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Nordic Council of Ministers

Nordic Innovation Monitor 2009



Nordic Innovation Monitor 2009

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Nordic co-operation

Nordic cooperation is one of the world's most extensive forms of regional collaboration, involving Denmark, Finland, Iceland, Norway, Sweden, and three autonomous areas: the Faroe Islands, Greenland, and Åland.

Nordic cooperation has firm traditions in politics, the economy, and culture. It plays an important role in

European and international collaboration, and aims at creating a strong Nordic community in a strong Europe.

Nordic cooperation seeks to safeguard Nordic and regional interests and principles in the global community. Common Nordic values help the region solidify its position as one of the world's most innovative and competitive.

Preface

At the 26 and 27 of February 2009, the second Nordic Globalization Forum will take place in Iceland. The Forum this year will focus on climate, energy and innovation. The Nordic Innovation Monitor will be presented for the first time ever at the Globalization Forum 2009.

The Nordic Innovation Monitor gives an in depth analysis of the innovation performance of the Nordic countries compared with leading countries in the world and the framework conditions that exist in the individual countries. This allows for a fact based policy, and for learning from those countries in the world that shape the best conditions for innovation.

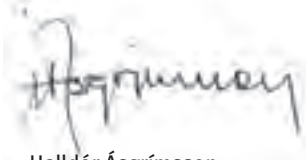
The analytical model has been used to help shaping national policies in Finland, Denmark and Holland. It also shows interesting perspectives, when looking at the five Nordic countries together.

The Nordic ministers of Enterprise will in 2009 start the discussions on a new Nordic strategy on innovation. The global economic crisis has enforced the focus on innovation, and the need to constantly improve performance in order to preserve the living standards and welfare systems as we know them in the Nordic countries.

I hope, that the Nordic Innovation Monitor will serve as a fact based platform that will lift the discussion on Nordic innovation to a new level and also serve as an input to discussions of the Nordic Ministers of Enterprise later this year.

I would like to thank the authors Charlotte Kjeldsen Krarup, Henrik Lynge-Hansen, Lise Andersen and Rikke Blæsbjerg Nielsen (FORA) for their excellent work. The analysis and conclusions in the Nordic Innovation Monitor are those of the authors and do not necessarily reflect the views of the Nordic Council of Ministers. However, I am convinced that the Nordic Innovation Monitor will be a useful instrument in our future work improving the Nordic conditions for innovation.

Copenhagen, 3 February 2009

A handwritten signature in dark ink, appearing to read 'Halldór Ásgrímsson', is written over a light, textured background.

Halldór Ásgrímsson

Nordic Innovation Monitor – 2009

Today, the global economic crisis is at the very top of the economic agenda. How deep and how long the economic crisis will last depends to a large extent on the economic policy response. The current economic crisis calls for an active economic policy.

Despite the current dark outlook, an active economic policy could promote a better future. A dynamic economic policy will give room for initiatives that can contribute to solving important global challenges such as climate change, the supply of clean water and social needs.

Innovation is a necessary part of new solutions to environmental and social challenges faced by many societies. It is therefore obvious that a strong innovation capacity is a crucial element in such an active economic policy.

The Nordic Innovation Monitor is an innovation model which rates the Nordic countries' innovation capacity against other groups of countries across the OECD. The Nordic Innovation Monitor is a fact-based platform for policy deliberations. Hence, it distinguishes between performance indicators and framework indicators. This distinction allows for comparing innovation capacity among the Nordic countries, illustrating which Nordic country is the top innovation performer and which Nordic country offers the best framework conditions for innovation.

The purpose of the Nordic Innovation Monitor is to assist the Nordic countries in formulating and implementing future-oriented innovation policies. To address new ten-

dencies and drivers of innovation, the report will include discussions on what values and institutional competences the Nordic countries share that can give unique comparative advantages in the future innovation race.

The conclusions of the innovation capacity in the Nordic region are¹⁾:

- The Nordic region performs well in the area of ICT
- On knowledge creation, the Nordic region is investing heavily in R&D
- The Nordic region is losing ground on human resources
- On stimulating high-growth entrepreneurship, the Nordic region lags far behind the leading countries

This executive summary provides an extract of the overall findings of the analyses of the Nordic Innovation Monitor. Throughout the paper, references will be made to the Nordic Innovation Monitor 2009 report. The final report – with detailed descriptions of results, analyses and methods – will be available at the Nordic Globalisation Forum in Iceland, February 2009.

1) Please note that the statistics used in the Nordic Innovation Monitor 2009 covers data up till 2008. The influence of the current economic crisis will not be directly reflected in the indicators.



Innovation Capacity and the Nordic Innovation Monitor

Innovation is recognized as one of the main sources of economic competitiveness, job creation and wealth creation. Consequently, innovation policies have become an increasingly important part of economic policy, and the creation of strong framework conditions for innovation has been given high priority across all Nordic countries.

Innovation is defined as new solutions, which add value to both customers and firms. Innovation takes place within private and public entities.

Innovation policy is defined as the creation of framework conditions which help companies and public entities in their innovation activities.

Innovation capacity is defined as a country's ability to create new valuable solutions. The capacity to innovate hinges on politically-built framework conditions and how companies utilise strong framework conditions in shaping innovations.

The Nordic Innovation Monitor measures countries' innovation capacity on four drivers of innovation:

- Information and Communication Technology: the exhibited use of ICT as an enabler of innovation
- Human Resources: the development of high quality knowledge workers and companies' use of their employees' creative and innovative skills
- Knowledge Creation: investments in new knowledge and companies' use of the benefits offered by new knowledge
- Entrepreneurship: entrepreneurship activities in terms of the number of start-ups as well as the number of high-growth entrepreneurs

Each driver is measured by a number of indicators. All indicators are listed in the Nordic Innovation Monitor 2009 report.

The Nordic Innovation Monitor 2009

The Nordic Innovation Monitor consists of two composite indexes summarising performance and framework conditions for ICT, human resources, knowledge creation and entrepreneurship. The high correlation between the indexes gives reason to believe that changes in framework conditions will impact a country's performance. Therefore, the Nordic Innovation Monitor is focused on identifying initiatives that can improve the framework conditions, thereby affecting overall innovation performance.

The composite indicator for performance covers nine performance areas, which in turn are based on 30 indicators measuring the four drivers of innovation. The composite indicator for framework conditions covers 42 policy areas based on 135 indicators, covering policy areas for the four drivers of innovation.

The Nordic Innovation Monitor covers a total of 165 indicators collected from valid international sources including OECD, WEF, IMF, IMD, ILO and Eurostat.

The model compares country performance over a period of 5 years and has been updated annually since 2003 – allowing to the tracking of national innovation performance over time.

The analytical design, data and statistical analyses are explained in detail in the Nordic Innovation Monitor 2009 report and Appendices.

Like all other benchmark analyses, the Nordic Innovation Monitor's methodology only uses internationally comparable statistics, and is therefore limited by the availability of such data. A key area in this respect is how to calculate the value created from innovation. No direct measure is available; hence one is forced to apply indirect estimation measures. As a consequence, the US Secretary of Commerce appointed a high level committee two years ago with representatives from a number of leading US companies and an elite group of researchers. They have presented a very interesting proposal for new innovation statistics²⁾.

The Nordic countries have the opportunity to support such initiative and join forces and assume a leading role in the creation of a new and significantly-improved measurement system for innovation.

The Nordic Innovation Capacity Compared to Other Country Groups

The global economic crisis is a reminder of the importance of sound economic fundamentals. Debt control – both in the public and the private sectors – and inflation control are critical. However, sound economic fundamentals are far from sufficient in creating economic prosperity. This requires well-functioning, effective and competitive labour, commodity and capital markets and investments in micro policies establishing good framework conditions that are conducive to innovation.

The correlation between well-functioning markets, innovation capacity and economic wealth is analysed in detail in the Nordic Innovation Monitor report.

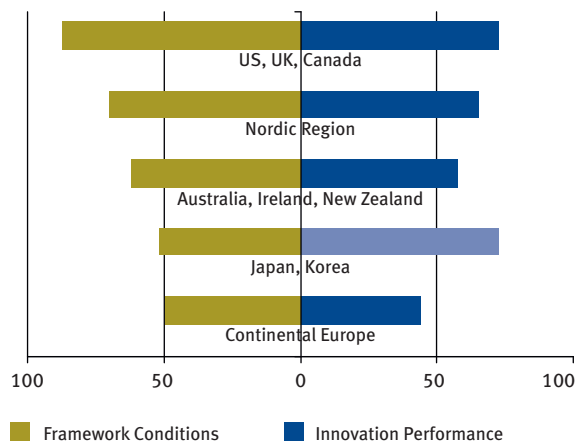
The conclusion of the analyses in the Nordic Innovation Monitor report is that the Nordic countries' heavy investments in micro policies conducive to innovation explain a large part of the increase in economic wealth among the Nordic countries.

Not neglecting the importance of macro-economic fundamentals, the Nordic Innovation Monitor focuses on evaluating the details on each country's national innovation capacity.

When comparing the Nordic Region to other industrialised regions in the world, central economies in the OECD (the United States, Canada and the UK) exhibit the best framework conditions for innovation and also have the best innovation performance. They are followed closely by the Nordic countries, while other regions lag behind (see Figure 1).

2) Innovation Measurement: Tracking the State of Innovation in the American Economy, the Advisory Committee on Measuring Innovation in the 21st Century Economy January 2008.

Figure 1: OECD Regions' Innovation Capacity



Source: Nordic Innovation Monitor 2009.

Note:

- a) Framework conditions and innovation performance are constituted by composite indexes made up by 165 indicators; see the report for detailed description on which indicators constitute the indexes and the correlation between framework conditions and innovation performance.
- b) Framework conditions and innovation performance are weighted in relation to GDP and measured on a scale from 1-100.
- c) In common Japan and Korea have extraordinary high performances on innovation performance indicators related to growth entrepreneurs and knowledge creation, but as they have insufficient data on other indicators, conclusions on their innovation performance must be combined with more in-depth peer reviews of these countries.

An in-depth look at the underlying indicators – comparing the Nordic Region with the best-performing countries – will highlight which areas would help improve innovation capacity the most. These analyses can guide policymakers' investment decisions (see Figure 2). Conclusions referred to in the following are based on analyses of the regions innovation capacity in the report.

Information and Communication Technology

The analyses show that the Nordic region has strong framework conditions in ICT, which in turn has materialised into solid ICT performance. Indicators show that the Nordic citizens are highly skilled in terms of ICT use and are among the world's most active users of the internet. Private companies in the Nordic countries are also among the most ICT-intensive companies, and the digitalization

of public sector institutions is very advanced across the Nordic countries.

The conclusion on ICT is that both individuals and companies in the Nordic countries master ICT, and the Nordic countries post the world's best framework conditions in terms of seizing the benefits of ICT and using it as an indispensable enabler of innovation.

Human Resources

The Nordic countries have, over time, had a substantial focus on talent development and education. The indicators show that the Nordic Region is characterised by high levels of investments in their educational systems. However, it is far from enough that the educational system produces graduates and students that are capable of working with innovation. It is equally important that the companies use knowledge workers' creative and innovative skills. This requires competent global strategic management and flexible organisations with a short distance to power, delegation of responsibility, and autonomous innovation teams. In this respect, data show that the Nordic countries are well-prepared. However, compared to the US, the Nordic region still has room for improvement in the areas of management skills and conditions for organisations.

The conclusion on investments in human resources is that the Nordic region has solid framework conditions – comparable to the leading English-speaking countries. Still, there are significant differences among the Nordic countries in how framework conditions in this policy area are designed with some countries showing a tendency to be stagnating in this area.

Knowledge Creation

Investments in new knowledge and systems for sharing knowledge have been given high priority across the Nordic region. This has also been the case across the leading English-speaking countries. The indicators applied in the Nordic Innovation Monitor illustrate that the Nordic countries match the performance of the three top-ranked

English-speaking countries in terms of knowledge-building and knowledge-sharing framework conditions, with high priority being given to R&D and access to technology.

In the area of knowledge creation, there is a lack of international indicators that measure new innovation areas, e.g. how knowledge is sourced globally and how framework conditions enforce open innovation and user involvement. Based on statistical data we cannot tell how the Nordic countries perform in this area. In the Nordic Innovation Monitor these issues are addressed when looking into new trends in innovation policy.

The conclusion is that the Nordic region matches the leading English-speaking countries in terms of the framework conditions for knowledge creation, but this will also be the area where countries most likely will need to develop specific competencies that are not captured by existing data.

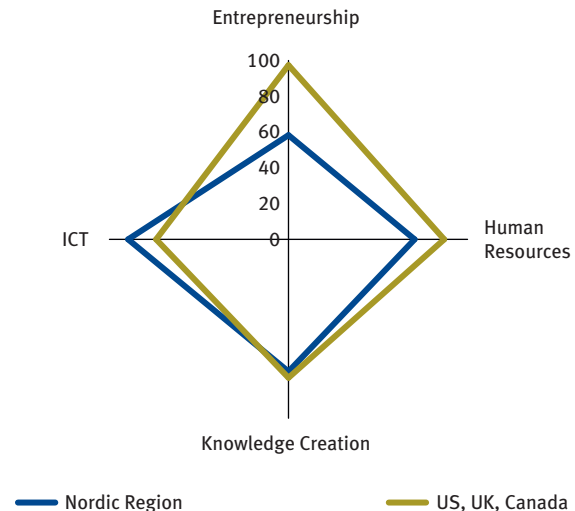
Entrepreneurship

Entrepreneurship is the final – and very important policy area – of innovation capacity. There are some weak indications that the innovation coming from new firms is as important to a country's wealth creation as innovation from existing companies³⁾. It is therefore crucial that countries offer good framework conditions for entrepreneurship. This is not the case in the Nordic region. The three leading English-speaking countries exhibit the best framework conditions for entrepreneurship, and the Nordic countries lag far behind.

In the Nordic Innovation Monitor, indicators point to the Nordic entrepreneurship culture as being weak. Entrepreneurship culture is crucial to the creation of a strong entrepreneurship eco-system, and as a result of the missing entrepreneurship culture, there is a lack of high-growth entrepreneurs in the Nordic Region compared to the English-speaking countries. In relation to start-up activity, the Nordic Region performs better.

3) Entrepreneurship and growth is proved to have a relatively higher impact on growth in MFP. The entrepreneurship driver is reflecting this higher impact on the overall performance indicator. For analysis on this, see Innovation Monitor 2004.

Figure 2: Framework Conditions in the Nordic Countries and the Leading English-Speaking Countries



Source: Nordic Innovation Monitor 2009.

Note:
The Spider web illustrates the framework conditions of the Nordic Region against the framework conditions of the world's best-performing region on innovation.

The conclusion is that the Nordic region has an innovation potential in supporting a more growth-oriented entrepreneurial culture. Compared to English-speaking countries, the Nordic region has much to learn in terms of improving the framework conditions for entrepreneurship.

Innovation Capacity in Individual Nordic Countries

The Nordic Innovation Monitor is designed to provide a fact-based platform for innovation policy. Individual countries may use the monitor to evaluate their strengths and weaknesses in important innovation policy areas, and use this as a platform for formulating innovation policy strategies. Based on careful investigations of the detailed micro-structures in best-practice countries, one may identify areas where peer countries’ experiences will provide inspiration for new policy initiatives.

Differences in history and culture will sometimes lead to differences in institutional conditions so that experiences from one country are less relevant in other countries. This will rarely be the case for the Nordic countries – where history, culture and institutional conditions have many similarities. But there are also decisive differences among the Nordic countries. This also applies to innovation policy and framework conditions. Therefore, it seems obvious that the Nordic countries have a lot to learn from each other, and that a more systematic exchange of experiences could help and inspire the Nordic countries when building a world-class innovation capacity.

Looking at the ranking of each country underscores the fact that the Nordic countries could benefit from learning from each other when trying to improve their national innovation capacity. Not only do the Nordic countries share cultural values, most of the Nordic countries also share relatively high rankings in the overall index on framework conditions and innovation performance – making it evident that they can find best practice experience within the borders of the Nordic region.

Iceland, Denmark, and Finland are ranked in the top five when it comes to creating good framework conditions for innovation. Sweden is ranked 9th and Norway 12th. Iceland, Denmark and Norway have made progress over the past 5 years, whereas Finland and Sweden have lost marginal ground (see Table 1).

In terms of innovation performance, the Nordic countries are also ranked relatively high with Denmark and Sweden in the top-5. Iceland is ranked 6th, Finland 7th and Norway 15th. Denmark, Sweden, Iceland and Norway have improved their performance over the past 5 years, whereas Finland has lost ground (see Table 2).

Table 1: The Nordic Countries' Individual Ranking in the Nordic Innovation Monitor – Framework Conditions				
Framework	Ranking 2008	Index 2008	Index 2003	Change in rank 2003-2008
Iceland	2	79	68	4
Denmark	4	77	64	6
Finland	5	75	80	-3
Sweden	9	69	66	-2
Norway	12	62	55	2
Source: Nordic Innovation Monitor 2009.				
Note: The Innovation Monitor model ranks 25 OECD countries. The total ranking and analytical design and the list of indicators can be seen in the Nordic Innovation Monitor Report and Appendixes.				

Table 2: The Nordic Countries' Individual Ranking in the Nordic Innovation Monitor – Performance				
Performance	Ranking 2008	Index 2008	Index 2003	Change in rank 2003-2008
Denmark	4	71	52	8
Sweden	5	68	56	1
Iceland	6	66	56	1
Finland	7	66	66	-4
Norway	15	56	40	2
Source: Nordic Innovation Monitor 2009.				
Note: The Innovation Monitor model ranks 25 OECD countries. The total ranking and analytical design and the list of indicators can be seen in the Nordic Innovation Monitor Report and Appendixes.				

The Nordic Innovation Monitor report shows a high correlation between framework conditions and innovation performance. However, one must expect a time lag before efforts improving framework conditions materialise into a positive effect on performance.

Peer Reviews

In the sections below, the main conclusions on the strengths and challenges will be presented for each Nordic country. Each country's development over time will be compared against top-performing countries for each of the four drivers. The conclusions in this paper will be an extract of the peer reviews presented in the final report.

The national performances have been discussed with key policymakers and innovation experts in each country in order to qualify data and to make sure that the interpretation fits the current political national innovation agenda.

Denmark

Denmark is among the leading countries in the global economy in 2008. The strong focus in recent years in developing the important drivers of innovation – human resources, knowledge building and knowledge sharing, ICT and entrepreneurship – have led to a significant improvement in the Danish innovation capacity. Denmark has made the most significant progress by climbing 8 spots within the latest five-year period and is now ranked 4th in innovation performance. At the same time, the framework conditions have improved with Denmark ranked 4th in 2008.

Denmark is ranked 4th in the human resource performance index. In one key area, Denmark has been the top-performing country at least as far back as when the indicators were initially introduced: organisation and management. The area is covered by three indicators (including employee motivation) and Denmark receives a top ranking on all three indicators. Denmark is challenged by a poor showing in terms of knowledge workers of working-age population (see Figure 3).

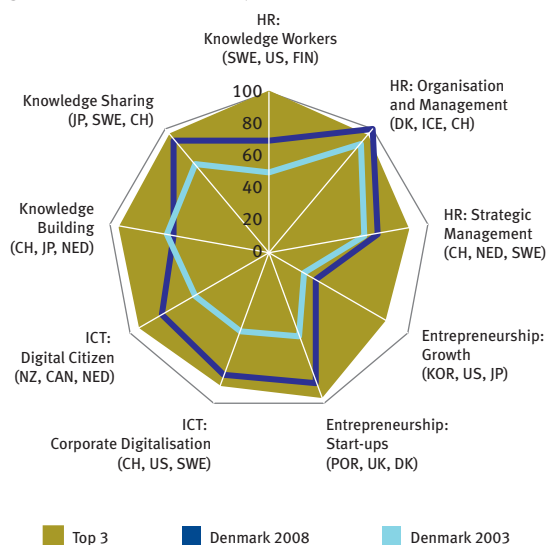
In terms of the framework conditions for human resources Denmark is ranked among global leaders. The high ranking is explained by solid rankings in flexibility of hiring and firing, lifelong learning and high education expenditure. One key challenge is Denmark's mediocre record in terms of the share of young people in higher education. Although

Denmark is ranked 6th in terms of share of population with a degree in higher education Denmark will most likely see a drop in the rankings in the longer term should the share of young people in higher education not increase.

In terms of ICT performance, Denmark is very well performing. Particularly, Denmark performs strongly on the indicator measuring the share of companies selling over the internet (see Figure 3).

The Danish framework conditions for ICT are the best among all countries. Thus, Denmark has succeeded in creating strong conditions and is ranked within top-5 in all the policy areas of relevance to ICT.

Figure 3: Innovation Performance – Denmark

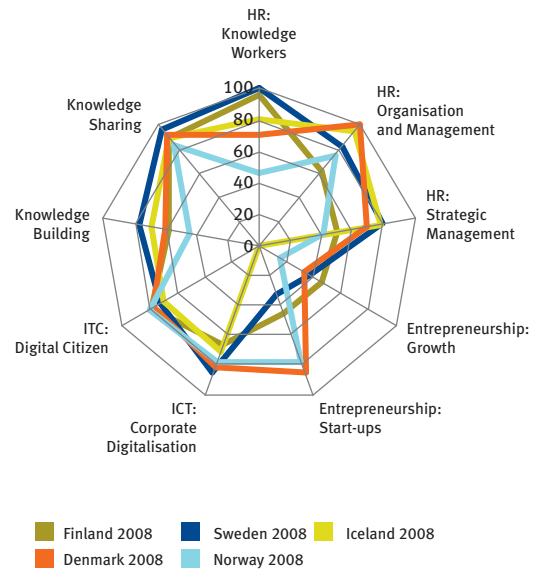


Source: Nordic Innovation Monitor 2009.

Note:

- The Spider web illustrates Denmark's performance on the 9 policy areas composing innovation performance.
- Top 3 consists of the top three performing countries on each of the 9 policy areas composing innovation performance.
- Spider webs illustrating Denmark's performance on framework conditions within the 42 policy areas will be presented in the final report.

*Figure 4: Innovation Performance
– The Nordic region*



Source: Nordic Innovation Monitor 2009.

Note:

- The spider web illustrates the Nordic countries performance on the 9 policy areas composing innovation performance.
- The analytical design and the list of indicators can be seen in the Nordic Innovation Monitor report and Appendixes.



Denmark is ranked average on performance for knowledge creation (see Figure 3). When measuring the framework conditions for knowledge creation, Denmark has two main challenges: To increase co-operation among business and universities in R&D and to use the expertise of high skilled knowledge workers, this includes attracting foreign professionals in Danish business life.

Entrepreneurship is essential to commercialise knowledge and creativity. Denmark is relatively strong in terms of start-up activity (see Figure 3). This was not the case 10 years ago; however, a strong and sustained political focus and a number of initiatives have materialised into solid Danish framework conditions for start-ups. As such, Denmark has solid conditions in administrative burdens, bankruptcy legislation, low entry barriers and access to foreign markets.

The high number of start-ups has yet to materialise into a satisfactory number of high-growth entrepreneurs compared to top-performing countries including the United States and Korea. Denmark also lags behind in framework conditions conducive to a high share of growth entrepreneurs. The Danish entrepreneurship culture is weak which could be tied to entrepreneurship education, where Denmark is ranked 16th. As is the case in the other Nordic countries the prevalent tax structures are not conducive to company start-up and growth.

Denmark has made significant progress in innovation capacity. Improved framework conditions have materialised into solid innovation performance.

Denmark is challenged by the declining competence level of young people.

There is a potential for improvement in innovation capacity in securing growth in newly-established companies.

While Denmark is well-prepared for the challenges of globalisation a number of issues remain to be addressed to maintain Denmark's unique position. The Danish government introduced the Globalisation Strategy in 2006, and with that, a number of initiatives in education, technology transfer and entrepreneurship. The Danish government maintains a strong focus on high-growth entrepreneurs, but the positive outcome of these policy initiatives has yet to materialise into a better performance on growth. The Globalisation Strategy also includes initiatives to address future drivers of innovation, e.g. through the programme for user driven innovation. The programme for user driven innovation aims to contribute to increased growth in the participating companies and increased user contentedness and/or increased efficiency in participating public institutions.

Finland

Finland's strong ability to create innovation has been declining in recent years, and the development of Finland's innovation capacity has come to a halt. Therefore, the Finnish government is working on a number of initiatives which will help improve micro-policy framework conditions conducive to generating innovative solutions in the coming years.

Over the past 5 years, Finland's position on innovation performance has remained unchanged – or has deteriorated – for all of the innovation drivers, resulting in a lower ranking. Finland has been overtaken by the other Nordic countries, which have improved performance for their innovation drivers. Finland is ranked 7th in 2008. The decline in performance is matched by a decline in Finland's micro-policy framework conditions. There is room for improvement if Finland successfully implements initiatives aimed at promoting the overall innovation capacity.

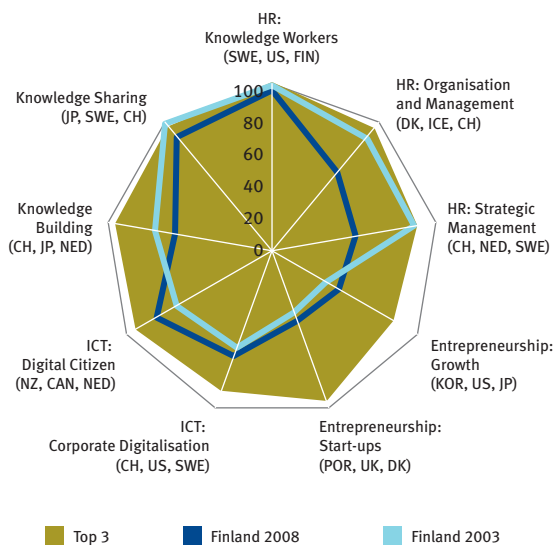
Finland is ranked in the top-3 when measuring the share of knowledge workers in the workforce. However, Finland posts a low score for the indicators measuring the companies' use of their employees' creative and innovative skills. Over the past 5 years, Finland has had a significant relapse in this area (see Figure 5).

In terms of the framework conditions for human resources, several indicators point to the unique Finnish education system. Finland is also ranked among the elite when measuring the share of the population with a degree in higher education, and Finnish pupils perform well in the Pisa surveys. While Finland overall is a top-performing country, its education expenditure is on par with other OECD countries. Finland's unique educational system has produced a large number of knowledge workers employed in Finland's business sector. However, in terms of organising and managing the workforce, Finland lags behind. This signals that Finland may not be harvesting the full potential of an excellent education system.

Like the other Nordic countries, Finland has a solid performance in ICT (7th) (see Figure 5). The same goes for the micro-policy framework where Finland is ranked 4th. ICT skills among the general public are solid, and the Finnish educational institutions are among the world's most sophisticated in terms of digitalisation.

Finland is investing heavily in knowledge-building and is ranked among the leading OECD countries. However, when companies are asked to evaluate the innovation activity level in Finnish companies, Finland is ranked 11th, which would indicate that Finland may not be harvesting the full potential of the investments made in new knowledge. Finnish companies are somewhat reluctant when evaluating the actual outcome of the knowledge investments made. A reluctance that can be caused by lacking cooperation between business and universities and poor knowledge transfers.

Figure 5: Innovation Performance – Finland



Source: Nordic Innovation Monitor 2009.

Note:

- The Spider web illustrates Finland's performance on the 9 policy areas composing innovation performance.
- Top 3 consists of the top three performing countries on each of the 9 policy areas composing innovation performance.
- Spider webs illustrating Finland's performance on framework conditions within the 42 policy areas will be presented in the final report.

Among the Nordic countries, Finland has seen the highest share of high-growth entrepreneurs. However, compared to the top-performing countries (the United States and Korea), Finland lags behind (see Figure 5). Initiatives to improve framework conditions for growth entrepreneurs would have a great impact on Finland's innovation capacity. Restart possibilities, tax structures and supporting entrepreneurial behaviour in the educational systems have been identified as policy areas where Finland could benefit from best practice analyses of other countries.

Finland's strong ability to innovate has come to a halt. Therefore, Finland could benefit from initiatives that improve the micro-policy framework for innovation, which in turn will re-establish a solid innovation capacity.

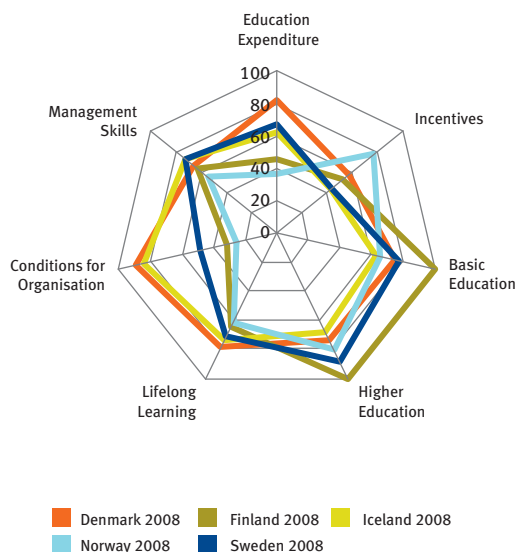
Human resources are an important prerequisite for innovation. Compared to other Nordic countries, Finland's education system is very strong. Thus, Finland has the best platform for generating innovative human resources.

Finland could benefit from putting more effort into better utilising R&D investments so that the Finnish business community can benefit from the knowledge generated by knowledge institutions.

There is a potential for improvement in innovation capacity in securing growth in newly-established companies.

The Finnish government has introduced a new innovation strategy which is to be implemented over the next few years. The government has provided room for the establishment of Aalto University. Interviews with some of the driving forces behind the initiative suggest that Finland's ambition is to create a university which experiments in inter-disciplinary activities and which has the ambition to create a new type of inter-cultural innovation and learning society. The effort will improve the framework conditions conducive to knowledge creation, human resources and entrepreneurial behaviour, and will set a complete new set of standards for innovative learning and for how knowledge is created and developed.

Figure 6: Framework Conditions on Human Resources – The Nordic region



Source: Nordic Innovation Monitor 2009.

Note:

- The spider web illustrates the Nordic countries framework conditions on the 7 policy areas composing human resources framework conditions.
- The analytical design and the list of indicators can be seen in the Nordic Innovation Monitor report and Appendixes.

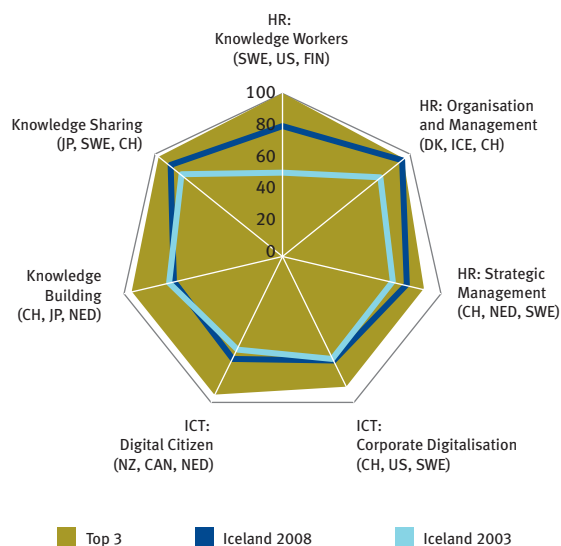
Iceland

Over the past decade, Iceland has seen the strongest growth in wealth in the Nordic Region. Iceland's economy has been transformed from a resource-based economy based on fishery and tourism into a knowledge-based economy focusing on the services sector. At the same time, the innovation debate has intensified. At the moment, Iceland is witnessing a financial downturn because of the global economic crisis. Therefore, innovation is an important part of the political agenda as innovation will significantly impact future wealth in Iceland.

When measuring overall performance, Iceland belongs to a group of countries which have improved their performance over the past 5 years. Iceland has made marginal improvements – from 7th to 6th – and remains in the top with the other Nordic countries in terms of overall innovation capacity (see Figure 7).

In the area of knowledge building and knowledge sharing, Iceland ranks 5th. However, Icelandic companies are rather hesitant in their evaluation of the innovation activity level in Icelandic companies, where the country is ranked 16th. Iceland is the country investing the most in R&D. And the business community evaluates the knowledge transfer between the companies and universities as being high. However, there is still some way to go in the cooperation between knowledge institutions and companies.

Figure 7: Innovation Performance – Iceland



Source: Nordic Innovation Monitor 2009.

Note:

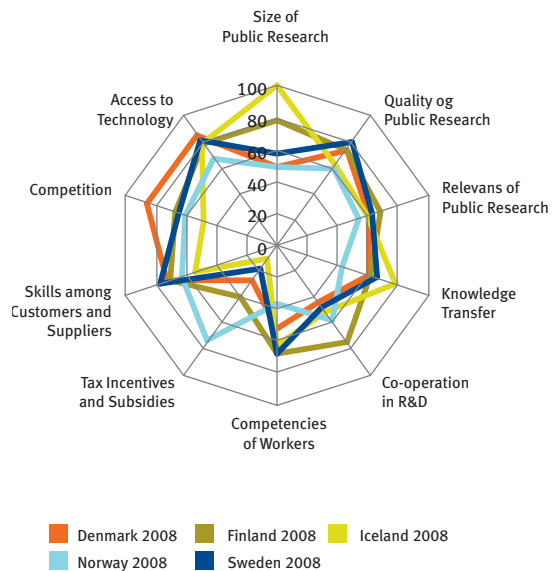
- The Spider web illustrates Iceland's performance on the 7 policy areas composing innovation performance.
- Top 3 consists of the top three performing countries on each of the 7 policy areas composing innovation performance.
- Spider webs illustrating Iceland's performance on framework conditions within the 42 policy areas will be presented in the final report.

Iceland has improved its performance in human resources over the past 5 years. When measuring the share of knowledge workers of the workforce, Iceland is a top-performing country. On indicators measuring the companies' use of their employees' creative and innovative skills, Iceland ranks 2nd. This has to do with a high level of worker motivation and the Icelandic companies' ability to adapt to new market changes (see Figure 7).

In terms of the framework conditions for human resources, Iceland has improved its performance. Iceland is investing heavily in the area of education as is the rest of the Nordic Region. But in terms of the scope and quality of basic and higher education, Iceland trails the other Nordic countries. This signals that Iceland may not be harvesting the full potential of the resources invested in the area of education. Furthermore, the global economic crisis has imposed cutbacks in university funding. Therefore, Iceland has to keep a strong focus on the quality of higher education.

Even though Iceland has improved its ICT performance, Iceland ranks lower than the other Nordic countries on the innovation driver measuring ICT use (see Figure 7). All countries perform well in the area of ICT, and are closely stacked in the normalised index - resulting in significant fluctuations in terms of overall ranking. But Iceland has the second-best framework conditions for ICT, and it should be possible to improve its performance. Despite great distances and deserted areas, Iceland has some of the best digital infrastructures in the world, and the educational institutions are among the most digitalised in the world.

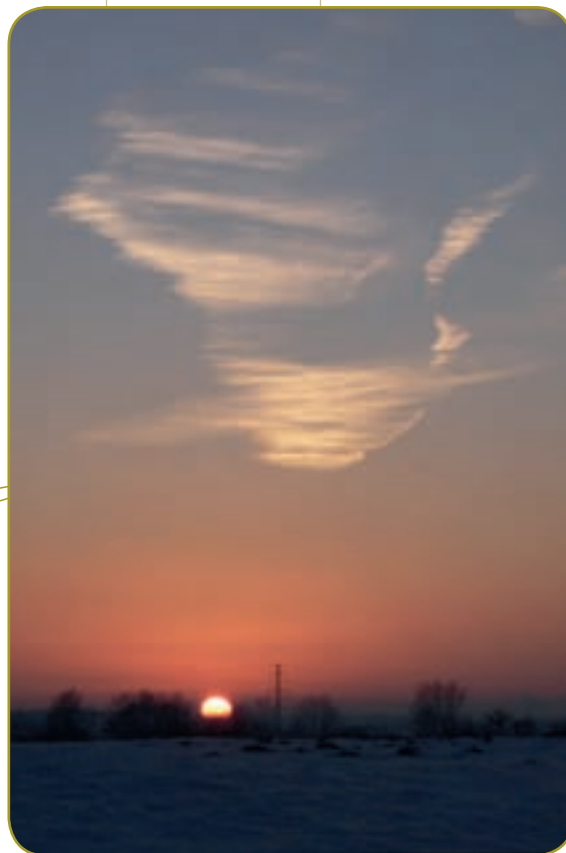
Figure 8: Framework Conditions on Knowledge Creation – The Nordic region



Source: Nordic Innovation Monitor 2009.

Note:

- a) The spider web illustrates the Nordic countries framework conditions on the 10 policy areas composing knowledge creation framework conditions.
- b) The analytical design and the list of indicators can be seen in the Nordic Innovation Monitor report and Appendixes.



There is no internationally comparable data available to measure Iceland's performance on entrepreneurship activity level (see Figure 7). But Iceland has the best framework conditions for entrepreneurship compared to the rest of the Nordic countries. The entrepreneurial culture in Iceland is strong. A significant share of the Icelandic population would like to be self-employed. Iceland's biggest challenge lies in re-building a venture capital market, which has declined significantly from 2003 to 2008. This has to do with the burst of the IT-bubble and the current global economic crisis.

ICT – and ICT use – is an important prerequisite for innovation. Among all Nordic countries, Iceland has the second-best framework conditions for ICT.

Iceland could benefit from focusing on the quality of the education system and work strategically to make the funding materialises in a high excellence education system.

Iceland could benefit from focusing on re-establishing the venture capital market and thereby increase the number of high-growth entrepreneurs and start-ups.

Interviews with Icelandic experts indicate high growth in the financial sector in later years. This growth has created wealth in Iceland, but at the same time it has been a demotivator for innovation among the Icelandic population. There has not been a need for innovation. Now the attitude has changed. Experts see innovation as a solution to the crisis and as a mean to restore economic wealth. Therefore, Iceland is working on innovative solutions to environmental challenges. Maybe Iceland's good framework conditions on innovation can strengthen its ability to overcome the challenges of the current economic crisis.



Norway

Norway can be regarded as an economy that relies more heavily on the production and sales of raw materials compared to other highly-developed countries. Therefore, it can be argued that Norway has been less dependent on a strong innovation capacity, or – rather – that Norwegian industry has developed innovative capabilities that are well-suited to the needs of these kind of companies. Whether this will hold true in the future remains a crucial question.

When measuring the overall performance, Norway belongs to a group of countries which has improved their innovation performance over the past 5 years. Norway has improved its ranking from 17th to 15th – but still lags behind the other Nordic countries in terms of overall innovation capacity.

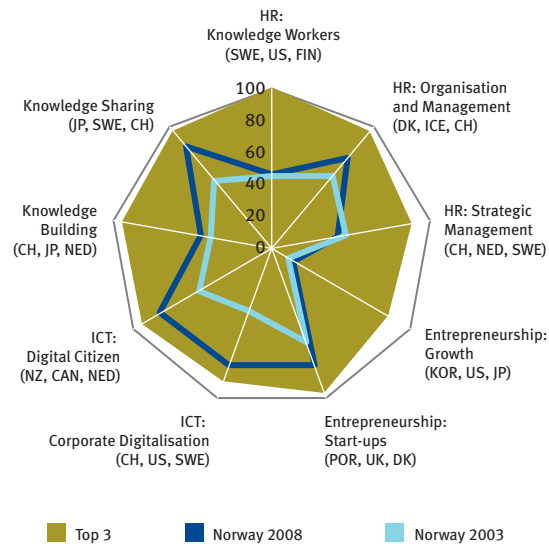
Among the Nordic countries Norway is the top-performer in ICT (see Figure 9). The business community and the public sector are very sophisticated users of ICT. Norway's ICT framework conditions are also strong, particularly in areas such as ICT competencies among employees, digital consumers and access to public content on the internet.

In terms of human resource performance, Norway is relatively strong when measuring the companies' use of their employees' creative and innovative skills. In the areas of delegation, employee motivation and the companies' readiness for change, Norway is ranked 6th. Norway ranks lower when measuring the share of high skilled knowledge workers in the working age population, which probably is tied to the dependence of the Norwegian economy on the production of raw materials⁴⁾ (see Figure 9).

When measuring human resource framework conditions Norway does not perform among the best, despite a high education expenditure per student.

In terms of high growth entrepreneurship, Norway's ranking on performance is low as is the case in the other Nordic Countries (see Figure 9). The framework conditions for start-up activity are quite good. On the other hand, Norway performs less well in terms of growth entrepreneur

Figure 9: Innovation Performance – Norway



Source: Nordic Innovation Monitor 2009.

Note:

- The Spider web illustrates Norway's performance on the 9 policy areas composing innovation performance.
- Top 3 consists of the top three performing countries on each of the 9 policy areas composing innovation performance.
- Spider webs illustrating Norway's performance on framework conditions within the 42 policy areas will be presented in the final report.

framework conditions. Like the other Nordic countries, Norway is ranked quite poor on entrepreneurship culture. Furthermore, restart possibilities are quite poor in Norway, and the prevalent tax structure does not provide incentives for start-up activity and growth.

In terms of knowledge building performance, Norway is ranked 12th when measuring business executives' assessment of the innovation capacity. There is a strong potential for a high ranking in this area when sizing government investments in R&D per capita. Norway gives R&D high

4) Norway has a high share of people - one in four - employed as technical staff and associate professionals. Among other things this covers technical staff in the oil industry. These categories are not included in the statistics measuring knowledge workers.



priority, especially in areas relevant for Norway's business structure. The negative assessment of the innovation capacity could indicate that Norway is not realising the full benefits of the invested funds.

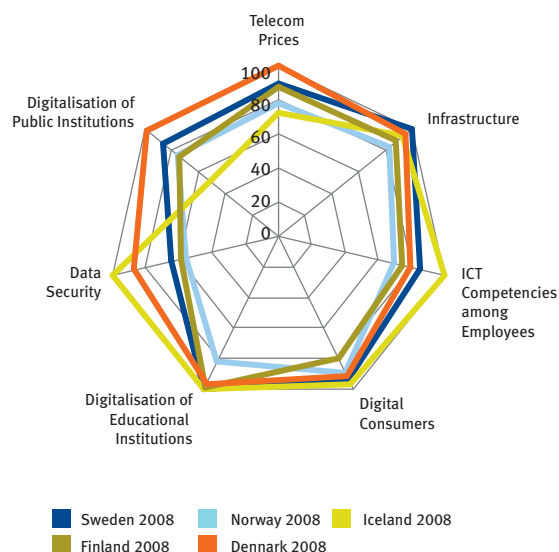
ICT - and ICT use - is an important prerequisite for innovation. Among the Nordic countries Norway is top-performing in ICT.

Norway could benefit from creating better framework conditions for growth entrepreneurs and improve competences in the national entrepreneurship ecosystem.

Norway faces a challenge in harvesting the effect of resources invested in R&D and let them materialise in a strong knowledge building.

In December 2008, the Norwegian Government published the White Paper *An Innovative and Sustainable Norway*. The paper deals with important areas for innovation. The focus is on establishing favourable conditions for increased innovation in Norway. Initiatives in the coming years include better conditions for small and medium-sized enterprises, strengthening of the education system and increased research investments in the public sector. Among other things, strategy councils for small and medium-sized enterprises and environmental technology are to be established.

Figure 10: Framework Conditions on ICT
– The Nordic region



Source: Nordic Innovation Monitor 2009.

Note:

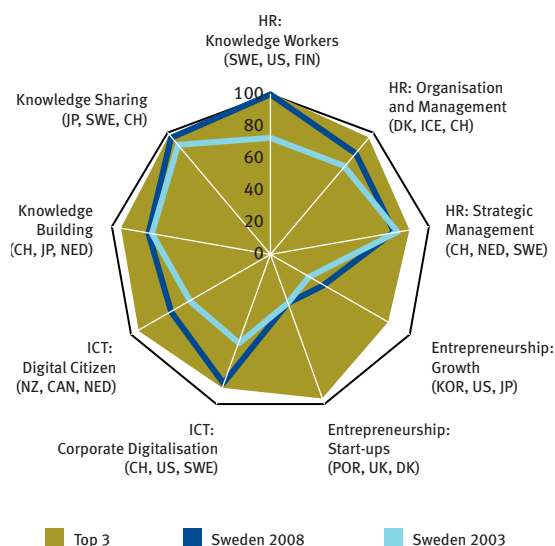
- a) The spider web illustrates the Nordic countries framework conditions on the 7 policy areas composing ICT framework conditions.
- b) The analytical design and the list of indicators can be seen in the Nordic Innovation Monitor report and Appendixes.

Sweden

The right amount – and use – of human resources and talent is a very important driver of innovation and wealth. Many researchers and knowledge workers are employed in Swedish industries. Sweden invests heavily in new knowledge, and (in contrast to most other Nordic countries) the companies offer a very positive evaluation of the innovation activity level across industries. On overall innovation performance, Sweden is ranked 5th. On framework conditions, the country performs less well (ranked 9th).

Sweden is the top-ranked country in the area of human resource performance (see Figure 11). Sweden is second to none when measuring the share of researchers. However, when measuring the framework conditions in this area, Sweden is ranked 7th – trailing both Denmark and Iceland.

Figure 11: Innovation performance – Sweden



Source: Nordic Innovation Monitor 2009.

Note:

- The Spider web illustrates Sweden's performance on the 9 policy areas composing innovation performance.
- Top 3 consists of the top three performing countries on each of the 9 policy areas composing innovation performance.
- Spider webs illustrating Sweden's performance on framework conditions within the 42 policy areas will be presented in the final report.

Here, the primary strength is found in the scope of higher education where Sweden is ranked in the top-5.

Sweden's ranking is also strong in the area of knowledge building and knowledge sharing performance (ranked 3rd) (see Figure 11). A prerequisite for knowledge sharing is that knowledge building is solid. Sweden is the only Nordic country to be ranked in the top-5 in both knowledge-building and knowledge-sharing in 2008. This was also the case in 2003. Supporting the impression that knowledge creation is the backbone of Swedish innovation policy.

Sweden is also well-positioned when measuring the overall framework conditions for knowledge-building and knowledge-sharing (ranked 4th). In terms of quality and relevance of research, Sweden is among the top-ranked countries. In the area of knowledge-sharing, Sweden performs well in access to technology and quality of customers and suppliers, and is ranked 3rd in both areas.

As is the case in the other Nordic countries, Sweden performs well in ICT and is ranked 5th. Sweden's strengths are particularly evident in the area of corporate digitalisation (see Figure 11). Sweden is ranked 3rd in framework conditions for ICT. Only Denmark and Iceland had better framework conditions in 2008.

Sweden has a rather poor ranking in terms of its entrepreneurship activities (see Figure 11). In terms of start-up activity, Sweden has the lowest ranking among the Nordic countries. When measuring high growth entrepreneurs, Sweden is ranked 9th – marginally below Finland.

Sweden is doing relatively well in some areas that are important to start-up activity such as venture capital, access to foreign market and administrative conditions.

In areas that are conducive to the share of growth entrepreneurs, Sweden's record is less impressive. They include entrepreneurship culture (21st), restart possibilities (23rd) and entrepreneurship education (18th). Sweden is also ranked in the bottom half in tax structure (i.e. personal income tax, corporate taxation, capital tax and wealth and bequest tax).

If innovation generated from emerging companies is an important part of a country's total wealth creation, the Nordic countries do not harvest all the benefits from their investments in new knowledge. Sweden has invested heavily in new knowledge, but is hardly reaping the full benefits when comparing to the United States and Korea (who both have a high entrepreneurial activity level and many high growth entrepreneurs).

Sweden is the top-performing country in share of knowledge workers, which is a critical driver of innovation and supported by high investments in human resources.

Sweden is the Nordic country that prioritises and invests most heavily in knowledge creation.

Sweden could benefit from a stronger emphasis on improving entrepreneurship conditions to both start-up activity and growth.

In its latest budget, the Swedish Government has placed strong emphasis on innovation by increasing the overall appropriation for R&D. According to the Government, a high effort in the area of research is very important for a strong competitive society in the long term.

The Government also acknowledges that entrepreneurs are vital to innovation. Therefore, research on entrepreneurship has been given a high priority. More specifically, the government will grant additional funds to research on entrepreneurship starting in 2009 to strengthen the knowledge of entrepreneurship and its correlation with higher wealth.

Conclusions on the innovation capacity in the Nordic region

The Nordic Region performs well compared to other leading regions in the area of ICT. The Nordic countries are leading in the world when it comes to integrating technology into everyday life and business models. Generally speaking, the Nordic Region has put significant efforts into promoting the public's and companies' access to ICT and education.

On knowledge creation, the Nordic Region is comparable to the best English-speaking countries when it comes to framework conditions and performance – suggesting that the Nordic Region has invested relatively heavily in research and development. However, analysis of future innovation policy trends points to the fact that some important areas are not captured by existing statistics in this area. There could be a shared Nordic interest in developing the indicators required to make fact-based policy on new trends in knowledge creation.

Looking at the framework conditions for human resources, the Nordic region is losing ground compared to the English-speaking countries. This will be a growing challenge for the Nordic region, where competition will be increasingly based on individuals' skills, experience and talent. A Nordic focus on best practice in this area would be most relevant in terms of improving skills and competencies among the workforce.

Entrepreneurship is the only area where the Nordic region lags far behind the English-speaking countries. Over the past decade across the entire Nordic region, there has been a growing political focus targeting entrepreneurship. Although efforts have led to significant improvements in some countries, the Nordic region still faces a challenge in formulating a Nordic-embedded entrepreneurship policy that commercialises high-growth entrepreneurship.

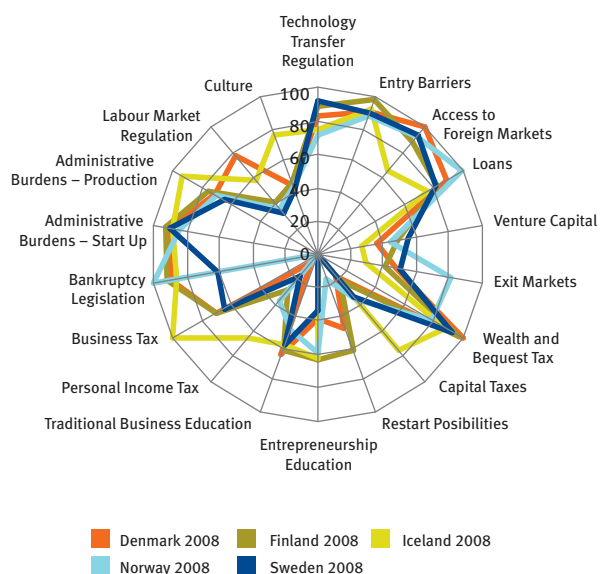
The conclusions on national and regional level serve as a fact-based platform for making decisions on innovation policy in the Nordic region. The Nordic Innovation Monitor thereby guides governments in improving national micro-policies through initiatives improving areas where countries lack behind expecting high impact on innovation performance. Such improvements of policy areas will contribute to the enforcement of the Nordic regions innovation capacity in the future.

However, parallel to the process of improving the micro-policies, countries work strategically with identifying new trends in innovation and analysing what are the policy

implications of these new trends. The policy implication can be important for e.g. policy on knowledge creation or entrepreneurship, or with time new policy areas will evolve.

Based on qualitative findings and previous analysis the Nordic Innovation Monitor report touches upon these new trends of innovation aiming to pinpoint some areas where the Nordic countries hold unique competitive advantages in utilising the future innovation drivers competitively. The hypothesis is that the Nordic countries have the strengths and the fundamentals in order to be global front-runners in the new age of innovation

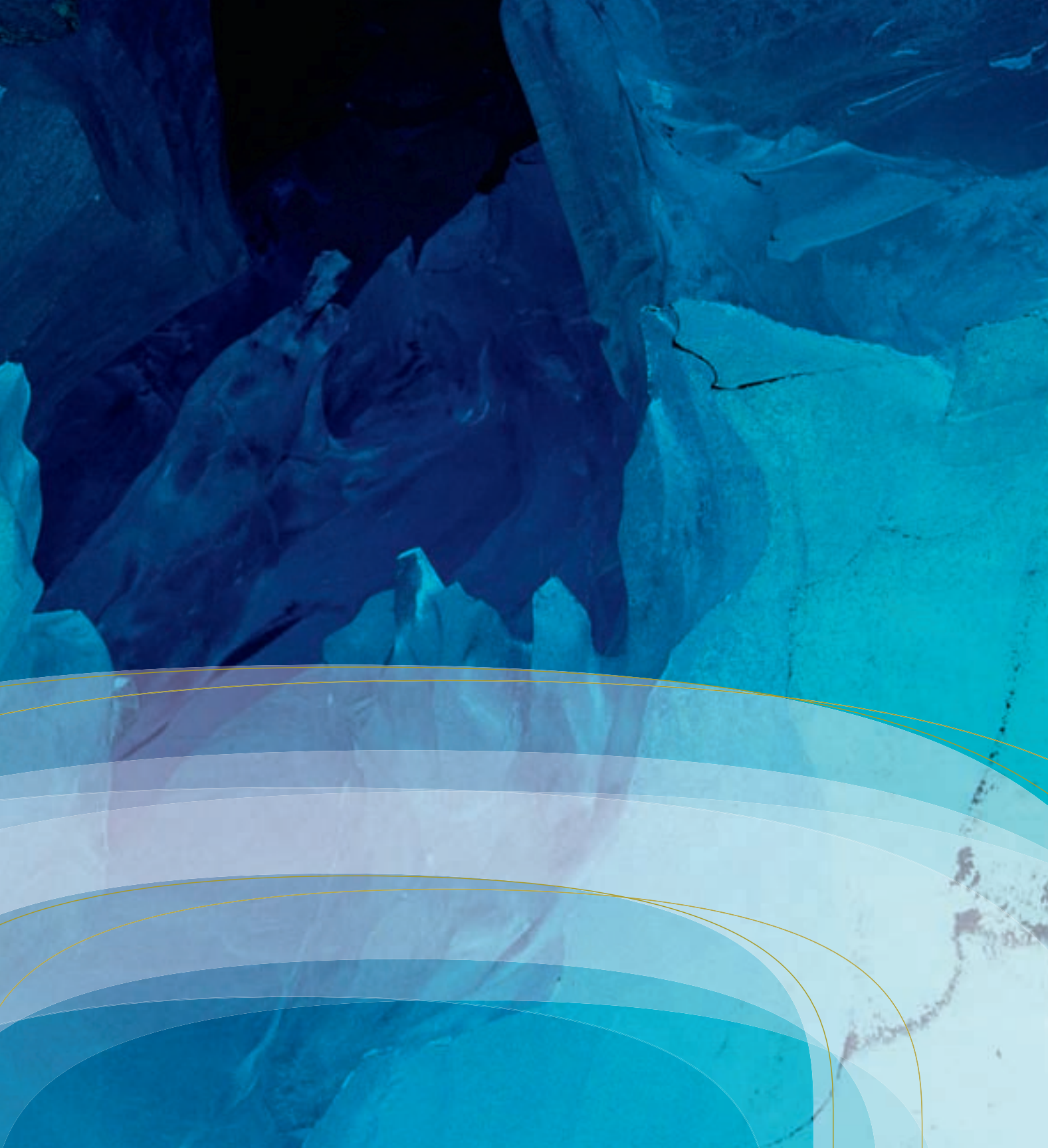
Figure 12: Framework Conditions on Entrepreneurship – The Nordic region



Source: Nordic Innovation Monitor 2009.

Note:

- The spider web illustrates the Nordic countries framework conditions on the 18 policy areas composing entrepreneurship framework conditions.
- The analytical design and the list of indicators can be seen in the Nordic Innovation Monitor report and Appendixes.



New Innovation Trends

The ambition of the Nordic Innovation Monitor is to guide countries in developing the most advanced innovation policy, but the innovation environment gets increasingly complex, and new generations of innovation policies must be created.

Governments play an important role in assisting the transition from an old innovation paradigm to an emerging one. The new innovation paradigm is still in the making, and the governments are acknowledging that the system is in a “transition” phase. Therefore, governments are currently considering how to allocate more funding and activities into building their innovation capacity to manage and embrace the transition.

Unique Nordic values and institutions give the Nordic countries an advantage in competing on some of the drivers of innovation evolving in the innovation horizon. Values affiliated to low distance to power, flexibility, equality, inclusion and environmental consciousness make significant contributions to build up absorptive capacity to benefit from global developments. In the Nordic Innovation Monitor report new innovation trends will be analysed in relation to the unique Nordic values.

Inspiration for identifying the new sources of innovation can be found by reviewing *next practice* among the world's most innovative companies. Drawing among other things from the OECD's efforts to draft a new innovation strategy, we will highlight the contours of some of the driving forces of innovation in the future⁵⁾. Knowing that these trends are already on the Nordic countries agenda, this can be seen as suggestions to areas where the Nordic countries could draw on common competencies in setting new standards for future innovation policies.

Co-create Value with Customers and Involve Users in the Innovation Process

Traditionally, company innovation has taken place in R&D departments where inspiration was found in new technology which was created. Another driver of innovation was the need to cut cost and create innovations which were cheaper than those of the competitors. The traditional way of working with innovation evolved around internal skills and various types of market research.

However, a new driver of innovation is inspiring companies and the public sector in the creation of products and services – user driven innovation⁶⁾. Entities are increasingly realising that by understanding user behaviour and needs, they will gain an understanding of which problems the users face and thereby how to solve them. The driver of innovation is shifting from technology creation and price reduction towards understanding which problems should be solved for users.

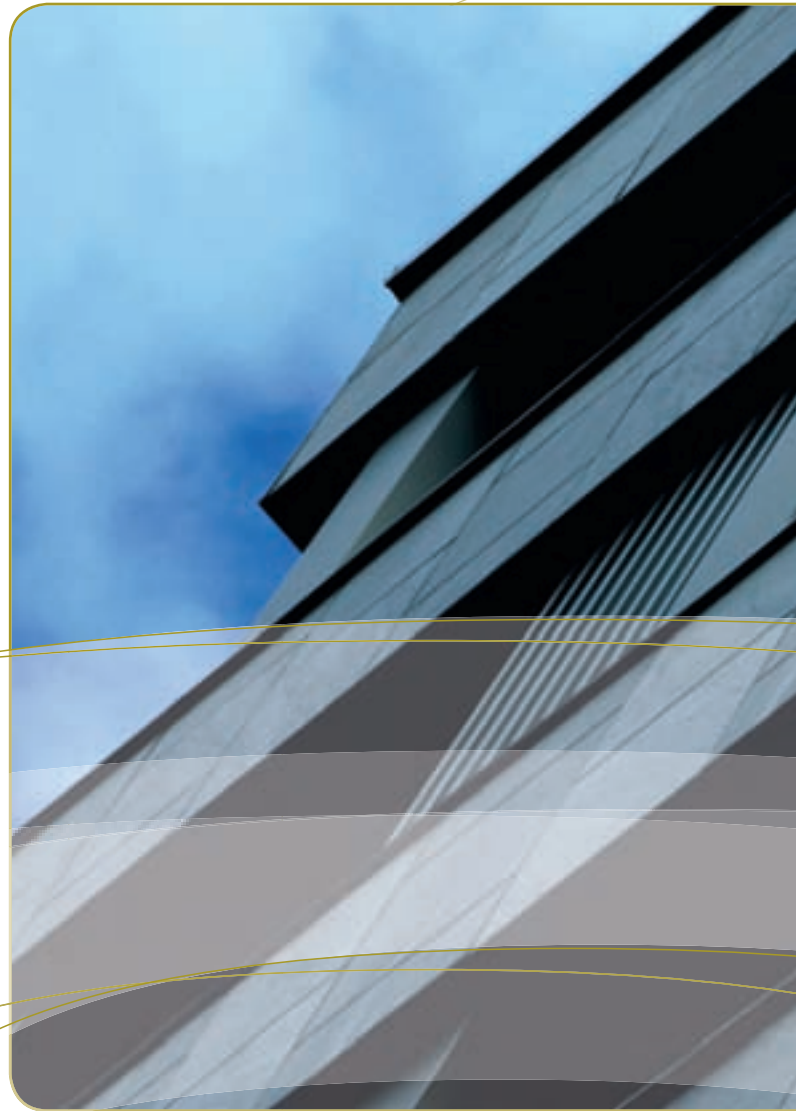
In order to understand user behaviour and needs companies and public institutions are employing new methods in the innovation process. Methods range from ethnographic research, observations and interviews, to involving the user in the development process through e.g. internet communities or as lead users.

Private and public entities make products and services customisable letting unique solutions be mass produced. The individual solutions often require an extensive partnership network and significant IT resources, which in turn poses a set of competence requirements to management, workforce and not the least, users.

5) “Changing nature of innovation”, note by NESTA and FORA, OECD, 2008

6) “User driven innovation – Results and recommendations”, FORA 2005

The Nordic countries have a strong set of competences in collaboration – with each other internally, with partners on an external scale and with customers and users. The Nordic values of inclusion, equality and trust enhance collaborative skills. Thus it is evident to further develop and apply the collaborative skills in the individualised innovation, where companies invite individual customers to create the product in collaboration with the company. The Nordic countries have strong skills in user-driven innovation, where the users recognised needs are part of the development phase and where the unrecognised needs and new development opportunities are exposed. By further developing and applying these skills the Nordic countries can identify new needs which will provide a platform for new solutions and new production.





Source Knowledge Globally

Multinationals have always sourced knowledge globally, but in the future, every company, even the smallest one, has the opportunity to source knowledge on a global scale – and they need to do so to manage the global competition on innovation.

In earlier days, companies usually searched for knowledge from renowned experts and institutions. Today, companies locate knowledge everywhere, even from individuals with a background and location that may appear less than obvious, but who nonetheless are highly relevant when attempting to solve a specific innovation challenge.

The new global search for knowledge bears important policy implications. In the industrial era, the free movement of commodities and capital was, and still is, crucial, but in the global knowledge economy, the free movement of knowledge workers will be critical. Codified knowledge can be shared at a distance, but tacit or hidden knowledge can only be shared through physical presence.

It is important for a country's or a region's wealth that companies take active part in global knowledge-sharing. It is also important that a country or region create unique knowledge which is attractive to companies abroad. Therefore it is more important now than ever that governments participate in creating knowledge of a unique quality and which is highly relevant to innovation. Deciding how to accomplish this is a challenging political task.

The Nordic countries are well prepared to develop and mobilise the talent mass found among general public and to supply companies with a workforce tailored to the challenges offered by the age of innovation. The labour market and the welfare state should undergo a continuous evolution to secure the best possible conditions for every single individual. At the same time it is necessary to ensure that talents from across the globe become part of the Nordic talent mobilisation in terms of providing knowledge and ideas and in being motivated and having access to work and carry out research in the Nordic countries. However, this will depend on the ability of the Nordic countries in finding new solutions in terms of including the surrounding world in the future Nordic competence building.

Explore New Business Opportunities Responding to Social and Environmental Challenges

Global challenges such as climate change, access to clean water and various social needs have until now been regarded as a political challenge and not a business challenge, implying that the responsibility for finding solutions rested with the political world. In the Nordic countries, the same was true for most welfare services. The governments held ownership of most welfare institutions and were responsible for welfare production.

It seems more and more obvious that the private/public demarcation is being challenged by a myriad of private and public entities that offer new solutions to problems caused by mankind's behaviour on earth. And they address challenges in the welfare sector where citizens ask for better and more individualized services. Both private and public entities open their innovation processes and create new solutions in collaboration with their partners.

The emerging demarcation also has repercussions for the role of governments. Public servants will have to collaborate in new ways with private companies. This requires a new set of skills and perhaps also a new culture in the public sector. At the same time the Nordic welfare system provides a long range of excellence that can be used as a key to innovation in social services if the framework conditions for innovating and cooperating with relevant partners are at place.

The Nordic countries are well prepared to respond the global demand for new environmentally-friendly, alternative energy sources such as wind power and much more. The Nordic values' strong respect for nature has contributed to the Nordic region's leading position in alternative energy. Still, there is a strong need for a pronounced political effort to secure that the Nordic countries remain pacesetters in developing new sustainable energy solutions. Also responding to social challenges and health issues the Nordic welfare system makes the Nordic countries well prepared to develop new services for elderly people, which may cover everything from tele-medication to disease prevention and activation, where the purpose is to atomise care, prevent diseases and mobilise elderly people to be part a supplement to the workforce.



An Opportunity for the Nordic Countries

As the Nordic Innovation Monitor demonstrates, the Nordic companies and governments are well positioned to take a leading role in exploring the new innovation trends and to develop practices and policies that turn these new trends into competitive advantages that generate growth and new jobs.

The Nordic countries hold an extremely strong position if they decide to collaborate to address new trends of innovation analytically and politically. The Nordic countries have been building a strong innovation capacity, making the

Nordic region a centre of excellence when it comes to the task of developing and implementing innovation policy. Instead of making parallel projects on grasping the policy implications of the new trends of innovation, the Nordic countries could benefit from collaborating in achieving new and relevant knowledge on these new areas and transform this knowledge into improved framework conditions for innovation policy.

The Nordic region could take on a global responsibility in leading countries out of the economic crisis by supporting an active innovation policy.



