new and smaller enterprises in this respect.

Part of this action plan will consist of the steps that have already been taken towards reform of the entire research, university, and innovation system (including the institutional and management reform of universities and the reform of the research advisory and funding system). The reforms are intended to provide for a more transparent and accessible research and innovation system, together with improved levels of co-operation.

The action plan focuses on how to improve cooperation between education, research and trade and business. The goal is that more enterprises, especially SMEs, will have faster and easier access to knowledge. The action plan focuses on six areas:

- Cooperation on research and innovation
- Access to competencies
- Commercial utilisation of public research
- New framework conditions for universities interplay with society
- Focus and prioritising in public research
- Access to qualified technological service and counselling.

European Trend Chart on Innovation



Research that counts – Action plan of the Danish Council for Strategic Research:

The objectives of an action plan of the new Danish Council for Strategic Research presented in September 2004 need to be mentioned. The Danish Council for Strategic Research aims to improve the understanding between the research world and society, and inspire both sides to invest more in each other. The Council presents a number of initiatives and describes a number of long-term objectives.

The Danish Council for Strategic Research will:

- identify research that can lead to value-generating innovation for Danish society in order to ensure that Denmark has the necessary knowledge mass and innovative power in the short and long term;
- recommend that research funding be earmarked for Innovation Accelerating Research Platforms, i.e. areas where a) Denmark has internationally recognised research environments, b) Denmark has internationally competitive business clusters, c) there is a clear need for research-based solutions, and d) where new technology can provide innovative breakthroughs;
- build up Centres for Strategic Research that focus on collaboration between public research institutions and society in general;
- take the initiative to hold conferences and meetings throughout Denmark to establish the necessary dialogue in collaboration with relevant players;
- assure the quality of the research programmes run by other ministries while working to coordinate them with its own research initiatives and their principles;
- map use of and need for research infrastructure the Danish research institutions have, and submit proposals for a strategy of collaboration and prioritisation of research infrastructure, both nationally and internationally;
- work for a prompt and significant expansion of funding in the areas of food and health, energy, environment, nanotechnology, biotechnology and IT, and in fields cutting across disciplines in these three action areas, in addition to allocating funding to Centres for Strategic Research with no special themes.

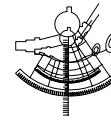
Taken together, these policy-documents illustrate the emphasis put on innovation policy objectives by the government and its institutions in recent years. The documents also illustrate the complexity of innovation policy and the fact that Danish policy-makers increasingly seem to realise that a very broad approach where business, research, education and other related policy fields are closely coordinated is an essential condition to secure a well functioning innovation system.

2.1.2.1 Regional innovation policies

Just as the national innovation policy, the development of an innovation policy at the regional level is currently being reformed and restructured. As the regional structures are therefore in a transition period between two systems, (new) initiatives tend to be postponed until the new structures are finally decided and launched. In a number of the regions, the first step of the reform was the establishment of the permanent growth forums. These growth act in partnership with regional and local authorities, institutions of knowledge and education and the social partners to serve as pivotal actors for regional business development in Denmark. The tasks of the regional growth forums will include recommending projects for funding by the Structural Funds. The aim is to ensure cohesion between regional initiatives, the government's growth policy and EU Structural Fund initiatives – thus promoting regional growth and employment.

In general, Structural Fund support appears to be of limited significance in Denmark with regard to regional innovation policy, and it is difficult to find examples of concrete initiatives. The most relevant initiative described in the National Reform Programme is the Objective 2 Programme, which covers specific regions of Denmark. The programme aims to strengthen the conditions for development and conversion to promote prosperity, employment and equal opportunities, as well as a sustainable environment in Danish regions that are at a disadvantage in terms of jobs, employment, business environment and transport. According to the National Reform Programme, the Objective 2 initiative allows a broad-based approach where the Social Fund can provide people who live and work in Objective 2 regions with new development opportunities and competencies, while the Regional Development Fund can support the development of enterprises, roads, systems, organisations and production methods. Projects with a Social Fund element and with a Regional Fund element are eligible for funding. Possible types of activity include: development of competence in enterprises, development in connection with business start-ups and development of the framework for thematic

European Trend Chart on Innovation



networking. The primary target groups of this initiative are private and public enterprises whose employees and executives are facing a need to change. Entrepreneurs and new enterprises are also eligible for funding. Another activity is the development of strategic infrastructures, i.e. education systems, teachers and instructors, as well as strengthening of labour market and business service and the framework for thematic networking. This initiative aims to develop organisations and institutions related to the labour market, e.g. educational and vocational training institutions, the public employment service, local authorities and the social partners. The initiative will also contribute to research and technology development at educational institutions by developing methods, tools, traineeships and, in general, by developing educational environments in educational institutions at all levels.

The structural reform mentioned above and the consequences for the regional innovation system should also be seen in relation to the Regional Growth Strategy presented in 2003 and the more recent regional research and innovation action plan called "Knowledge moves out", which was presented in September 2004 by the Ministry of Science, Technology and Innovation to strengthen research and innovation in regions with a previously low research and innovation intensity²⁰.

The action plan has four key objectives:

- To put Research, Technology and Innovation on the regional political agenda
- To create strong regional collaborations on research and innovation
- To increase the level of innovation and competence in the regions
- To increase the number of knowledge-based entrepreneurs throughout the country

The plan has initiated two new initiatives aiming to create a high-technological knowledge-based regional structure, the Regional Technology Centres (regionale teknologicentre), and so-called regional knowledge pilots. The government initially earmarked DKK 130 million (EUR 17.5 million) for these initiatives for the next four years, but the funding has recently been increased.

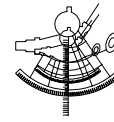
A number of existing measures with regional effects, such as the Technology Incubators (DK 4), Innovation Consortia (DK 17) and the Industrial PhD Initiative (DK 5), will also be strengthened. Particular emphasis is given to the Regional Technology Centres, which will focus on regional competencies and act as intermediaries between regional research and SMEs. Experiences made with the former Regional Growth Centres initiative (DK 13) will guide the establishment of these centres. The regional Technology Centres aim at strengthening the collaboration between the regional business-environment and relevant knowledge-institutions in relation to research, innovation and technology development. The collaboration is based on business strength positions within a limited geographic area outside Greater Copenhagen. The government has earmarked EUR 8.5 million for 13 Regional Technology Centres for the next four years. Seven of the Centres are new, while the remaining seven Centres build on existing Regional Growth Centres.

Another initiative, the 'Regional Knowledge Pilots' programme enables SMEs to hire academic staff. As a forum for targeting, prioritising and coordinating initiatives to suit the regions, a number of so-called regional business co-operations have already been established in the form of Trade and Industry Partnerships between local, regional and national actors. Currently there are four regional partnerships in Jylland-Fyn, Vestsjælland-Storstrøm, the Capital region and Bornholm. It has been up to the regions themselves to establish new independent units implementing the regional business service. These units are co-financed by the national government. The new structure, which entered into force in January 2004, replaced the former TIC network and the local centres for entrepreneurs. Furthermore, DKK 175 million (EUR 23.33 million) were earmarked for a specific Jutland Funen IT-programme running from 2002 to 2005. The scheme is co-financed by local authorities, who provide a similar amount. The programme aims at developing partnerships between research and trade in IT areas in which universities in the Jutland-Funen region have specific competences.

2.1.3 Key developments in innovation policy measures

²⁰ See www.videnflytterud.dk

European Trend Chart on Innovation



The TrendChart policy monitoring exercise tracks developments in innovation policy not only at the level of policy definition and the setting of overall objectives as discussed in the previous sections, but also through the compilation of information in an analytical structure on specific innovation policy measures (IPM). At the present time, the TrendChart innovation policy database contains over 1100 IPM fiches detailing measures implemented in 32 European countries (all countries covered by the TrendChart except Liechtenstein). An innovation policy measure is defined broadly to include any public policy initiative that directly or indirectly impacts on the innovation process in the enterprise sector. In practice, the TrendChart IPM fiches tend to fall into one of the follow categories of measures:

- Intervention in the form of financial support State Aid to enterprises through programmes of grants, loans, etc. (e.g. grants for product development);
- Funding of innovation programmes or projects aimed at groups of innovation stakeholders with the objective of improving co-operation and collaboration and thereby the functioning of the innovation system (e.g. cluster);
- Measures taken to improve, disseminate or develop knowledge about specific aspects of national innovation systems (e.g. sectoral or regional strategies, foresight exercises, the innovative performance of firms through spread of best practice, etc.);
- Action to improve the functioning of institutions (legal acts, regulations) which affect innovation processes and performance (e.g. intellectual property rights, financial markets, creation of firms);
- Funding of innovation infrastructure and intermediaries (innovation centres, incubators, etc.)

This section of the report describes in more detail the current policy mix adopted in Denmark in terms of the political priorities and human and financial resources allocated to each of these broad types of measures. Further details on the specific innovation policy measures can be found in annex 2 and via the TrendChart website.

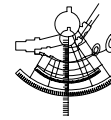
As mentioned above, Danish innovation policy is changing rapidly at the moment. As a policy-field, innovation is steadily gaining importance in the public and political debate. However, over the last year, practically all efforts were consumed in the work of the Globalisation Council rather than in the actual initiation, modification, funding or implementation of concrete measures. Accordingly, very few new measures were launched recently. However, several new measures are expected to be launched in the near future. This also means that so far there have been no major shifts in the allocation of funding from one type of innovation initiatives to another.

The current Danish innovation policy consists of a broad mix of measures, with a strong tendency to set up various funding and advisory councils and think tanks. At present, there is much emphasis on the identification of strengths and weaknesses as the foundation for the formulation of strategies that will give Denmark a competitive advantage in the coming years. More or less all aspects of the Danish innovation system are in a being restructured at the moment to strengthen the overall functioning of the national innovation system. Nonetheless, available statistical data suggests that there have not been any significant changes in public funding and that there have not been any major shifts from one type of activity to another. On the other hand, there is considerable uncertainty about the future funding of innovation and research activities, which means changes in the proposed priorities and funding should not be ruled out. For example, the government has already announced that a considerably greater part of university funds will in the future be allocated on a competitive basis rather than as basic funds. However, the opposition as well as a party usually supporting the government have already denounced this suggestion, and at the moment it seems that it will be difficult for the government to find a majority for the proposal. The same can be said about the funding of future innovation and research initiatives. The government has presented a rather ambitious funding plan, but it has not yet secured the political majority to make it a reality.

In general, the Danish innovation policy mix has its main focus on science based sectors and 'high technology research' in fields such as nanotechnology, information-technology and biotechnology, while other modes of innovation relevant for small and medium sized enterprises in low tech branches receive much less attention. The recent Globalisation Strategy primarily focuses on R&D for large high tech companies, thus leaving low and medium tech companies, which dominate the Danish innovation system, somewhat marginalised.

As shown in the SWOT analysis, it can be argued that this strategy fails to take account of the uniqueness of the Danish innovation system. This can partly be explained by the changes in the

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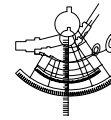
organisation of innovation policy following the 2001 election. Overall responsibility for innovation was transferred from the Ministry of Industry to the Ministry of Research and Information Technology. The industry ministry's task was changed to focused more on creating good general conditions for private business, on promoting entrepreneurship and on supporting start-up firms. As a consequence, most current measures intend to make research more relevant and more accessible to industry. The recent university reform, for example, primarily aims at bringing universities closer to users in the industry. Several measures aim at strengthening the interaction between universities and the small minority of science-based firms. For example, a new fund for 'high technology research' using incomes from the sale of the North Sea oil rights has been established (Lundvall, 2005).

Accordingly, there is a strong focus on universities as deliverers of new ideas and new inventions. Comparatively little attention is paid to the innovative capabilities of enterprises and their need for research based competences. Discussions on user-needs tend to focus on how to adapt university research to company needs, not on research as part of company competence development in the broad sense. Indications are that the focus on science-based and technical innovation – and the relative neglect of innovation in low tech and service sectors – will remain a dominating feature of the Danish system for some time, although there are some counteracting tendencies (Lundvall, 2005). One of these is a proposal to establish a centre of user-driven innovation. The underlying rationale is that in many Danish enterprises, innovation results from interaction with customers and suppliers. The government therefore intends to develop a special programme for user-driven innovation and dissemination of knowledge based on market demand in fields where local and regional enterprises have special competences. Interest in understanding and developing the 'knowledge-based economy' has also increased, but the bias in favour of formal knowledge, coupled with an insufficient understanding of the importance of learning by doing, using and interacting remains in place. All in all, there is still a clear preference for initiatives supporting science-driven high tech innovation.

Exhibit 10: New Innovation Policy Measures over last 12 months

IPM N°	Title	Innovation policy framework category	Organisation responsible
DK 31	Proof of Concept	III.2. Facilitate the acquisition and transfer of knowledge ad technologies to enterprises, encouraging in particular cross-border initiatives III.6. Facilitate the development of collaboration between enterprises and other actors with a view to joint innovation activities and knowledge exchange	The Council of Technology and Innovation
DK 4	High Tech Networks	IV.1. Increase the number of new innovation intensive enterprises created and their survival IV.2. Provide adequate infrastructure to new technology based firms to facilitate their survival and growth	The Council of Technology and Innovation
DK 29	Regional Technology Centres	Facilitate the development of collaboration between enterprises and other actors with a view to joint innovation activities and knowledge exchange	The Ministry of Science, Technology and Innovation

European Trend Chart on Innovation



Description of new measures

Proof of Concept

The Proof of Concept measure is a new measure which aims to strengthen technology transfer from public research to private enterprises. A number of stakeholders have emphasised the need to support the transition of commercially promising research results to actual commercialisation. The main objectives of the measure are to facilitate the process from research to business, to facilitate the attraction of risk willing investors, and to stimulate cooperation between public research institutions, innovation incubators and other relevant partners. The measure is a pilot project with limited funding, and the experiences made during its implementation will decide whether it will be continued.

http://www.vtu.dk/fsk/div/Opslag_af_Forsøgsordning_med_PoC_finansiering.pdf

New high tech networks:

This measure is not new in itself, but a number of new networks have recently been approved. The objective of the measure is to create lasting relationships between private enterprises and knowledge institutions. The measure originates from the 2003 Action plan 'Strategy for Public-private Partnership on Innovation' (Nye veje mellem forskning og erhverv - fra tanke til faktura). The Strategy focuses on how to improve co-operation between education, research and trade and business. The goal is to give enterprises, and especially SMEs, faster and easier access to knowledge. In December 2005 the Council of Technology and Innovation decided to fund five new high tech networks. The new networks target energy, health-ICT and user-driven innovation / understanding of the market. Almost EUR 3 million have been allocated to the new networks.

http://www.videnskabsministeriet.dk/cgi-bin/doc-show.cgi?doc_id=262850&doc_type=28&leftmenu=NYHEDER

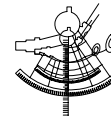
Regional technology centres:

The main objective of this new measure is to strengthen knowledge-based growth and development in outside the larger cities. Regional Technology Centres focus on regional competencies and act as intermediaries between regional research and SMEs.

Experiences made with the former Regional Growth Centres initiative (DK 13) will guide the establishment of these centres. The regional Technology Centres aim at strengthening the collaboration between the regional business-environment and relevant knowledge-institutions in relation to research, innovation and technology development. The collaboration is based on business strength positions within a limited geographic area outside Greater Copenhagen. The government has earmarked EUR 8.5 million for 13 Regional Technology Centres for the next four years. Seven of the Centres are new, while the remaining seven Centres build on existing Regional Growth Centres.

http://www.videnskabsministeriet.dk/cgi-bin/doc-show.cgi?doc_id=258690&doc_type=35&leftmenu=NYHEDER

European Trend Chart on Innovation



2.2 How well does policy meet the innovation challenges?

2.2.1 Policy responses to identified challenges

A number of significant attempts to improve the overall functioning of the innovation system were made recently, and many more have been proposed in the recent Globalisation Strategy. It is seen as an overall challenge to create a more coherent and coordinated national innovation system, and the policy response to this key challenge is given very high political priority. More or less all elements of the Danish innovation system have been reformed and restructured in recent years. A number of policy responses were also initiated or recently proposed to address the specific challenges identified below.

Exhibit 11: innovation challenges and policy responses

Key challenge	Measures responding to the challenge
1: To improve quality at all levels of the educational system	There is a number of proposals in the Globalisation Strategy, but they have not yet been implemented
2: To increase the supply of labour	There is a number of measures in the Globalisation Strategy, but they have not yet been implemented
3: To strengthen conditions for all modes of innovation	Programme for User-driven innovation

Challenge 1: To improve quality at all levels of the educational system:

The government has identified improving the quality of the education system as one of the main challenges. Some steps are being taken now and many more are proposed. The Globalisation Strategy has a number of proposals targeting all levels of the education system from basic education to the universities. A number of proposals cut across different issues, such as securing a more coherent and transparent educational system, strengthening the global perspective of all educations and emphasising entrepreneurship and innovation at all levels. Other proposals target specific elements and levels of the educational system. Some of the most important proposals are listed below.

Addressing the need to improve basic education, the government presented almost 50 concrete proposals to strengthen formal competencies, improve the role of evaluations and improve the education of teachers, just to mention a few of the most important aims. A similar number of proposals target secondary education, where practical training, the relevance of qualifications and the problem of high-drop out rates are emphasised as particularly important aspects.

Other main themes in the long list of proposals are to better prepare young people for a tertiary education, to increase the number of graduates in technology, science and health related areas, to encourage an earlier start of higher education and to reduce delays, to facilitate studying abroad and to make Danish educations more attractive to an international audience.

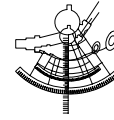
With regard to short tertiary education, the government proposes to gather the existing education programmes in fewer, larger and stronger units, to create new qualifications matching the needs of the private sector, to strengthen quality and evaluation and to improve the quality of teaching.

Furthermore, a large number of proposals target education in the university sector. Some of the most important proposals in this area concern the content of programmes, the quality of teaching, the creation of elite educations, evaluation and the education of researchers.

Finally, a number of proposals were made in the area of life long learning.

To sum up, it must be concluded that the policy response to this challenge is very comprehensive and ambitious. Whether the means to achieve the objectives are the right ones remains to be seen. It has,

European Trend Chart on Innovation



however, been argued, that the proposed initiatives have a very strong focus on formal competencies and do not put enough weight on improving abilities such as creativity, collaboration and learning by doing, using and interacting, all of which are areas where Denmark has traditionally done well. It should also be stressed once again that the exact shape outcome of the proposals still depends on the results of numerous political negotiations. There are, in other words, no guarantees that the proposals will be implemented in their current form. It is, nevertheless, unlikely that the approach to this challenge will change radically.

Challenge 2: To increase labour supply

Ensuring sufficient labour supply is another challenge identified by the Danish government. According to a number of observers the main risk endangering the favourable outlook for Denmark's business environment and innovation system is the threat of labour shortages, aggravated by strict immigration policies. The size of Denmark's population is growing very slowly and the already high level of labour force participation, as well as a tendency of workers to take early retirement, means that labour supply will be squeezed in the next decade. Although current labour force participation is quite high, the number of hours worked is low. There is, however, a trade-off between long working hours per worker and high rates of female participation in labour markets which needs to be taken into account. It might not be a realistic strategy to increase all aspects of labour supply at the same time. Danish politicians generally recognise that families with children 'need more time for family life'.

These considerations also appear to have influenced the approach of the government. The government has formulated a comprehensive policy response to the challenge, but a proposal of increased weekly working hours is not among them. The government welfare strategy was presented in April 2006 (*Fremtidens velstand og velfærd*) and the challenge of securing sufficient supply of labour in the future is a pivotal point in this set of reform measures.

The government intends to increase the number of years all individuals are working as active members of the labour market by reducing delays before entering the labour market and by raising the average retirement age. Most the proposals intended to reduce delays before entering the labour market are linked to the reform of the education system (see above), but there are also some additional proposals. One of the most important ones includes incentives to start and finish education as quickly as possible. It is proposed that public support for students studying for a higher degree should depend on their age at the time of beginning their studies. Furthermore, the support system would create incentives to keep study times short.

The government also proposes to raise the age thresholds for early retirement by three years and for the age pension by two years for citizens who are younger than 50 years. This would be followed by an indexation of the retirement age.

In addition to these proposals, the government also intends to improve access to the labour market for the unemployed. Many such efforts target a relatively large group of people with a foreign background, where unemployment rates are alarmingly high.

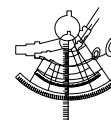
Finally, the government also proposes to improve access to the Danish labour market for highly qualified foreigners. This proposal comes with suggestions for an improved Green Card system.

So far, the government proposals have been well received by most stakeholders in the innovation system, although quite a few seem to believe that more ambitious and radical reforms are needed. However, the opposition parties believe that the proposals are too drastic and want to soften the impact. The forthcoming political negotiations will decide the exact shape the proposals will take when turned into laws, but any reforms that would be even more far-reaching than the government proposals seem unlikely, if not impossible, to achieve in the existing political climate.

Challenge 3: To improve the conditions for all modes of innovation

The third and final challenge in this overview is not subject to the same level political attention as the two previous ones. Improving the conditions for all modes of innovation is a challenge the government is aware of, but it has so far not given it a very high political priority. Much emphasis is currently placed on the science driven mode of innovation. However, there are counteracting tendencies.

European Trend Chart on Innovation



One of the most important attempts to address this challenge is a recent proposal in the Globalisation Strategy to improve the conditions for user-driven innovation. The proposal builds on a report from FORA, which identifies at least three areas where Denmark could strengthen user-driven innovation:

- The skills and competences of recently graduated employees in identifying customer needs and preferences should be addressed.
- Co-operation between Danish companies and external knowledge centres in identifying customer needs is limited, as compared to the quite extensive collaboration in technology.
- Companies that excel in user-driven innovation often are very large or belong to a highly competitive cluster with strong networks that provide access to sophisticated technical or customer-related knowledge.

In general the report concludes that to boost the skills necessary for carrying out user-driven innovation requires extensive investments in knowledge and competence building. The report outlines seven concrete recommendations that could significantly strengthen user-driven innovation in Denmark. Some of the most important recommendations are proposals to establish an interdisciplinary education in user-driven innovation, to improve research in user-driven innovation, to adapt educational programmes in existing education, to improve life-long training, to create knowledge- and innovation centres, and to enhance networking (Fora, 2005).

The government has not followed all recommendations, but the issue has been put on the agenda. The government therefore intends to develop a special programme for user-driven innovation and dissemination of knowledge based on market demand in fields where local and regional enterprises have special competences.

However, in general it must be concluded that the extent to which the policy needs of low-tech firms and knowledge intensive service companies involved in interactive learning are reflected, or indeed assessed, remains limited. This seems to be an area where significant improvements can be made. Lundvall makes a number of recommendations on how to adapt Danish innovation policy to other modes than strictly science driven innovation.

In order to enhance the innovation capacity of the Danish system, innovation policy must be transformed. First, it is necessary to take into account the importance of the wider socio-economic setting for the Danish model. Second, there is a need for a new and more ambitious competition policy. Third, the current focus on high technology firms needs to be supplemented with policies that support the absorptive capacity of SMEs in traditional sectors. Fourth, there is a need to develop policies that promote the diffusion of good organisational practices in terms of learning organisations and network formation (Lundvall, 2005).

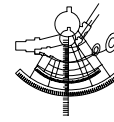
Exhibit 12: innovation challenges, policy responses and impact

Challenge	Relevance of policy response	Evidence of impact
To improve quality at all levels of the educational system	3	Too early to appraise
To increase the supply of labour	4	Too early to appraise
To strengthen conditions for all modes of innovation	2	Too early to appraise

Policy response ranking scored from 1 to 5 : 1 No specific measures addressing the challenge (possibly a debate but no evidence of any real policy development); 2 Policy development under way to respond to challenge (policy debate or design launched, e.g. announced in National Lisbon Reform Plan, etc.); 3 Specific measures existing for some time but insufficient to respond fully to challenge; 4 Existing measure plus one or more newly launched measures (during last 18 months) 5 A comprehensive set of measures which potentially responds fully to the challenge.

Evidence of impact scored from 1 to 5: 1 trend for indicators has worsened since measure(s) introduced, 2 no observable change in trend since measure(s) introduced, 3 too early to appraise (measures introduced in last 24 months), 4) trend for indicators has improved since measure(s) introduced, 5 Evaluation or study indicates measure(s) has clearly contributed to improving performance of country.

European Trend Chart on Innovation



2.2.2 The Lisbon Agenda and innovation: an appraisal

The Danish National Reform Programme presents the Danish government's strategy for structural reforms. It aims to improve the long-term potential for growth and employment within the framework of good social conditions and sound environmental and sustainable fiscal development. The programme focuses on concrete national initiatives that are either implemented or planned, and these initiatives are put in the right setting to be discussed in an EU context.

In general, Denmark makes good progress in meeting most of the Lisbon targets. The Lisbon Strategy is generally seen as a continuation of Danish policies since the 1990s. Most of the Lisbon Strategy's agenda matches the national political agenda, and the overall objectives of the Lisbon Strategy are also largely similar to the overall objectives of the Danish government. This means that a number of reforms that are highly relevant in relation to the Lisbon Strategy had already been initiated or implemented prior to the 2000 European Council. At the time, the Danish political agenda already strongly focused on the themes and priorities of the Lisbon Strategy. Hence, the Lisbon Strategy's potential for affecting policy was somewhat exhausted at an early stage. It is, therefore, difficult to identify a specific impact of the Lisbon Strategy in Denmark, although policy initiatives in line with the Lisbon objectives have gained increasing momentum after the change of government in 2001.

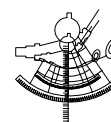
According to an analysis of the contribution of the Structural Funds to the Lisbon Strategy made by the Danish Technological Institute in 2005, this means that it is difficult to describe the launch of new initiatives and reforms which are partly or fully congruent with the objectives of the Lisbon Strategy as "resulting from"- or even "caused by" - the Lisbon Strategy: These reforms would most probably have occurred anyway in one shape or another, as the Lisbon targets are similar to targets Denmark had already set itself. This means that the Strategy did not imply any significant external pressure (The Danish Technological Institute, 2005).

Overall, the Lisbon Strategy has therefore not been a very significant driver for change in Denmark. In general, the political debate has not been defined by the Lisbon Strategy, and many reforms that have been initiated have not resulted directly from the Lisbon Strategy. This does not mean that there is no political attention to the themes covered by the Lisbon Strategy or that there are no reforms. However, where reforms pertain to a policy field that is prioritised in the Lisbon Strategy, these reforms are often only indirectly related to the Lisbon Strategy and their specific contents is often not a central point of the Lisbon Strategy: some of the issues taken up in the Lisbon Strategy's policy fields concern "post-Lisbon issues" or a "post-Lisbon" prioritisation of themes that are covered within the overall Lisbon Strategy. In Denmark there is, for instance, some political focus on the promotion of embedded/pervasive computing and mobile computing/services rather than the Lisbon Strategy's focus on internet/broadband access.

In spite of the wide lack of (political) pressure to achieve the Lisbon Strategy's objectives, the Strategy is considered as important and relevant in key ministries. First, the themes and priorities that are identified in the Lisbon Strategy are generally considered relevant and important and the Strategy is seen to be helpful in maintaining a focus on a series of important issues, both within the country and in the European Union. Second, the Lisbon Strategy is used as an instrument for knowledge-sharing and the exchange of experience. This is particularly important in a context where government representatives emphasise the need for the EU as a whole to develop along the lines defined by the Lisbon Strategy's objectives (The Danish Technological Institute, 2005).

All in all significant political attention is devoted to the policy fields defined as important by the Lisbon Strategy. However, due to the relatively advanced situation of Denmark with regard to achieving the Strategy's objectives, it is very difficult to link significant measures directly to the Lisbon Strategy. In Denmark, the main significance of Lisbon is understood to be the Strategy's use as a tool to maintain the focus on the right issues and priorities, as an instrument for the systematic exchange of knowledge and experience throughout the EU, and as a strategy which is to help other EU Member States to advance towards the Lisbon objectives. Furthermore, discussion of the Structural Funds in connection with the Lisbon Strategy is limited in Denmark as support from the Structural Fund is of little significance for the Danish economy (The Danish Technological Institute, 2005). The structural funds are therefore not present in the Danish debate and in initiatives concerning the Lisbon Strategy. There

European Trend Chart on Innovation



are complementarities between Lisbon, the Structural Funds and other national initiatives, but this has apparently not happened in a process of focused national integration.

For the reasons mentioned above the challenges and the policy objectives emphasised in the NRP are more or less the same as the general challenges and objectives, which have already been discussed elsewhere in this report.

The NRP identifies the following challenges for Denmark as a knowledge society in the next years:

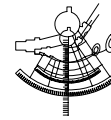
- To increase private investment in research and development and to improve the interaction with public research.
- To double the number of PhDs.
- To improve the primary and lower secondary education system, including strengthening evaluation and quality development processes.
- To increase the number of students who complete a secondary education programme and, at a later stage, a tertiary education programme.
- To ensure continued improvements in the framework conditions for innovation and entrepreneurship.
- To appropriate DKK 10 billion for an increased effort in research, innovation, entrepreneurship and education until 2010.

In order to meet these challenges a number of initiatives have been launched. Some of them are listed in the NRP, but a long list of new proposals that are relevant to the Lisbon objectives was put forward recently in accordance with the requirements of the Globalisation Strategy.

Exhibit 13 : Policy Measures relevant to Lisbon guidelines n°8 and 15.3

Lisbon guideline no. 8 - Innovation	Referenced in NRP	IPM Fiche Number*	Title of measure
1. Improvements in innovation support services, in particular for dissemination and technology transfer.	N	DK 31*	Proof of Concept
	Y	DK 21	Act on technology Transfer on Public Research Institutions
2. The creation and development of innovation poles, networks and incubators bringing together universities, research institutions and enterprises, also at regional/ local level, helping to bridge the technology gap between regions.	Y	DK 4	Technology incubators
	Y	DK 17	Innovation Consortiums
	Y	DK 19	High-tech Networks
	N	DK 22	Innovation accelerating research platforms
	Y	DK 29	Regional technology centres
3. The encouragement of cross-border knowledge transfer, including from foreign direct investment.	Y	DK 20	Pre-project grant for the sixth EU framework programme
	N	DK 31*	Proof of Concept
4. Encouraging public procurement of innovative products and services.			
5. Better access to domestic and international finance.	N	DK 31*	Proof of Concept
	Y	DK 1	VækstFonden - Business Development Finance
6. Efficient and affordable means to enforce intellectual property rights.			
Lisbon guideline no. 15 - Entrepreneurship and SMEs	Referenced in NRP	IPM Fiche Number	Title of measure
3. Strengthen the innovative potential of SMEs	N	DK 8	Approved Technological Service Institutes (GTS-Institutes)
	Y	DK 20	Pre-project grant for the sixth EU framework Programme for User-driven innovation
	P		

European Trend Chart on Innovation



The NRP mentions the following initiatives to strengthen public research are mentioned:

- Reform of the research advisory system dividing the system into research councils that support independent basic research and a research council supporting politically prioritised strategic research. Furthermore, the reform ensures the continued existence of the Danish National Research Foundation.
- Establishment of the High-Technology Foundation. The capital of the Foundation will gradually increase to DKK 16 billion. The return on the capital is to be invested in research and innovation projects involving both public and private sector participants including SMEs.
- Reform of the university management structures.
- Reform of government research institutions, increasing their professional independence.
- Increasing (doubling) the number of new PhD-students in the fields of natural science, technical science and health science as well as within the industrial PhD programme.
- Establishing a mobility centre with EU support.
- Better possibilities for the universities to operate internationally.
- A special programme for talented young researchers (EliteForsk) is in preparation.
- Tax incentives
- 150 per cent tax deduction for companies as financial support to research.
- Reduced tax rates for foreign experts in Danish companies and at Danish research institutions.
- Immediate deduction of research expenditures.

The NRP also lists a number of initiatives within knowledge transfer and innovation:

- An action plan with more than 20 initiatives to increase the interaction between public research institutions and private enterprises.
- Networks promoting partnerships between private enterprises and knowledge institutions.
- The action plan "Knowledge relocates – The path to high-tech regions".
- Act on Technology Transfer at Public Research Institutions enabling the public research institutions to establish and invest in companies to commercialise public research results.
- Developing a programme for user-driven innovation.
- Increased weight on innovation and development in the food, agriculture and fishery sector, including changes in the rural development programme and the Innovation Act.

The NRP also outlines the strategy for integration of ICT:

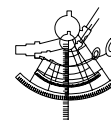
- e-government, standardisation in the public sector, e-Days, and digital signatures.
- ICT use in SMEs.
- ICT research and innovation.
- ICT trust and security.
- Infrastructure and broadband.
- ICT skills and e-Learning.
- Establishment of a Digital Task Force to promote the transition to e-government across the public sector.

Finally, the NRP lists a number of entrepreneurial initiatives:

Completed initiatives:

- Started-up loans. Government guarantees for entrepreneurs borrowing up to DKK 500,000.
- Establishment of the International Danish Entrepreneurship Academy, IDEA
- The Entrepreneurship Foundation, which will invest in new businesses in their earliest stages.
- Venture capital action plan.
- Advice and entrepreneurial culture.
- IT Growth House to provide a meeting venue for students, new businesses, etc.
- Business sparring through establishment of entrepreneurship clubs.

European Trend Chart on Innovation

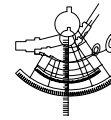


Planned initiatives:

- Tax cuts for growth entrepreneurs.
- Reduction of red tape, especially with regard to systems and procedures related to business start-ups.

In the EU appraisal of the Danish NRP it is concluded that the Danish reform strategy is presented clearly and coherently. The NRP's approach is in general seen as broad, ambitious, covering a long-term period and as realistic as it aims to carry out existing policies and, if necessary, to reinforce them. It is also concluded that consultation and efforts to develop ownership of the document have been substantial. However, although quantitative targets and timetables are set in some areas (e.g. the target set for R&D investment is to exceed 3% of GDP by 2010) more concrete measures are demanded and it is argued that a number of initiatives lack detail. Measures encouraging investments in human capital are held to be adequate and focused, with overall targets identified for 2010 and 2015, although some of those seem overly optimistic.

European Trend Chart on Innovation



3. What lessons can be drawn from policy implementation?

3.1 Lessons from the evaluation of innovation policy measures

Denmark has no tradition of systematic evaluations of all innovation policy initiatives. Evaluations have generally been carried out in an ad hoc manner, and only some initiatives have been evaluated. This is, however, one aspect of Danish policy in general which the current government wants to improve. Evaluation is accordingly given a high priority in the recent Globalisation Strategy, where it is proposed that substantial efforts should be made to create a systematic evaluation culture in Denmark.

As a result of the previous situation, evaluations have rarely had any significant implications for the Danish innovation policy mix as a whole. Generally speaking, evaluations have, at most, had implications for the specific initiatives that were evaluated.

Nevertheless, a number of evaluations/analyses have been carried out. Some of the most recent ones are listed below.

Analysis of the innovation policy efforts of the Ministry of Science, Technology and Innovation

In May 2006, the National Audit Office of Denmark published an analysis of the innovation policy efforts of the Ministry of Science, Technology and Innovation, focusing on efforts to improve collaboration between public research institutions and private enterprises. In effect this analysis is therefore an evaluation of an 'Action plan for Public-private Partnership on Innovation', launched by the government in September 2003 and setting the aim for Denmark to become one of the best countries in the world for cooperation and interaction between knowledge institutions, trade and business. In its plan, "New ways of interaction between research and industry - turning science into business", the Danish government presented a number of initiatives to create a new and better framework for the interaction between the business and industry sector and the knowledge institutions in relation to research and innovation

The overall conclusion of the analysis is that the Ministry's action plan has created a strong starting point for improving collaboration, but that some of the necessary follow-up action is missing to see whether the initiatives have had the desired effect (The National Audit Office of Denmark, 2006).

Commercialisation of public research

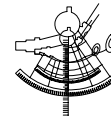
In March 2006, a new report analysing the commercialisation of public research in the Danish research and innovation system for future improvements was published by the Danish Council for Research Policy. The Council for Research Policy was established on 1 January 2004, implementing one of the dispositions of the new Act on Research Advice. It advises the Minister for Science, Technology and Innovation in matters concerning research policy. The parliament and other ministers may also ask the Council for advice. The Council may act upon request or out of its own initiative.

The report targets the framework conditions for the commercialisation of Danish public research and was published to coincide with the government's finishing touches to the Globalisation Strategy, which deals with all elements of education, research and innovation in the public and private sector.

The overall conclusion is that there is room for substantial improvement, and the Council puts forward a number of recommendations to improve commercialisation in the future. Its recommendations include: stronger incentives for institutions as well as researchers; a more transparent, coherent and coordinated system, strengthening of the technology transfer efforts and stronger efforts to identify research with potential for commercialisation.

A number of recent government statements suggest that the official strategy and the Council's recommendations follow the same lines in a number of areas (The Council for Research Policy, 2006).

European Trend Chart on Innovation



Mid-term evaluation of the Jutland Funen IT programme (Midtvejsevaluering af jyskfynsk IT satsning):

In September 2005, the Ministry of Science, Technology and Innovation published a mid-term evaluation of the Jutland Funen IT-programme. Government funding for the measure amounts to DKK 175 million ((EUR 23,33 million) for the period from 2002 to 2005. A similar amount is provided by the local authorities. The programme aims to develop partnerships between research and trade in IT areas where universities in the Jutland-Funen region have specific competences.

In general, the evaluation is positive. It concludes that the measure has been a success both in terms of improving the competitiveness of the involved enterprises (according to the enterprises themselves) and in terms of also attracting enterprises that are not located close to the involved research institutions.

For further details, see: http://www.videnskabsministeriet.dk/cgi-bin/doc-show.cgi?doc_id=255290&doc_type=35&leftmenu=NYHEDER

Evaluation of PhD Education in Denmark

The report "A Public Good", written by an International Evaluation Panel, is in effect an evaluation of PhD education in Denmark (published in April 2006).

The panel concludes that the education of PhD students works well in general and provides adequate training and high standards. Only a few instances where the education of PhD students was conducted on a potentially substandard level were singled out, although it should be noted that PhD students are trained in scientific environments that are not very strong themselves. This seems to result from the Danish attempt to admit PhD candidates to any university and for any subject.

It is also concluded that the goals of the PhD education are insufficiently articulated and it is recommended that a broad discussion in academia and among stakeholders should be initiated by the Ministry of Science, Technology and Innovation. The panel is particularly sceptical about the notion that PhD education could be streamlined to serve primarily as a driver of economic growth or competitiveness. The education of PhD students serves society best when it is a solid, top quality, broad ranging training of research talent in all areas of science and scholarship. The panel is also critical of the structures in which graduate schools are organised. It is argued that Danish graduate schools are sometimes innovative, but are too varied in kind and quality. The panel is of the opinion that graduate schools need a critical mass and disciplinary breadth, and therefore require solid funding. It is also argued that graduate schools should be organised by universities, but co-funded by funding agencies on a competitive basis, and that they should work on an interdisciplinary basis. With this in mind, the panel recommends that an increasing proportion of Danish PhD research training should be organised in graduate schools of a different kind than the large majority of the existing ones. The template should rather be the graduate school model established in top-ranking American universities. The innovative Danish variety of the graduate school should become a trademark that can sustain and improve the international recognition of PhD education in Denmark.

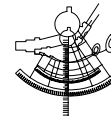
http://www.videnskabsministeriet.dk/fsk/publ/2006/International_evaluering_af_ph_d_uddannelsen_April_2006.pdf

Annual performance accounts for the GTS institutes

The Authorised Technological Service Institutes (the GTS institutes) provide technological consulting services to Danish companies and public authorities²¹. The GTS institutes have the task of building up and developing scientific and technological competencies and of gathering knowledge and communicating it to Danish companies. Each year, Denmark invests between DKK 250 million and DKK 300 million in technological service in order to promote the dissemination of knowledge to trade and industry and society in general. The funds, which are granted by the Council for Technology and Innovation, are primarily spent on building up competencies in the network of GTS institutes. The seven institutes making up the GTS network develop and communicate technologically based knowledge to private companies and public institutions, thereby fulfilling an important function in the Danish knowledge and innovation system.

²¹ See www.teknologiportalen.dk

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As allocating authority, the Council for Technology and Innovation closely monitors the results of the public investment in the GTS network. For that reason, the Ministry of Science, Technology and Innovation, acting on behalf of the Council, prepares annual performance accounts for the GTS institutes, providing a picture of the GTS network's current quality level and usefulness to society and describing the trend in the institutes' performance. The accounts are built up around a number of indicators that together show the ability of the institutes to develop and communicate knowledge effectively at a high level to companies and the public sector. The performance accounts have been presented four times by now. It is only at this stage that it has become possible to see the trend in the results, which can now be compared to the results from the last years.

The most recent performance account for the year 2005 (presented March 2006) shows a slightly higher total turnover and more customers, but a decrease in the research carried out by the institutions. Over a period of five years, R&D has decreased by 16 percent.

For more details, see: http://www.teknologiportalen.dk/NR/ronlyres/2B78FE7B-374D-4A98-BD7A-1CF2CE03C507/0/4253_GTS_internet3.pdf

Older evaluations

Apart from the recent evaluations mentioned above, there are also several older evaluations which should be emphasised:

Evaluation of the Danish Innovation Incubators

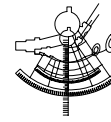
An evaluation²² of the Danish Innovation Incubators was conducted by the National Agency for Enterprise and Construction in 2004. The evaluation benchmarked eight Danish incubators - DTU Innovation, CAT Research Park, HIH Development, NOVI, Syddansk Innovation, Symbion Science Park, Teknologisk Innovation and Østjysk Innovation - against a selection of top-rated incubators across the United States, the UK, Finland and Sweden. A total of 19 incubators were benchmarked. The study compared the incubators' ability to hatch viable businesses, as well as their ability to attract venture capital. Three of the Danish incubators perform well, whereas the remaining five under-perform compared to the top-performing incubators. In particular, the Danish incubators NOVI, Symbion and CAT rank among the best in terms of attracting venture capital, whereas exit rates among Danish incubators are generally significantly lower than in the top-performing incubators. The study also showed that the quality of the surrounding entrepreneurship infrastructure is essential for the growth and survival of an incubator. The growth of Danish enterprises can be promoted by improving the quality of the entrepreneurship infrastructure, and incubators play a significant role in the continued development of entrepreneurship infrastructures. This assessment is supported by the fact that the top-performing incubators operate in areas where significant efforts have been made to improve entrepreneurship infrastructures. The study shows that compared to other countries, Danish incubators are less involved in developing entrepreneurship infrastructure. The study confirms that the best performing incubators offer a higher degree of specialisation and work more closely with the local communities. At the same time, compared to the lower-performing incubators, the top-performers maintain a lower focus on formal monitoring and strategic counselling. No significant variation in incubator performance is detected across the areas of financing, co-operation with universities and outreach.

Evaluation of the Danish Act of Inventions at Public Research Institutions

Another evaluation targeted the Danish Act of Inventions at Public Research Institutions. On 1 January 2000, the framework conditions for commercialisation of research at public research institutions were altered by a new act passed by the Danish parliament in 1999. Before 2000, the rights to inventions made at universities and public hospitals were assigned to the researchers, while government research institutions (sektorforskningsinstitutioner) could claim the rights to inventions made by their researchers. Since 1 January 2000, all public research institutions can claim the rights to the inventions, while the researchers are entitled to a reasonable payment from the institution. Moreover, the act introduced an obligation to the institutions to work actively to increase the industrial exploitation of public research. The implementation of the law was promoted by a government grant of 58 million DKK, 36 million of which was earmarked for hiring external services at the institutions in 2000 and 2003, while DKK 22 million were spent on competence building and knowledge sharing.

²² See http://www.ebst.dk/file/3057/Entrepreneurship_2004.pdf

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The evaluation of the Act of Inventions at Public Research Institutions was undertaken in early 2004 by Inside Consulting, Cowi A/S and Eskild Hansen, sub-contractors to the Ministry of Science, Technology and Innovation. It covered all institutions that have received government grants – ten universities, four hospital administrations and seven government research institutions (sektorforsknings-institutioner). The evaluation was based on a questionnaire to the 21 patent organisations and on interviews with the top management, researchers and key personnel in the patent organisations at seven institutions. The evaluation produced the following conclusions:

According to top managers, patent organisations and researchers the Act of Inventions at Public Research Institutions provides a useful and well functioning framework for protection and commercialisation of public research institution inventions. In general, researchers accept the rules and regulations introduced by the Act. Most researchers are quite pragmatic in their attitude towards the Act. Patent services and funding provided by the institutions are appreciated. Nevertheless researchers also express worries and dissatisfaction about a lacking ability of the patent organisations to put patented inventions to any commercial use. If researchers at public Danish research institutions are to continue supporting the law and the institutional infrastructure for patenting and commercialisation, improvements in the institutions performance with regard to licensing and spin off activities is of a central importance. In a number of areas, research institution, top managers and patent managers put forward suggestions for changes in the Act. One of the major issues was whether the Act should also apply to students. However the evaluation concluded that the Act is a well functioning legal framework with no major constraints to future performance improvements. There has been a great deal of protection, but commercialisation was modest: Since the introduction of the Act (2000-2003), employees at public Danish research institutions have reported a total of 654 inventions. For a total of 387 inventions, rights have been transferred to the institution with a view to commercial exploitation. In 133 cases inventions have been commercialised through licensing, selling of patents or spin-outs. When it comes to putting inventions to commercial use, Danish public research institutions do not perform very well. Also in terms of the number of new science based start-ups, Denmark is a poor performer. The findings show that Danish institutions have not yet been able to establish effective support structures for commercialising public inventions. However, there are significant differences between different institutions.

Evaluation of the Danish Universities

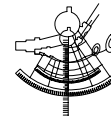
In 2002 the Danish authorities asked the OECD “to evaluate the Danish university sector in respect of its role in the transition to the knowledge society and in respect of how the sector meets the international challenges to research universities”, and to examine “the universities’ roles as research, education and knowledge institutions in respect of their public, social and economic context” as well as “their capability of contributing to lifelong learning and knowledge and technology transference to economy, society and public life”. The main topics were central aspects of the Danish university system, including (i) research-based teaching (BA, Master, Ph.D.), (ii) research, (iii) management and organisation, and (iv) “services to economy and society”.

An international panel of six experts carried out the review. The recommendations given by the expert panel to the Danish government include:

- The government should set a national strategy for the universities and the new university boards should review the objectives of their individual universities as they determine the strategy for the future.
- The government should consider whether the status of the universities should be changed from special administrative entities to foundations under private law to enable them to operate as private sector bodies, while continuing to receive public funds.
- The government should consider relinquishing central control over universities. In addition all universities should establish units or programmes for promoting high quality teaching and learning and introducing innovative teaching methods. Excellent teaching should be recognised and rewarded. Universities should carry out programme reviews periodically. Universities should develop programme reviews over a periodically.

In accordance with the OECD’s recommendations, the government and the universities have already taken a number of new initiatives, including the University Act of 2003, which increases the autonomy of universities and introduces self-government. Furthermore, the allocation of funds to university education is under review to make the system more transparent and simple.

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3.2 Review of good practice

Good practice in innovation governance

As mentioned above, more or less all parts of the Danish innovation system are currently in a process of restructuring. It is therefore difficult to identify good practices in innovation governance. There are, however, two specific aspects of the Danish innovation governance system that could be mentioned as examples of good practices.

The first example is the fact that practically all innovation policy related responsibilities has been gathered in a single ministry, the Ministry of Science, Technology and Innovation. This enhances the coherence of the system as well as the political and administrative coordination. For further information see the innovation governance system section of this report.

The second example is the strong stakeholder involvement in the formulation of innovation policy. The prime example of this is the recent set up of the so-called Globalisation Council, which unites representatives of different sectors of society. The Council has assisted the government in formulating an ambitious, holistic and multi-year strategy to make Denmark a leading growth, knowledge and entrepreneurial society. For further information, see the innovation governance system section of this report.

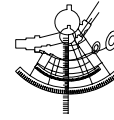
Good practice in policy implementation

There are only very few assessments of the implementation of measures. However, the Regional Centres of Excellence is based on the positive experiences of the pilot project "Regional growth environments", which ended in 2003.

Another effective measure implemented in Denmark is the Innovation Consortia Initiative (DK 17) aimed at developing technologies generally available to trade and business via co-operation between various players in the research, trade and business. The diffusion of technologies takes place via the participating GTS institutes (DK 8). The aim of the Innovation Consortia is to strengthen co-operation between companies, public research institutions and technological services to develop new generic technology platforms for product and service development in Denmark over the next five to ten years.

The co-operation strengthens applied research and supports efforts to gear public research towards the specific needs of the trade and service, to build up competencies and services in technological services that can be diffused to other Danish companies (especially SMEs), to create a highly qualified innovation and research environment, and to develop projects with a generic content that can be used by and diffused to a wide range of companies.

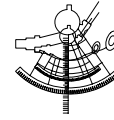
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Annex 1: overview of innovation policy documents

Main policy documents concerning innovation policy adopted/published since 2000

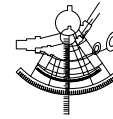
Title of document (in English)	Date (of approval, publication, etc.)	Organisation responsible (Ministry, etc.)	Legal status (Law, government Decision, strategy (white) paper, action plan, etc.)
The Danish Growth Strategy	May 2002	Ministry of Economics and Business Affairs	Strategy paper Initiatives to strengthen framework conditions for economic growth in Denmark.
The Danish Knowledge Strategy	January 2003	Ministry of Science, Technology and Innovation	Strategy paper The government's plan for redesigning the Danish knowledge system.
Action plan for Public-private Partnership on Innovation	September 2003	Ministry of Science, Technology and Innovation	Action plan / strategy Paper. The Action plan is a further specification of the Danish Knowledge strategy. DKK 275 (EUR 37) million has been set aside for the initiatives in the plan.
government Action plan on high-tech regions	September 2004	Ministry of Science, Technology and Innovation	Action plan / strategy Paper. The Action Plan aims to improve regional effort in creating a high-tech and knowledge based development. The plan contains a number of initiatives (either new ones or a strengthening of existing ones)
Action plan for Strategic Research – Research that Counts	September 2004	The Strategic Research Council	Action plan / strategy Paper. The plan aims to increase understanding between the research world and society, and inspire both sides to invest more in each other.
government's Action plan on venture capital	January 2005	Ministry of Economics and Business Affairs	Action plan / strategy Paper. The plan includes ten initiatives, paving the way for more venture capital investments from private investors as well as from Pension Funds.
New Goals - government Platform	February 2005	The PM's Office	government action plan. A strategy to make Denmark a leading growth, knowledge and entrepreneurial society
The Globalisation Strategy	April 2006	The PM's Office	government Strategy More than 300 proposed initiatives to prepare Denmark for the challenges of globalisation



Annex 2: overview of innovation policy measures

As part of the European TrendChart on Innovation provides detailed information on policy measures in each country is collected in an online database which can be consulted via the TrendChart website (www.trendchart.org). The aim of this section is to provide a succinct overview of the detailed information that is available online for each individual measure.

European Trend Chart on Innovation

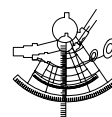


List of Innovation Policy Measure Fiche in the TrendChart database as of 21 April 2006

Table A2.1: Policy Monitoring framework (2005-2007) objective(s)

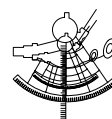
IPM Fiche Number	Title of measure	Policy Monitoring framework (2005-2007) objective(s)	IAP96 Action line	Start Date	End date	Status during reported period	Evaluated
DK 31	Proof of Concept	III.2. Facilitate the acquisition and transfer of knowledge and technologies to enterprises, encouraging in particular cross-border initiatives III.6. Facilitate the development of collaboration between enterprises and other actors with a view to joint innovation activities and knowledge exchange		2006	2007	New	No
DK 30	KINO (Creativity and Innovation, New modes of Production and Entertainment Economy)	V.2. Increase rates of non-technological innovation in enterprises		2006	2008	New	No
DK 29	Regional technology centres	III.6. Facilitate the development of collaboration between enterprises and other actors with a view to joint innovation activities and knowledge exchange		2006	No End Date Planned	New	No
DK 22	Innovation accelerating research platforms	III.2. Facilitate the acquisition and transfer of knowledge and technologies to enterprises, encouraging in particular cross-border initiatives	III.	2005	No End Date Planned	New	No
DK	Act on	III.2. Facilitate the acquisition and	II.2.	2004	No End	New	No

European Trend Chart on Innovation



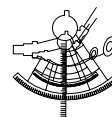
21	technology Transfer on Public Research Institutions	transfer of knowledge ad technologies to enterprises, encouraging in particular cross-border initiatives V.3. Favouring the protection and optimising the exploitation of intellectual property as a driver for innovation			Date Planned		
DK 20	Pre-project grant for the sixth EU framework programme	III.6. Facilitate the development of collaboration between enterprises and other actors with a view to joint innovation activities and knowledge exchange	III.5.	2004	2008	Modified	No
DK 19	High-tech Networks	III.2. Facilitate the acquisition and transfer of knowledge ad technologies to enterprises, encouraging in particular cross-border initiatives III.6. Facilitate the development of collaboration between enterprises and other actors with a view to joint innovation activities and knowledge exchange	I.6 III.4.	2004	2007	Ongoing	No
DK 17	Innovation Consortiums	III.2. Facilitate the acquisition and transfer of knowledge ad technologies to enterprises, encouraging in particular cross-border initiatives III.6. Facilitate the development of collaboration between enterprises and other actors with a view to joint innovation activities and knowledge exchange	I.6 III.4.	2003	Not defined	Ongoing	Yes
DK 16	150 per cent tax deduction on certain research expenditures	II.4. Increase rates of expenditure on research and technological innovation in enterprises	II.6. III.5.	2002	2007	Ongoing	No
DK 14	Large Cross-Disciplinary Research	II.4. Increase rates of expenditure on research and technological innovation in enterprises	III.2.	2001	2004	Ongoing	No

European Trend Chart on Innovation



	Groups	<p>III.2. Facilitate the acquisition and transfer of knowledge ad technologies to enterprises, encouraging in particular cross-border initiatives</p> <p>III.4. Increase the availability of innovative infrastructures to facilitate knowledge exchange and product/service development by enterprises</p> <p>III.6. Facilitate the development of collaboration between enterprises and other actors with a view to joint innovation activities and knowledge exchange</p>					
DK 12	Technology Foresight (Teknologiske Fremsyn)	<p>I.1. Development of a strategic medium-to-long term vision of innovation challenges and innovation potential</p> <p>I.3. Improve the effectiveness of the policy-cycle in order to increase the impact of public intervention activity and outputs in enterprises</p>	III.1.	2001	2004	Ongoing	No
DK 8	Approved Technological Service Institutes (GTS-Institutes)	III.2. Facilitate the acquisition and transfer of knowledge ad technologies to enterprises, encouraging in particular cross-border initiatives	III.4.	1973	continuous	Modified	No
DK 5	INDUSTRIAL PHD INITIATIVE	III.1. Facilitate access of enterprises to skilled personnel	I.2.	1970	Continuous	Modified	No
DK 4	Technology incubators	<p>IV.1. Increase the number of new innovation intensive enterprises created and their survival</p> <p>IV.2. Provide adequate infrastructure to new technology based firms to facilitate their survival and growth</p>	III.3.	1997	not defined	Ongoing	Yes
DK	«Equity	II.4. Increase rates of expenditure on	II.5.	1994	2004	Ongoing	No

European Trend Chart on Innovation

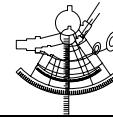


2	Guarantee Programme»- Development Companies (Venture Capital Companies)	research and technological innovation in enterprises IV.4. Increase the availability of private sector innovation financing to enterprises IV.5. Optimising the legal/regulatory framework for the development of private innovation financing V.4. Increase the rate of commercialisation/marketing of the results of innovation activity in enterprises					
DK 1	VækstFonden - Business Development Finance	IV.1. Increase the number of new innovation intensive enterprises created and their survival IV.4. Increase the availability of private sector innovation financing to enterprises IV.5. Optimising the legal/regulatory framework for the development of private innovation financing V.4. Increase the rate of commercialisation/marketing of the results of innovation activity in enterprises	II.5.	1992	Continuous	Ongoing	No

Table A2.2: Policy Measure Fiche: overview

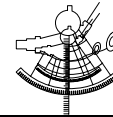
IPM Fiche Number	Title of measure	Overview
DK 31	Proof of Concept	The measure aims to strengthen technology transfer from public research to private enterprises. Main objectives are to: facilitate the process from research to business; to facilitate the attraction of risk willing investors; and to stimulate cooperation between public research institutions, innovation incubators and other relevant partners. The measure is a pilot project, and the experiences from this initiative, will decide whether it will be continued.
DK 30	KINO (Creativity and Innovation, New modes of Production and	The Danish Strategic Research Council has initiated a programme supporting research in Creativity and Innovation, New modes of Production and Entertainment Economy. With the creation of strategic research centres and with support of smaller strategic research projects is

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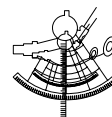
	Entertainment Economy	it a main objective to strengthen development and growth in creative, knowledge-service enterprises, service enterprises etc.
DK 29	Regional technology centres	The main objective of the measure is to strengthen knowledge-based growth and development in the regions outside of the larger cities. Regional Technology Centres focus on regional competencies and act as intermediaries between regional research and SMEs. Experiences from the former Regional Growth Centres (DK 13) initiative guide the establishment of these centres. The regional Technology Centres aim at strengthening the collaboration between the regional business-environment and relevant knowledge-institutions in relation to research, innovation and technology development. The collaboration is based on business strength positions within a limited geographic area outside the capitol area.' The government has earmarked 8.5 million Euro for 13 Regional Technology Centres during the coming 4 years. 7 of the Centres are new, while the remaining seven Centres build on existing Regional Growth Centres
DK 22	Innovation accelerating research platforms	As a new measure from the Strategic Research Council The Innovation accelerating research platforms are attempts to create research-areas where high quality research can be combined with business strength positions. The objective is to secure that research leads to innovation with international perspective and business-development. Accordingly, the 'Innovation accelerating research platforms are expected to contribute to interplay between competences and knowledge-areas - internally in the public research-system as well as between the public and the private sector. The first round of applications are currently in the process of evaluation.
DK 21	Act on technology Transfer on Public Research Institutions	The act allows for universities to establish a limited company responsible for the transfer of knowledge/technology to the private sector.
DK 20	Pre-project grant for the sixth EU framework programme	The main goal is to stimulate SMEs participating in the sixth EU framework programme.
DK 19	High-tech Networks	The objective of the measure is to create lasting relationships between private enterprises and knowledge institutions
DK 17	Innovation Consortiums	The aim of Innovation Consortiums is to strengthen co-operation between companies, public research institutions and technological service to develop new generic technology platforms for the coming 5-10 years product and service development in Denmark. Enterprises must contribute with 50% of the funding. Typically a consortium has a total budget of 2.500.000 - 5.500.000 EURO and lasts 3-4 years.
DK 16	150 per cent tax deduction on certain research expenditures	The primary aim is to increase private incentive to co-operate with public research institutions. The government has in 2006 announced that the initiative will be phased out.
DK 14	Large Cross-Disciplinary	The research groups will co-operate across institutions and traditional technical and

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	Research Groups	professional disciplines and be organised for joint management. The Research Groups are to be established in areas having large societal or industrial need of developing new knowledge and know-how. One particular goal is that these research groups attract co-funding from private business, and that private business will find it attractive to embark upon a partnership on research and development.
DK 12	Technology Foresight (Teknologiske Fremsyn)	The Main goals are to create a basis for public and private priorities decisions within research and technological development and to facilitate public debates on possible and desirable developments. Furthermore the initiative will create new contacts between the private business sector and public knowledge institutions.
DK 8	Approved Technological Service Institutes (GTS-Institutes)	The main objective of the approved technological service institutes is to support and promote innovation within business and industry located in Denmark. This is done by collecting, developing and creating new advanced knowledge and by ensuring that companies have access to advice and knowledge transfer.
DK 5	INDUSTRIAL PHD INITIATIVE	The Industrial PhD initiative is aimed at enhancing research and development in the Danish business sector by: Training researchers to gain insight into the business related aspects of research and development; Building personal networks of knowledge between companies and Danish or foreign universities / research institutions.
DK 4	Technology incubators	The Ministry of Science, technology and Innovation originally approved 8 technology incubators situated at universities or science/research parks. The current number of incubators is 7. The objective is to bridge research environments, innovative entrepreneurs and finance companies in order to develop and transfer research and innovative ideas to commercially sustainable innovative projects and enterprises.
DK 2	«Equity Guarantee Programme»- Development Companies (Venture Capital Companies)	Since mid-1994, a number of Development Companies (Venture Capital Companies) have been approved (capital & reserves of minimum EUR 2.7 million investment & managerial expertise in SMEs as a prerequisite) to receive state risk-sharing of investments in SMEs. The first objective was to create a venture capital market in Denmark. The programme aims at providing a guarantee on investments made in emerging growth companies (from seed/start-up stage to a later development stage).
DK 1	VækstFonden - Business Development Finance	Business Development Finance (VkstFonden) supports Danish companies by helping to finance R&D, internationalisation and skills development projects. This support is organised through an institution operating under the legal form of a private venture capital company. With a capital base of EUR 300 million Vækstfonden is one of the largest Danish VC players. Vækstfonden is a state backed investment company, which provide funding to fast-growing Danish companies and act as a fund-of-funds investor in the private equity sector in the Nordic region. The fund invest in early stage ventures mainly focusing on Life Science/Med Tech and High Tech, and provide mezzanine financing to a broad range of industries. It is part of the

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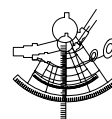


		strategic objectives to work actively to facilitate access to international venture capital and drive the development of an internationally competitive private equity environment in Denmark.
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Table A2.3: Policy Measure Fiche: Lisbon guidelines n°8

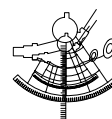
Integrated Guideline No 8 - Innovation							
1. Improvements in innovation support services, in particular for dissemination and technology transfer.							
1	DK 21	Act on technology Transfer on Public Research Institutions					
The act allows for universities to establish a limited company responsible for the transfer of knowledge/technology to the private sector.							
<u>Measures referenced in the 2005 NRP:</u> Yes - page number 10 in NRP.							
<u>Status:</u> adopted - full scheme							
<u>Timeline for implementation:</u> Start date: 2004 End date: No End Date Planned		before 2005	2005	2006	2007	2008	beyond 2008
<u>Budgetary costs</u> (e.g in millions of €) Overall budget (for period as specified in 2.1 and 2.2) : No direct budget							
<u>source(s) of funds:</u> No direct funding involved							
<u>Expected impact:</u> Improved technology transfer							
<u>Suggested indicators to measure progress:</u> N/A							
Comments:							
2	DK 31	Proof of Concept					
The measure aims to strengthen technology transfer from public research to private enterprises. Main objectives are to: facilitate the process from research to business; to facilitate the attraction of risk willing investors; and to stimulate cooperation between public research institutions, innovation incubators and other relevant partners. The measure is a pilot project, and the experiences from this initiative, will decide whether it will be continued. ' '							
<u>Measures referenced in the 2005 NRP:</u> No							
<u>Status:</u> adopted – pilot programme							
<u>Timeline for implementation:</u> Start date: 2006 End date: 2007				2006	2007		
<u>Budgetary costs</u> (e.g in millions of €) Overall budget (for period as specified in 2.1 and 2.2) : 1.6 Million Euro							
<u>source(s) of funds:</u> Public grants							

European Trend Chart on Innovation



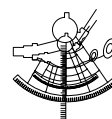
<u>Expected impact:</u> Improved technology transfer								
<u>Suggested indicators to measure progress:</u> N/A								
Comments:								
2. The creation and development of innovation poles, networks and incubators bringing together universities, research institutions and enterprises, including at regional and local level, helping to bridge the technology gap between regions.								
3	DK 4	Technology incubators						
The Ministry of Science, technology and Innovation originally approved 8 technology incubators situated at universities or science/research parks. The current number of incubators is 7. The objective is to bridge research environments, innovative entrepreneurs and finance companies in order to develop and transfer research and innovative ideas to commercially sustainable innovative projects and enterprises.								
<u>Measures referenced in the 2005 NRP:</u> Yes								
<u>Status:</u> adopted - full scheme								
<u>Timeline for implementation:</u> Start date: 1997 End date: not defined			before 2005	2005	2006	2007	2008	beyond 2008
<u>Budgetary costs</u> (e.g in millions of €) Overall budget (for period as specified in 2.1 and 2.2) : 16.000.000 Euro								
<u>source(s) of funds:</u> Public grants								
<u>Expected impact:</u> Improved technology transfer								
<u>Suggested indicators to measure progress:</u> N/A								
Comments:								
4	DK 17	Innovation Consortiums						
The aim of Innovation Consortiums is to strengthen co-operation between companies, public research institutions and technological service to develop new generic technology platforms for the coming 5-10 years product and service development in Denmark. Enterprises must contribute with 50% of the funding. Typically a consortium has a total budget of 2.500.000 - 5.500.000 EURO and lasts 3-4 years.								
<u>Measures referenced in the 2005 NRP:</u> Yes								
<u>Status:</u> (prepared/adopted, pilot/full scheme, follow-up of previous measures, part of a broader programme, etc.)								
<u>Timeline for implementation:</u> Start date: 2003 End date: Not defined			before 2005	2005	2006	2007	2008	beyond 2008
<u>Budgetary costs</u> (e.g in millions of €) Overall budget (for period as specified in 2.1 and 2.2) : 51.4								
<u>source(s) of funds:</u> Public grants and private co-funding								
<u>Expected impact:</u> More cooperation								

European Trend Chart on Innovation



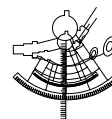
<u>Suggested indicators to measure progress:</u> N/A						
Comments:						
5	DK 19	High-tech Networks				
The objective of the measure is to create lasting relationships between private enterprises and knowledge institutions						
<u>Measures referenced in the 2005 NRP:</u> Yes, page 9 in NRP						
<u>Status:</u> Adopted, full scheme						
<u>Timeline for implementation:</u> Start date: 2004 End date: 2007		before 2005	2005	2006	2007	
<u>Budgetary costs</u> (e.g in millions of €) Overall budget (for period as specified in 2.1 and 2.2) : 2.640.000 EURO for 2005						
<u>source(s) of funds:</u> Public grants and private co-funding						
<u>Expected impact:</u> Stronger links between private enterprises and knowledge institutions						
<u>Suggested indicators to measure progress:</u> N/A						
Comments:						
6	DK 22	Innovation accelerating research platforms				
As a new measure from the Strategic Research Council The Innovation accelerating research platforms are attempts to create research-areas where high quality research can be combined with business strength positions. The objective is to secure that research leads to innovation with international perspective and business-development. Accordingly, the 'Innovation accelerating research platforms are expected to contribute to interplay between competences and knowledge-areas - internally in the public research-system as well as between the public and the private sector. The first round of applications are currently in the process of evaluation.						
<u>Measures referenced in the 2005 NRP:</u> No						
<u>Status:</u> In the start up phase						
<u>Timeline for implementation:</u> Start date: 2005 End date: No End Date Planned			2005	2006	2007	2008 beyond 2008
<u>Budgetary costs</u> (e.g in millions of €) Overall budget (for period as specified in 2.1 and 2.2) : No earmarked funding yet						
<u>source(s) of funds:</u> Public grants and private co-funding						
<u>Expected impact:</u> to contribute to the interplay between competences and knowledge-areas - internally in the public research-system as well as between the public and the private sector.						
<u>Suggested indicators to measure progress:</u> N/A						
Comments:						

European Trend Chart on Innovation



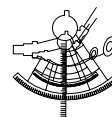
7	DK 29	Regional technology centres					
<p>The main objective of the measure is to strengthen knowledge-based growth and development in the regions outside of the larger cities. Regional Technology Centres focus on regional competencies and act as intermediaries between regional research and SMEs. Experiences from the former Regional Growth Centres (DK 13) initiative guide the establishment of these centres. The regional Technology Centres aim at strengthening the collaboration between the regional business-environment and relevant knowledge-institutions in relation to research, innovation and technology development. The collaboration is based on business strength positions within a limited geographic area outside the capitol area.' The government has earmarked 8.5 million Euro for 13 Regional Technology Centres during the coming 4 years. 7 of the Centres are new, while the remaining seven Centres build on existing Regional Growth Centres</p>							
<u>Measures referenced in the 2005 NRP:</u> Yes, Annex 2, page 9							
<u>Status:</u> (prepared/adopted, pilot/full scheme, follow-up of previous measures, part of a broader programme, etc.)							
<u>Timeline for implementation:</u> Start date: 2006 End date: No End Date Planned				2006	2007	2008	beyond 2008
<u>Budgetary costs</u> (e.g in millions of €) Overall budget (for period as specified in 2.1 and 2.2) : 8,533.000 EURO							
<u>source(s) of funds:</u> Public grants and private co-funding							
<u>Expected impact:</u> a strengthening of the collaboration between the regional business-environment and relevant knowledge-institutions in relation to research, innovation and technology development							
<u>Suggested indicators to measure progress:</u> N/A							
Comments:							
8	DK 32	9 steps towards a better environment					
<p>The Danish Ministry of the Environment has presented an action plan in support of environmental technologies. The plan is based on an' analysis carried out by FORA(Ministry of Economic and Business Affairs unit of business economic research and analysis), which seeks to identify environmental technology areas where Denmark potentially could create new strongholds, if strategic and binding collaboration involving companies, knowledge institutions and government authorities is carried out. A total of 420 environment companies with 60 000 employees are identified, along with 46 knowledge institutions that focus on environment efficient technologies. The environment cluster is one of Denmark's largest business clusters. The cluster is divided into sub-clusters based on the environmental challenge faced by the company or knowledge institution. A total of eight sub-areas are identified. The action plan has 9 concrete initiatives. Among them are: Partnerships of Innovation;' Strengthened and targeted support of export;' Research and technology development and an effort to strengthen the use of environmental efficient technology in EU.'</p>							
<u>Measures referenced in the 2005 NRP:</u> No							
<u>Status:</u> prepared							
<u>Timeline for implementation:</u> Start date: 2007 End date: 2009					2007	2008	beyond 2008

European Trend Chart on Innovation



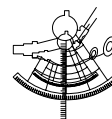
<u>Budgetary costs</u> (e.g in millions of €) Overall budget (for period as specified in 2.1 and 2.2) : Between 100 million Euro and 200 million Euro							
<u>source(s) of funds:</u> Public grants							
<u>Expected impact:</u> The creation of new Danish strongholds							
<u>Suggested indicators to measure progress:</u> N/A							
Comments:							
3. The encouragement of cross-border knowledge transfer, including from foreign direct investment.							
9	DK 20	Pre-project grant for the sixth EU framework programme					
The main goal is to stimulate SMEs participating in the sixth EU framework programme.							
<u>Measures referenced in the 2005 NRP:</u> Yes							
<u>Status:</u> adopted							
<u>Timeline for implementation:</u> Start date: 2004 End date: 2008			before 2005	2005	2006	2007	2008
<u>Budgetary costs</u> (e.g in millions of €) Overall budget (for period as specified in 2.1 and 2.2) : App. EURO 800.000. per year			EURO 800.000	EURO 800.000	EURO 800.000	EURO 800.000	EURO 800.000
<u>source(s) of funds:</u> public grants							
<u>Expected impact:</u> More sme's to participate in FP6							
<u>Suggested indicators to measure progress:</u> N/A							
Comments:							
10	DK 31	Proof of Concept					
The measure aims to strengthen technology transfer from public research to private enterprises. Main objectives are to: facilitate the process from research to business; to facilitate the attraction of risk willing investors; and to stimulate cooperation between public research institutions, innovation incubators and other relevant partners. The measure is a pilot project, and the experiences from this initiative, will decide whether it will be continued.							
<u>Measures referenced in the 2005 NRP:</u> No							
<u>Status:</u> adopted, pilot programme,							
<u>Timeline for implementation:</u> Start date: 2006 End date: 2007					2006	2007	
<u>Budgetary costs</u> (e.g in millions of €) Overall budget (for period as specified in 2.1 and 2.2) : 1.6 Million Euro							

European Trend Chart on Innovation



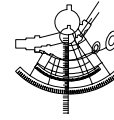
<u>source(s) of funds:</u> Public grants							
<u>Expected impact:</u> Improved technology transfer							
<u>Suggested indicators to measure progress:</u> N/A							
Comments:							
4. Encouraging public procurement of innovative products and services.							
5. Better access to domestic and international finance.							
11	DK 1	VaekstFonden - Business Development Finance					
<p>Business Development Finance (VkstFonden) supports Danish companies by helping to finance R&D, internationalization and skills development projects. This support is organized through an institution operating under the legal form of a private venture capital company. With a capital base of EUR 300 million Vaekstfonden is one of the largest Danish VC players. Vaekstfonden is a state backed investment company, which provide funding to fast-growing Danish companies and act as a fund-of-funds investor in the private equity sector in the Nordic region. 'The fund invests in early stage ventures mainly focusing on Life Science/Med Tech and High Tech, and provide mezzanine financing to a broad range of industries. It is part of 'the strategic objectives to work actively to facilitate access to international venture capital and drive the development of an internationally competitive private equity environment in Denmark.</p>							
<u>Measures referenced in the 2005 NRP:</u> Yes, Annex 2, page 18							
<u>Status:</u> adopted, full scheme							
<u>Timeline for implementation:</u> Start date: 1992 End date: Continuous		before 2005	2005	2006	2007	2008	beyond 2008
<u>Budgetary costs</u> (e.g in millions of €) Overall budget (for period as specified in 2.1 and 2.2) : No fixed budget							
<u>source(s) of funds:</u> Vaekstfonden is a state backed investment company							
<u>Expected impact:</u>							
<u>Suggested indicators to measure progress:</u> N/A							
Comments:							
12	DK 31	Proof of Concept					
<p>The measure aims to strengthen technology transfer from public research to private enterprises. Main objectives are to: facilitate the process from research to business; to facilitate the attraction of risk willing investors; and to stimulate cooperation between public research institutions, innovation incubators and other relevant partners. The measure is a pilot project, and the' experiences from this initiative, will decide whether it will be continued. ' '</p>							
<u>Measures referenced in the 2005 NRP:</u> No							
<u>Status:</u> adopted, pilot programme							

European Trend Chart on Innovation

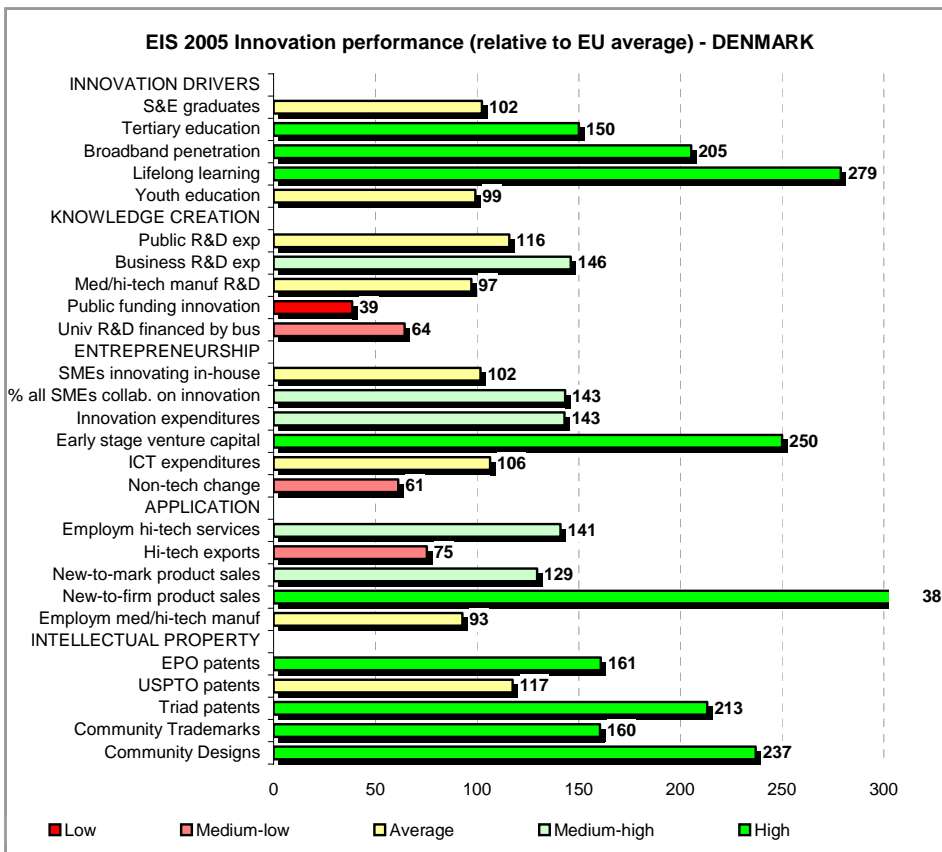
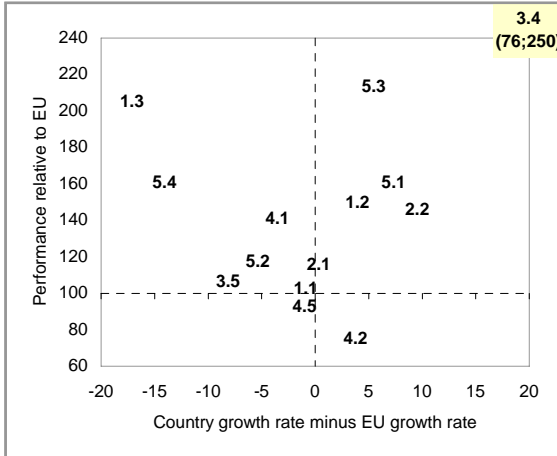


<u>Timeline for implementation:</u> Start date: 2006 End date: 2007				2006	2007		
<u>Budgetary costs</u> (e.g in millions of €) Overall budget (for period as specified in 2.1 and 2.2) : 1.6 Million Euro							
<u>source(s) of funds:</u> Public grants							
<u>Expected impact:</u> Improved technology transfer							
<u>Suggested indicators to measure progress:</u> N/A							
Comments:							
6. Efficient and affordable means to enforce intellectual property rights.							
13	DK 21	Act on technology Transfer on Public Research Institutions					
The act allows for universities to establish a limited company responsible for the transfer of knowledge/technology to the private sector.							
<u>Measures referenced in the 2005 NRP:</u> Yes, annex 2, page 9 in NRP...							
<u>Status:</u> adopted, full scheme							
<u>Timeline for implementation:</u> Start date: 2004 End date: No End Date Planned		before 2005	2005	2006	2007	2008	beyond 2008
<u>Budgetary costs</u> (e.g in millions of €) Overall budget (for period as specified in 2.1 and 2.2) : No budget							
<u>source(s) of funds:</u> No direct funding involved							
<u>Expected impact:</u> Improved technology transfer							
<u>Suggested indicators to measure progress:</u> N/A							
Comments:							

European Trend Chart on Innovation

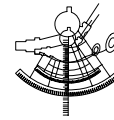


Annex 3: European Innovations Scoreboard: country pages



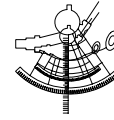
Indicator quality concerns: None known.

European Trend Chart on Innovation



DENMARK				(2003)	(2004)	2005	Relative to EU	Trend	Trend EU		
SII	--	--	--	--	0.61	0.62	0.60	-0.7	0.0		
	<i>relative to EU</i>	--	--	--	144	145	142				
	<i>rank</i>	--	--	--	5	5	5				
		1998	1999	2000	2001	2002	2003	2004			
INPUT - Innovation drivers											
1.1	S&E graduates	8.1	8.2	11.7	12.2	11.7	12.5	--	102	8	9
	<i>relative to EU</i>	--	87	115	111	103	102	--			
1.2	Population with tertiary education	25.4	26.6	26.2	28.4	29.6	31.9	32.9	150	8	4
	<i>relative to EU</i>	--	--	131	141	145	150	150			
1.3	Broadband penetration rate	--	--	--	--	7.4	10.4	15.6	205	32	50
	<i>relative to EU</i>	--	--	--	--	--	--	205			
1.4	Participation in life-long learning	19.8	19.8	20.8	17.8	18.4	25.7	27.6	279	--	--
	<i>relative to EU</i>	--	--	263	225	230	276	279			
1.5	Youth education attainment level	76.3	73.2	69.8	78.5	79.6	74.4	76.1	99	--	0
	<i>relative to EU</i>	--	--	--	--	--	97	99			
INPUT - Knowledge creation											
2.1	Public R&D expenditures	0.73	0.77	0.76	0.75	0.79	0.80	--	116	3	2
	<i>relative to EU</i>	111	118	115	112	116	116	--			
2.2	Business R&D expenditures	1.33	1.33	1.51	1.65	1.76	1.84	--	146	11	1
	<i>relative to EU</i>	115	110	124	132	141	146	--			
2.3	Share of med-high/high-tech R&D	84.5	86.7	--	--	--	--	--	97	--	--
	<i>relative to EU</i>	95	97	--	--	--	--	--			
2.4	Enterprises receiving public funding			3.2					39	--	--
2.5	Business financed university R&D	--	2.1	2.0	3.0	4.2	2.7	--	64	--	1
	<i>relative to EU</i>	--	32	31	45	64	--	--			
INPUT - Innovation & entrepreneurship											
3.1	SMEs innovating in-house			16.1		25.9			102	--	--
3.2	Innovative SMEs co-operating with others			15.7		16.6			143	--	--
3.3	Innovation expenditures			0.54		2.15			143	--	--
3.4	Early-stage venture capital	0.005	0.014	0.020	0.053	0.080	0.063	--	250	48	-28
	<i>relative to EU</i>	--	47	35	88	216	250	--			
3.5	ICT expenditures	--	--	7.0	6.8	6.8	6.7	6.7	106	-1	7
	<i>relative to EU</i>	--	--	108	108	103	105	106			
3.6	SMEs using non-technological change			26.0					61	--	--
OUTPUT - Application											
4.1	Employment in high-tech services	4.15	4.51	5.04	4.93	4.73	4.50	--	141	-3	0
	<i>relative to EU</i>	--	--	164	150	146	141	--			
4.2	Exports of high technology products	12.5	13.9	14.4	14.0	15.0	13.4	--	75	-3	-6
	<i>relative to EU</i>	--	71	70	68	82	75	--			
4.3	Sales new-to-market products			8.9		5.9			129	--	--
4.4	Sales new-to-firm not new-to-market products			18.0		25.6			380	--	--
4.5	Med-hi/high-tech manufacturing employment	6.83	6.39	6.44	6.99	6.31	6.12	--	93	-4	-3
	<i>relative to EU</i>	--	--	92	100	92	93	--			
OUTPUT - Intellectual property											
5.1	New EPO patents	139.7	168.5	199.3	225.7	214.8	--	--	161	13	5
	<i>relative to EU</i>	128	142	149	159	161	--	--			
5.2	New USPTO patents	75.0	91.7	81.7	91.3	83.8	--	--	117	1	6
	<i>relative to EU</i>	123	146	123	127	117	--	--			
5.3	New Triad patents	42.8	47.0	47.6	--	--	--	--	213	7	1
	<i>relative to EU</i>	187	211	213	--	--	--	--			
5.4	New community trademarks	--	--	--	--	135.7	166.7	139.9	160	2	16
	<i>relative to EU</i>	--	--	--	--	208	196	160			
5.5	New community designs	--	--	--	--	--	228.1	199.1	237	--	--
	<i>relative to EU</i>	--	--	--	--	--	334	237			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data



Annex 4: sources of further information

A4.1 Websites of key innovation organisations

Type of organisation	Name	Website
Not-for-profit foundation/organisations	Morgenavisen Jyllands - Posten	http://www.jp.dk
Not-for-profit foundation/organisations	Boersen	http://www.borsen.dk
Not-for-profit foundation/organisations	GTS - Advanced Technology Group	www.atg.dk
Higher education or public research institute	The Centre for Studies in Research and Research Policy; University of Aarhus (Aarhus Universitet)	www.cfa.au.dk
Other	The Academy of Technical Sciences	http://www.atv.dk
National government Ministry/department	Danish Agency for Enterprise and Housing	http://www.ebst.dk
Regional government/agency	Institut for Produktion og Ledelse	http://www.ipl.dtu.dk
National government Ministry/department	DANISH PATENT and TRADEMARK OFFICE	http://www.dkpto.dk
Other	Confederation of Danish Industries - DI	http://www.di.dk
National public agency	Danish Institute for Food and Veterinary Research	www.dfvf.dk
Other	VækstFonden	http://www.vaekstfonden.dk
National government Ministry/department	Ministry of Economic and Business Affairs	http://www.oem.dk
National government Ministry/department	Danish Research Agency(Forskningsstyrelsen)	http://www.forsk.dk

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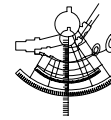
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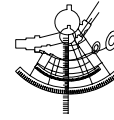
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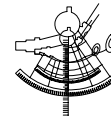
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