

Working Paper Series

Department of Business Studies

No. 1, 2009

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National Innovation Policy Strategies in Denmark,
Finland and Sweden

By

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Abstract

This is a brief note on a complex set of issues. It gives a sketch of the outlines of the national innovation policy strategies in Denmark, Finland and Sweden with emphasis on new tendencies. At some points it indicates where there might be positive and negative lectures to learn when developing a national innovation strategy Norway.

ISBN 9788791646300

Introduction

I have worked with Nordic innovation strategies on and off since I moved from Sweden to Denmark 1973 and especially since 1991-92 when I together with Edquist wrote a chapter for the Nelson-book on National Innovation Systems where we compared the innovation systems of Sweden and Denmark. For the purpose of this note I have consulted three sets of recent documents from Denmark, Finland and Sweden:

1. InnovationDanmark 2007-2010 (and InnovationDanmark 2008.)
2. Proposal for Finland's National Innovation Strategy, June 2008
3. Regeringens Proposition 2008/09:50 Et lyft for för Forskning och Innovation.

These three sources originate from different types of organisations and have very different form and content. InnovationDanmark combines analysis and intentions with a presentation of specific policy programs already in operation – it is a document produced by the Danish Council for Technology and Innovation in charge both of giving policy advice and of managing relevant policy programs. The Strategy Proposal from Finland outlines a new strategy with proposals for new instruments and it has been produced by an ad hoc group bringing together experts strategically placed in the Finnish Innovation System. The Swedish document is the Annual Bill on Research and Innovation delivered by the Minister of Education to the Parliament and it outlines in detail resource allocation to research while some of the strategic considerations in relation to innovation policy are implicit rather than explicit.

What follows is an attempt to distillate a comparative understanding out of the three documents and to see what negative and positive lessons that can be drawn from such an exercise.

A first rough classification of national strategies

As a first rough classification I would propose:

1. Denmark has an activist, opportunistic and ambivalent strategy
2. Finland has a systematic, holistic and technocratic strategy
3. Sweden has a conservative and narrowly focused strategy

Denmark has been quick to absorb and adopt ideas for innovation policy from abroad. The fact that innovation policy became part of the mandate of the Ministry of Science led to a strong focus on how to transfer university produced research results into the market or into industrial innovation. In the more recent documents this tendency has become broadened through referring to specific classes of innovation as being not science-driven but ‘user-driven’ (2007) and more recently even ‘employee-driven’ (2008). In certain areas the quick adoption of certain policy practises – such as the opening up for university patenting – may prove difficult to revise even if the outcomes should turn out to be negative. The old strategy with focus on transforming research-based knowledge directly from universities into innovation has recently been broadened. More weight is now given to the role of technological institutes and to the hiring of academic personnel in small and medium-sized firms.

Finland seems now to be prepared to take new steps ahead in order to remain international leader in national innovation policy strategy. The new document is quite radical in proposing innovation to

become a major theme also when it comes to pursue radical reform in the public sector. The ‘technocratic’ reference flags a risk that mechanical applications of principles that work well in connection with innovation promotion in the private sector will be uncritically applied to public sector activities sensitive to human interaction and human needs (health, education etc.). The fact that innovation policy now has as host the Ministry of employment and economy contributes to a broad strategy with emphasis on the role of users, citizens and workers in relation to the innovation process. In general the strategy seems to build upon a sophisticated understanding of the innovation process.

Sweden is ranked number one in European innovation scoreboard – see appendix 1. But the *public* innovation policy strategy is quite limited in scope and perspective.¹ Almost all public research takes place within ‘universiteter och högskolor’ and innovation policy is mainly about how to transform and transfer research outcomes into innovation at the regional level. The amount of research taking place in government supported technological institutes is much smaller than in the other Nordic countries and this imbalance is not significantly changed with the new bill. There is little emphasis on the role of end users of innovations and no indication at all that the organisation of working life might affect innovation. The innovation promoting authority, Vinnova should use resources to promote ‘innovation systems’ in the economy. It appears as if Vinnova’s programs are inspired more by triple-helics and Porter’s Cluster analysis than by innovation system theory, however.

At the end of this document I will argue that the lack of understanding of the importance of social capital and participatory learning is a common problem for the three strategies.

Innovation policy strategies for the small Nordic countries

The Nordic countries are small. In spite of small size they perform well in economic terms – both GNP-measures and estimates of competitiveness place them at the top in international rankings. Sweden, Denmark and Finland also appear among the top five in the *European Innovation Scoreboard* while Norway lags far behind in this ranking. A critical issue when designing a national innovation policy strategy is *how innovation is transformed into economic performance and well-being in society*.

In the background paper (Lundvall 2008) referred to above I argued that there is a bias in the analysis of these ‘transformation mechanisms’ putting too much emphasis on science as a source of innovation (STI) and too little on experience-based learning (DUI) (see also Jensen et al 2007). It is only when new ideas are actually integrated in production, products and new services that they have their impact upon socio-economic development. Especially for small countries most ideas based in scientific research come from abroad and the capacity to integrate them in the practise of domestic firms will reflect not only R&D-activities but also the competence and collaborative efforts of scientists, engineers, managers, workers and experts on marketing.

To have a high rate of investment in R&D, frequent patenting and frequent new to the market innovations in domestic firms might be important - especially if it reflects a strong capacity to absorb and use new ideas – and in certain fields such as pharmaceuticals it is the case. But in

¹ This raises the issue if innovation policy may be private rather than public. The big Swedish firms and those who control them may have such strong in house capacities and strong links to the most relevant domestic research that they have signalled that they do not want or need a national innovation strategy – besides public investment in academic research. This might however go against the interests of domestic SMEs.

general small countries neither can nor should set the same ambitions for domestic innovation as the United States or China. Critical for small country performance is the capability to learn and this will reflect skilled labour, good labour relationships and good collaboration with customers and among experts with different backgrounds.

	DUI	STI
Innovation		Most policy attention
Diffusion	Major source of Nordic success	

This basic assumption will lie behind the presentation and assessment of the three national strategies. We are therefore starting with the question: To what extent do the new strategies represent an adequate balance between DUI and STI and between innovation new for the market and innovation diffusion?

The Swedish strategy remains strongly focused upon promoting research in an academic context. To this is added some recent efforts to stimulate universities to connect more strongly to industry. In this context the Minister also considers introducing university patents as a means to diffuse knowledge to industry. But at the end of an interesting argument he decides against it. Most of Vinnova’s funding of specific project is given from a triple-helics perspective – the idea is that government policy should help move knowledge from universities to industry. Especially interesting and somewhat broader in scope are Vinnova’s regional program VinnVäxt where local partners get together in ambitious efforts to build regional strength in specific fields of technology such as robotics or pharmaceuticals. But most funding activities have little focus on the demand side and on end users of innovations. It is striking that there seem to be no link whatsoever between innovation and the organisation of work in the current Swedish discourse. Another striking feature weakening the diffusion side is the marginal role played by industry technological institutes in government funded R&D. The STI-bias is and remains strong in Sweden.

The Danish strategy is broader than the Swedish. It is reflected in the peculiar Danish argument that ‘innovation can be research-driven, user-driven, employee-driven, market driven or (sic!) price-driven.’² Still there is a strong focus upon ‘commercialisation of university research’ and upon collaboration between universities and industry. Denmark introduced the right for universities to patent quite early (2000). One interesting new elements in the strategy is the focus upon the role of academic personnel in the business sector and the role of technological institutes in bridging between research activities and business. It is signalled that the strategy should move from being mainly oriented toward manufacturing toward first private and then also public services. The regional dimension is referred to but the administrative reform of the Counties means that regionally based Growth Fora should take charge of this dimension. While the strategy document refers to important elements within the DUI-dimension the distinction made between different

² The idea to classify innovations in such categories is not well supported by empirical and theoretical analysis – see Caraca et al (2008) for an attempt to bring together in one model the complex interactions involved. Most successful innovations are price-driven, draw upon science and employee competences and almost all needs to focus upon market demand and user needs. I believe that this peculiar terminology, that has influenced the organisation of Danish innovation research, should be seen in the light of the specific Danish situation. Originally innovation police was hosted by the ministry of industry and rather broad. When it was transferred to the ministry of science the STI-perspective took over almost completely. One way for those who played key roles in the ministry of industry to get back to a broader perspective was to introduce this somewhat dubious classification.

drivers tends to get in the way of a systemic approach where the aim is to combine the DUI- and STI-mode of innovation.

The *Finnish Strategy* is the one that gets closest to combining the DUI and the STI-mode in a systemic understanding of what drives innovation and of how innovation is transformed into economic performance. It covers much of the same issues as a covered in the Danish reports but the emphasis is much more on an integrated and systemic approach:

'As a concept, innovation has expanded and diversified considerably in the past few years. In terms of the related strategy, innovation is perceived as an exploited, competence-based competitive asset, which, in addition to the application of technology, can be founded on e.g. new service and business models, working and operating methods, or the management of product concepts and brands. Most typically, innovation emerges as a combination of many competencies. Broad-based innovation policy creates the preconditions for operating models combining the needs of users, consumers and citizens, alongside knowledge, creativity and competence.'

Some horizontal issues to be considered

In what follows I will discuss some issues that are controversial and difficult to handle when it comes to design a national innovation strategy and I will try to indicate what positive and negative lessons that can be drawn from the three Nordic countries.

Internationalisation strategies

In all the three countries there is awareness of globalisation and of a need to take part in transnational networks and in EUs programs. All three strategies aim at attracting star scholars from abroad. In the case of Sweden the focus is almost exclusively upon collaboration in natural science while the focus is broader and covering innovation collaboration in Denmark and Finland. Again the Danish strategy is more 'opportunistic' while the ideas behind the Finnish strategy are more consistent and systemic. In the Danish strategy there remains a strong focus upon *how Danish universities better can serve Danish firms* and to this is *added* the idea to attract foreign talent and to make Danish researchers more internationally oriented. The Finnish strategy takes into account that it is not realistic to get involved in global knowledge sharing if you are not making major contributions to it. The strategy therefore points to a mutual relationship between developing world lead competence and sharing competences world-wide.

In a globalising knowledge economy a common problem for small countries is to find a way of allocate public resources to research and development that takes into account:

1. That many *legitimate* domestic research endeavours have no immediate innovation outlets at all while others have no 'domestic clients'. The research may contribute to culture, understanding or to academic training programs.
2. That for most big and internationally oriented domestic firms that draw upon science there is no advantage to draw upon domestic as compared to foreign knowledge sources. When this happens it should not be taken as a sign of low quality of domestic research in the field.
3. Most domestic small firms do not have resources and capacity to *draw directly* upon academic research. But many of them can benefit from getting indirect and perhaps gradually more direct access. Here technological colleges and institutes with a more commercial profile have an important role as mediator.

A strategy that aims at a one to one match between domestic knowledge production at universities and domestic knowledge use by industry is detrimental to the university system and not in the interest of domestic industry. But there is some tendency in all national strategies to fall in this trap. For Sweden the absence of a strong institute sector forces the system in this direction but so far it has not gone as far as in Denmark where the efforts to commercialise university research have gone to extremes. The current Finnish strategy seems to get further in seeing the need to rethink these issues and give more attention to the role of other parts of the knowledge infrastructure than universities.

Both in Denmark and in Finland the growing emphasis in the strategy reports on the presence of academic labour in industry may also be seen as broadening the perspective from 'direct' to 'indirect knowledge transfer'.

Political prejudice and neglect

Sometimes certain public policy instruments are recommended as part of a national innovation strategy without much documentation. In the Finnish report *lowering personal taxes* is recommended in order to attract experts. There is, as far as I know, no evidence that low tax economies perform better in terms of innovation than those with high taxes. A general lowering of the tax level is certainly an expensive way to solve this problem. Selective measures would be more efficient.

A standard element of the national innovation strategies is a reference to the need to stimulate *entrepreneurship* understood as getting more individuals to start up their own new business. There is, as far as I know, no indication that countries with high frequencies of start-ups perform better in terms of innovation and growth than those with low frequencies of start ups. Most innovation processes are interactive and take place through interpersonal communication within or across borders of existing organisations. What may be more important than individual entrepreneurship may therefore be 'collective entrepreneurship' – the capacity of people to develop and implement new ideas together. It is interesting that this understanding is present in the Finnish strategy document. For instance it is recommended that the education system should enhance students' capacity to interact and work together. But it co-exists with the traditional argument in favour of individual entrepreneurship.

On the other hand there are certain dimensions that are documented to play a positive role for innovation that are neglected in most innovation strategies. There is documentation that countries successful in innovation offer a big share of employees participatory forms of work organisations and *learning organisation practises* at the level of the firm (Arundel et al 2007). Nonetheless innovation policy strategies often neglect the importance of promoting new forms of organisation – the Danish idea that this can be reduced to a special class of innovation that are 'employee driven' is not the best way to capture this. The new Finnish strategy builds upon a more adequate understanding of the innovation process while the Swedish tends completely to suppress this dimension.

Who should be in charge of innovation policy?

In Sweden innovation policy is something of an add-on to research policy and the policy is coordinated by the Minister of Education. Vinnova operates in parallel with three other authorities that fund research activities. In Denmark innovation policy was moved from the Ministry of Industry to the Ministry of Research and Telecommunication more than a decade ago. Since a

couple of years the Danish Council for Technology and Innovation is responsible both for giving policy advice and for implementing innovation policy – the secretariat of the council is part of the administrative unit serving all the Danish research councils and it is sorting under the Ministry of Science. In Finland the responsibility for innovation policy is now located in the Ministry of Employment and Industry. The new strategy document for Finland proposes several new governance forms – changing the Council for Science and Technology into a Council for Research and Innovation and, perhaps even more radical, the Cabinet committee on Economic Policy changing into the Cabinet committee on Economic and Innovation Policy.

It is obvious that the location of responsibility for innovation policy affects its content. Leaving it as part of ministries with responsibility for science policy will tend to weaken the attention to other dimensions of the innovation process related to markets, industrial networks and work organisations. This is most obvious in the Swedish case but also in Denmark the fact that it was necessary to add on user-driven and employee-driven innovations as separate categories may be seen as responding to the hitherto assumption that all innovations emanated from science. Leaving it as the responsibility of the ministry of industry may give more emphasis to the needs of industrial firms sometimes translated into an exaggeration of interest for programs that make life easier for SMEs, stimulating entrepreneurship and lowering taxes. The Finnish model where the coordination now takes place in a ministry where employment and economics are combined is interesting because it for once may give adequate weight to policies affecting human resources, labour market and work organisation.

The fact that we find the most sophisticated strategy for innovation in Finland may have as one explanation the unique role of the National Council for Science and Technology presided over by the Prime Minister (and serviced by extremely creative and competent administrators). The fact that this institution already in the beginning of the nineties initiated nation-wide discussions of the national innovation system involving different ministries and social partners may have avoided that innovation policy became taken hostage by a specific ministry within government. Finding ways to establish a balanced governance form that offers both some coherence in perspective and diversity in implementation of the strategy takes creative thinking and adjustment to the specific situation in each country. (It is interesting to note that the recent long term plan for innovation in China was made concrete and possible to implement by the Prime Minister. He rejected a less ambitious draft and supervised the design of the final version. – see Gu et al (2008).)

The role of universities and how should academic research be organised?

Universities are exposed to cross-pressure all over the world. On the one hand there is the search for excellence where excellence is measured as high output of scientific articles and frequent citations in important journals. On the other hand universities are expected to deliver knowledge to the market and to industry and this takes the form of hiring new university administrators in charge of ‘liaison’ with business firms or lawyers in charge of patent offices. There have been a series of ongoing reforms in all the Nordic countries aiming at excellence and usefulness. Some of these reforms have spread from one country to another without much analytical testing of their general or specific usefulness or relevance.

High quality in education and research reflects more than anything else the collective efforts of teams of scholars often with a strong scientific leader. Such teams will often have national and international links to other leading teams as well as to advanced users of research results or with

potential employers of graduates. The incentives driving successful individuals and teams are intrinsic – pride of success, the joy of solving problems together and so forth. In the Nordic countries these mechanisms seem to have worked exceptionally well (also in terms of publication frequency and citation impact where Nordic countries appeared at the top before university reforms). Why do we need to introduce evidence based distribution of money to research in this situation? Will such system have a positive impact upon the core mechanisms in academic organisations – the research team and its leadership? Norway started to introduce such mechanisms 2004 and now Denmark and Sweden are following direction. Has there been some critical assessment of the impact of the early Norwegian experience? What are the gains and what are the costs?³

In the field of commercialising university research Denmark has taken the lead introducing university patents already 2000 and now several Danish universities and Danish firms have some experience. Some of the experience is that building at each university the necessary expertise is costly and that the income created does not always cover the costs. Single successes may give ‘lottery gains’ but it is far from obvious that there will be a regular flow of income compensating for the costs. Business sector seems to be ambivalent to the new rules.⁴ Both Norway and Finland have instituted similar instruments and according to the Swedish Research Bill Sweden is moving in this direction. It might be a good idea to make a critical assessment of the Danish experience.

In the introduction I gave the Swedish strategy the epithet ‘conservative’. But when it comes to taking a stand on the two issues mentioned here the ‘conservatism’ appears to have given more room for critical reflection than the activist approaches in some of the other countries – see the Swedish Bill for a balanced argument.

Diversity as a source of innovation

One of the potential costs of introducing a singular evidence-based system to distribute means to knowledge institutions is that imposing the same incentive structure on all agents will make agents less diverse.⁵ I have argued that different principles of planning that start from below would give much more room for diversity and in the learning society a diverse knowledge infrastructure is an important source of innovation (Lundvall 2002). Specifically the planning could start from the research team and build up to a national strategy. For instance each university would with intervals present their own development plan including measurable indicators for success. It would make the life of ministerial bureaucrats more difficult and demanding but it would certainly be more in line with the logic of innovation than current systems.

It is interesting to analyse how the three national strategies refer to diversity in relation to innovation. None of them discuss the problems just referred to.

³ A very interesting ne paper by Dutch scholars analyse how research leaders and research teams working in the field of biotechnology in the UK and in Netherlands have responded to the double pressure. The case is interesting because new developments in the US in biotechnology research have more than anything else inspired commercialisation strategies. The authors show that researches see bureaucratisation as a major problem and a need to act opportunistically to survive under the new regime (Leisyte et al 2008).

⁴ In Denmark the very person who as director at the ministry of research installed the right to patent for Danish universities has changed his mind about the reform. After that he moved to a research active private firm he found that the new rule set got in the way for the kind of natural collaboration that would be the most efficient for both parties.

⁵ In Soviet Union all producers developed heavy products for the simple reason that production success was measured in tons. This syndrome – where the planner gets what he asks for but not necessarily what is needed - will appear under all generalised incentive systems, however sophisticated.

But the Swedish bill turns down the proposal to bring together the four existing research councils into one organisation with the argument that diversity in funding is more important than getting one hegemonic funding structure. This is in line with the analysis of the success of the US system as rooted in among other factors the diversity in its sources of funding for research.

It is interesting to note that Finnish document does not explicitly mention 'diversity'. This might reflect the downside of its systemic approach where there is a bias toward 'engineering' the system and to some degree neglecting that economic evolution is a self-propelling evolutionary process feeding upon and re-creating diversity not easy to manage and control.

When it comes to diversity the Danish strategy has most to offer (especially in the 2008 report). It builds upon an interesting analysis of how gender, education, age and ethnic diversity (mangfoldighed) contribute to innovation performance in Danish firms. On this basis it brings a discussion of what firms can do to promote innovation by aiming at diversity among employees and through giving employees a more active role in processes of change.

Social capital and participatory learning as the hidden and forgotten strengths of the Nordic Innovation Systems

According to New growth theory small countries should be worse off than big ones in a knowledge economy. To invest in knowledge creation is expensive while it is much less expensive to diffuse knowledge. Therefore it is a paradox that the small Nordic countries appear among the top ten countries in terms of GDP per capita. The case of Norway is especially interesting when it comes to analyse how innovation efforts relate to economic performance. Norway is performing well also after we subtract the impact of Oil revenue but it appears with a very low score in the European Innovation Scoreboard – see Appendix 1. In a recent paper Fagerberg (Fagerberg, Mowery and Verspagen 2008) and colleagues have explained this 'Norwegian paradox' with reference to the fact that Norway together with the other Nordic countries has developed a strong 'absorptive capacity'. The education level is high and broadly distributed, industrial networking is well developed in connection with innovation and as a result the diffusion of new technologies such as information technology is rapid. Also the research capacity in some traditional sectors is on level with that in other countries.

In another paper Jan Fagerberg and Martin Srholec (2008) have tried to locate what are the most crucial factors behind economic growth. Their analysis that includes more than 100 countries at different levels of economic developments shows that the strong position of the Nordic countries in terms of GNP is coupled with strong elements of what they define as social capital. Social capital has been seen as 'lubricating' the economic system making it less costly to make 'transactions'. This perspective is too limited. In an economy exposed to strong transformation pressure and rapid change social capital makes interactive learning more efficient. The egalitarian character of the Nordic innovation systems with small income and status differences makes vertical interactive learning and delegation of responsibility much more frequent and efficient.

Edward Lorenz and Antoine Valeyre have developed a method to compare work organisation in different European countries (Lorenz and Valeyre 2005). One major result of recent calculation based upon data from 2005 and including Norway is that the Nordic countries together with Netherlands – the same countries that appear to have the highest developed social capital - are among those that offer workers most access to learning at the workplace and that there is a

significantly broader employee participation in problem-solving in these countries than in the rest of Europe (see Lundvall 2008).

There are many elements that contribute to the relative success of the Nordic innovation systems and they are systemic in the sense that they tend to support each other. Nonetheless I would argue that the most important and basic element – the basis on which knowledge is successfully created, diffused and absorbed has to do with ‘social capital’. It reflects egalitarian and homogenous societies with high levels of trust both horizontally and vertically. The ease with which people coordinate activities and learn from each other is transformed into a strong capacity to pursue incremental innovation and to absorb new ideas developed elsewhere.

These elements are only marginally considered in the national innovation strategies of Denmark, Finland and Norway. Some of the analysis even tends to see the egalitarian income distribution and the related social norms as getting in the way for developing and recruiting the creative elite. It is proposed here that any innovation policy strategy needs to consider how its implementation affects social capital. Social capital has in common with ‘natural capital’ that it is easier to destroy it than it is to recreate it when it has ones been destroyed. Russia illustrates what happens when financial capital and intellectual capital have no foundation in social capital.

Summing up

There is a general trend in the three strategy documents to point to a broadening of the innovation policy strategies. In the Swedish case this broadening is least marked. But it is reflected in a change of the mandate for Vinnova where some qualifications are taken out. Both in the case of Denmark and Finland the broadening gives stronger attention to services, including public sector activities. In these two countries there is also a broadening of the understanding of the factors that are important for innovation with more emphasis on users, markets and employees. The main difference is that in Denmark new dimensions are added on as separated from each other while they are integrated in a systemic perspective in the Finnish analysis and strategy.

One important question to recent innovation strategies is to what extent they risk to adopt practices from abroad without a sufficient analysis of the national context. I have argued that the Nordic countries’ strong performance in a turbulent global context has a lot to do with social capital; horizontally with high levels of trust and vertically with strong participatory learning. Any new instrument or institutional reform ought to take this unique starting point into account. Importing policy concepts from countries with a very different economic culture might undermine this secret source of innovation and competitiveness.

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