Regionality, innovation policy and peripheral regions in Finland, Sweden and Norway

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This article discusses how the national innovation policies in Finland, Sweden and Norway consider regionality, especially peripheral regions. This aspect is of interest considering how these three countries perform well in international competition while having substantial differences between different regions in terms of their economical development. The northernmost parts of Finland, Sweden and Norway are raised as examples as they are especially challenging areas in the context of innovation activities. As a theoretical background I introduce the concepts of innovation systems and innovation policy and define the challenges involved when implementing innovation policies in peripheral regions. The study is realised by analysing 20 innovation policy documents: ten from Finland, six from Sweden and four from Norway. I use qualitative content analysis as a research method. This investigation shows that, in spite of the importance of regions in innovation activities, national innovation policies in the research countries do not consider regionality, or, more specifically, the less-favoured regions. Meanwhile, regional innovation systems, especially institutes of higher education, are seen as important for the economic development and competitiveness of the countries and their national innovation systems.

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Introduction

In a knowledge-based economy, knowledge creation and knowledge transfer are seen as the most important devices for innovation creation and, subsequently, also for the economic growth of nations and regions. The importance of regions as key arenas of innovation has increased because the innovation process is, at present, understood as a regional phenomenon. However, when considering innovations, the term 'region' usually refers to the innovation centres of metropolitan areas in more developed countries. Peripheries, i.e. regions with fewer resources that are located far from core areas and main markets, are not normally recognised in innovation policies and strategies.

Northern Europe, especially Finland and Sweden, have enjoyed success in international competition in the field of information and communication technology business. In all the Nordic countries, the ICT clusters of the capital cities are important links between national and international networks (Mariussen 2004: 8). However, there are substantial regional differences in innovation activities and economic development in Finland, Sweden and Norway. There are peripheral regions especially in the northernmost parts of these countries. Their greatest challenges are their distant location from the core areas and the lack of key actors in innovation process and resources, e.g. high-tech enterprises, institutes of higher education and R&D institutes. These factors generally decrease the opportunities for providing education and establishing internationally competitive businesses in peripheral regions when compared to the core areas of the countries. Hence, especially young people (i.e. potential future experts, entrepreneurs and innovators) are moving away from the peripheral northern parts of Finland, Sweden and Nor-

way (Gløersen et al. 2006; Jauhiainen 2006, 2007).

However, the concept of welfare state is based on the idea that all citizens, regardless of their sex, age or the region where they live, are equally entitled to the same rights and opportunities (e.g. education and work). This is why equality and a balanced regional development are also considered in the innovation policies of the Nordic countries (Sotarauta & Srnivas 2005: 35). The policies consider innovation activities (i.e. research and development, possibilities for higher education, creating new knowledge and products) important for the economic development of peripheral regions. Some innovation policy measures are directed especially at the less-favoured regions. For example, the Northern Periphery Programme of the European Union is aimed at the peripheral regions of Scotland, Norway, Sweden and Finland (Northern periphery… 2007). The problem is, however, that the regions are faced with quite demanding challenges that make the promotion of innovation-related economic activities difficult.

The present study investigates how national innovation policies in three Nordic welfare states, Finland, Sweden and Norway, consider peripheral regions. I will first introduce the theoretical background of the study and then describe the northernmost parts of Finland, Sweden and Norway with respect to their locational, demographic and economic peripherality and their challenges in implementing innovation activities. In Finland, the study area contains the regions of Northern Ostrobothnia, Kainuu and Lapland; in Sweden, the Norbotten County; and, in Norway, Nordland, Troms and Finnmark. After presenting the background, I will introduce the research methods and materials as well as the main findings of the study. The study will end in a discussion of the challenges involved in enforcing innovation policies to the peripheral regions of northern Europe.

Innovation policy and peripherality

Innovation policy and innovation systems

In the 1990s, the concept of innovation policy has changed from a research and technology policy to a more holistic innovation policy that integrates other political sectors, such as education and competition and regulatory, regional, agricultural and foreign policies. This results from a new understanding of R&D infrastructures, changes in economy (i.e. globalisation), increasing co-operation between different sectors of the economy, increasing role of ICT and knowledge transfer and new paradigms in economic theories (Lundvall & Borrás 1997; Biegelbauer & Borrás 2003). When knowledge creation and transfer are considered the most important devices for economic growth and well-being, creating and sustaining innovations are regarded as the keys to improved global competitiveness (Cooke 2004; Corona et al. 2006). Therefore, the role of innovation policies and, especially, the tools used to promote companies' innovation activities are emphasised. Recent theories also emphasise that companies' ability to innovate does not solely depend on the entrepreneurs, as also communities, and especially regions, have an effect on innovation processes (Corona et al. 2006). This is why the focus of innovation policies in the 1990s lay on institutions, especially on creating bridging institutions, and networks.

Lundvall and Borrás (1997: 37) define innovation policies as "elements of science, technology and industrial policy that explicitly aim at promoting the development, spread and efficient use of new products, services and processes in markets or inside private and public organisations. The main focus is on the impact on economic performance and social cohesion". The major objective of an innovation policy is to enhance the learning ability of firms, knowledge institutions and people. An innovation policy should also cope with the possible negative effects of the learning economy, such as social and regional polarisation (Lundvall & Borrás 1997: 38). However, Tödtling and Trippl (2005: 1204) state that innovation and regional policies emphasising high-tech and knowledge-based or "creative" industries are targeted at successful regions.

The concept of innovation system, which is also used as a theoretical framework in this study, is used in politics to define actors with an effect on innovation activities (Miettinen 2002). The main point in the innovation system framework is that innovations are developed through co-operation between different actors (e.g. firms, R&D institutes, educational institutes, political organisations, etc.) of the system. In that sense, the actors, their co-operation and relationships constitute the system (Lundvall et al. 2002: 219–220). Interactive learning between the actors of the system is emphasised especially in territorially based systems of innova-

tion (Gregersen & Johnson 1997: 482). The focus is on the innovation process and the factors that affect that process, not on innovations as such (Nelson 1993). Besides market relations, also other relations (power relations, trust and loyalty) are considered (Lundvall & Maskell 2000: 359–369). A functioning innovation system needs actors and their co-operation at both the national and regional levels. Political actors (e.g. governments, ministries) function at the national level and shape national systems (e.g. research, education, technology and innovation policies). The actual innovation processes happen between these actors at the regional level in firms, research institutes or projects. The role of institutes of higher education is emphasised because they develop new knowledge and educate people (Nelson 1993; Lundvall et al. 2002).

Peripheries in innovation policy

The innovation system framework is based on studies of successful regions, such as the Silicon Valley. The results from those studies have been regarded as universal and adaptable to every region. However, there has lately been a shift of focus to studying also the less-favoured regions. Nevertheless, the concepts used in studying successful regions were originally developed to explain the rise of economically prosperous regions. It is, therefore, difficult to adapt them to the conditions of economically challenging, less-favoured regions (Benneworth & Charles 2005: 540). This is a challenge especially when the innovation system framework is used in innovation policy. Rosenfeld (2002) identifies the following three types of less-favoured regions: first, older industrialised regions dominated by labour-intensive industries that have lost their cost advantage to newly industrialised regions, second, semi-industrialised regions that had many small craft industries that operate with low levels of technology and, third, peripheral or less populated regions. The focus of this study is on peripheral regions.

Peripherality can originate from the physical/geographical location or social situation of the region. For example, Keeble et al. (1988, in Spiekermann & Aalbu 2004: 7) define peripheral regions as lacking accessibility to the main markets. In this sense, the accessibility of a region determines its competitive advantage or disadvantage. The accessibility of a region consists of two functions. The first represents the activities or opportunities to be reached, while the second represents the effort, time, distance or cost needed to reach them (Spiekermann & Neubauer 2002: 7; Spiekermann & Aalbu 2004: 7–8). In the context of innovation, peripherality can also result from a lack of resources and networks. For example, according to Benneworth and Charles (2005: 539), a region can be defined as peripheral if it lacks the knowledge resources that enable the creation of agglomeration economies and the development of a competitive advantage in knowledge-based activities. Consequently, Copus (2001) uses the concept of aspatial peripherality to describe regions with poor knowledge resources, e.g. poor quality of the local information technology infrastructure and no access or poor access to local, national and global institutional structures and networks. The regions that are aspatially peripheral face the greatest challenges in innovation activities. They need their own policy measures to enhance their innovation activities and to prevent social and regional polarisation.

In the case of innovation, the challenges of less-favoured regions usually lie in the lack of necessary infrastructure, social capital, co-operation partners and markets (Tödtling & Trippl 2005). The lack of "dynamic clusters" and supporting institutions leads to a lower level of innovation activities compared with more central and agglomerated regions. Therefore, national R&D funding is low in peripheral regions. Also networking is low, SMEs dominate the business and clusters are often missing or weakly performing. Consequently, less-favoured regions need to find new solutions for building dynamic networks and co-operation (Tödtling & Trippl 2005: 1208–1210). According to Morgan and Nauwelaers (1999), the challenge is also that sticky "branches" (where tacit knowledge is emphasised and new knowledge is created) are often located in core regions, while "downstream" activities are located in peripheries. "Downstream" activities are more mobile and can thus move to different regions with lower production costs.

Hassink (2005) claims that political lock-ins are a development challenge in less-favoured regions. Old political practices are regarded effective even though the needs of industry have changed. Policy-makers should both learn and unlearn (see also Lorenzen 2001). For example, Morgan (2004) criticises the cluster-building innovation policy used in many countries. This policy often develops institutions that supposedly create an innovative cli-

mate, but it does not consider the private sector. Such an innovation policy is not effective if the learning ability of the region is not considered. Oughton et al. (2002) refer to the concept of a regional innovation paradox in innovation policy. In politics, there is a need to invest on innovation activities in lagging regions, but the regions have a relatively low capacity to use public funds earmarked for investment in innovation-related activities because of the lacking learning capacity and infrastructure. According to Morgan and Nauwelaers (1999), the problem in innovation policy is that it is still concentrated on R&D and a narrow understanding of innovation. As a consequence, less-favoured regions are not considered innovative because they do not have the required competence.

According to Oughton et al. (2002), there is a need for a policy that helps firms in peripheral regions to utilise public funds. Thus, the policy should also increase the level of R&D spending in the business and education sectors as well increase the region's ability to absorb public funding. Hence, the innovative capacity of a firm is related to the learning ability of the region. Therefore, there is a need for an innovation infrastructure, possibilities for learning and creation of new knowledge. When using a broad understanding of innovation (e.g. new methods in working, better and more effective networking relationships, etc.) less-favoured regions are considered more innovative (Morgan & Nauwelaers 1999). Tödtling and Trippl (2005: 1212–1215) emphasise that, in peripheral regions, innovation policy should concentrate on "catching up learning", attracting new firms to the region and strengthening potential clusters.

Key features of the research area: northern Finland, Sweden and Norway

The northern parts of Europe are peripheral when measuring with locational, demographic and educational as well as economical factors. Therefore, northern Finland, Sweden and Norway have many challenges in innovation activities. For example, the number of relevant actors, e.g. innovative enterprises, experts and institutes of higher education, is low and geographical distances to main markets and between actors are large. Hence, cooperation and networking are challenging.

Locational peripherality

When measuring accessibility (i.e. peripherality) by travel cost indicators and potential accessibility, the northernmost parts of Finland, Sweden and Norway are very or extremely peripheral on the European scale. ESPON Project 2.1.1 (2007) identifies Kainuu and Finnmark as very peripheral and the other regions in the research area as peripheral. The regions and their municipalities are also peripheral on the intra-Nordic scale, especially municipalities with a poor transport infrastructure (e.g. no airports or railways) (Spiekermann & Aalbu 2004). Because of better motorway networks, municipalities in northern Sweden are more accessible than those in northern Finland or Norway (Spiekermann & Aalbu 2004) (Fig. 1). There are six airports with scheduled service in northern Norway, five in Sweden and eight in Finland. The amount of air travellers was over a million a year in Tromsø, Langnes and Bodø in Norway; over 500,000 in Luleå in Sweden and Oulu in Finland; over 100,000 in Alta, Kirkenes and Hammerfest in Norway, Kiruna in Sweden, Rovaniemi, Kittilä and Ivalo in Finland; and under 100,000 in Lakselv and Banak in Norway, Gällivare and Pajala in Sweden, Kuusamo, Kajaani, Kemi-Tornio and Enontekiö in Finland (Finavia 2006; Statistics Norway 2006; Statistics Sweden 2006). However, the Nordic peripheral regions are economically more developed than other European regions with low accessibility. National assets and policies in education, R&D and innovations help, to a certain degree, to overcome the locational disadvantage (Spiekermann & Neubauer 2002: 36–40). Regarding aspatial peripherality (see Copus 2001), northern Finland, Sweden and Norway are not as peripheral as other peripheral regions in Europe. Nevertheless, the Nordic peripheral regions have other disadvantages due to their distant location, e.g. very high travel costs of participating in European co-operation and a high population loss resulting from negative net migration (Spiekermann & Neubauer 2002: 36–40). Also, institutions of higher education and research centres are small and few in number.

Demographic peripherality

The northern parts of Finland, Sweden and Norway are sparsely populated (Table 1). The regions are relatively large. For example, the land area of northern Finland (150,000 km^2) is 44.9 percent of

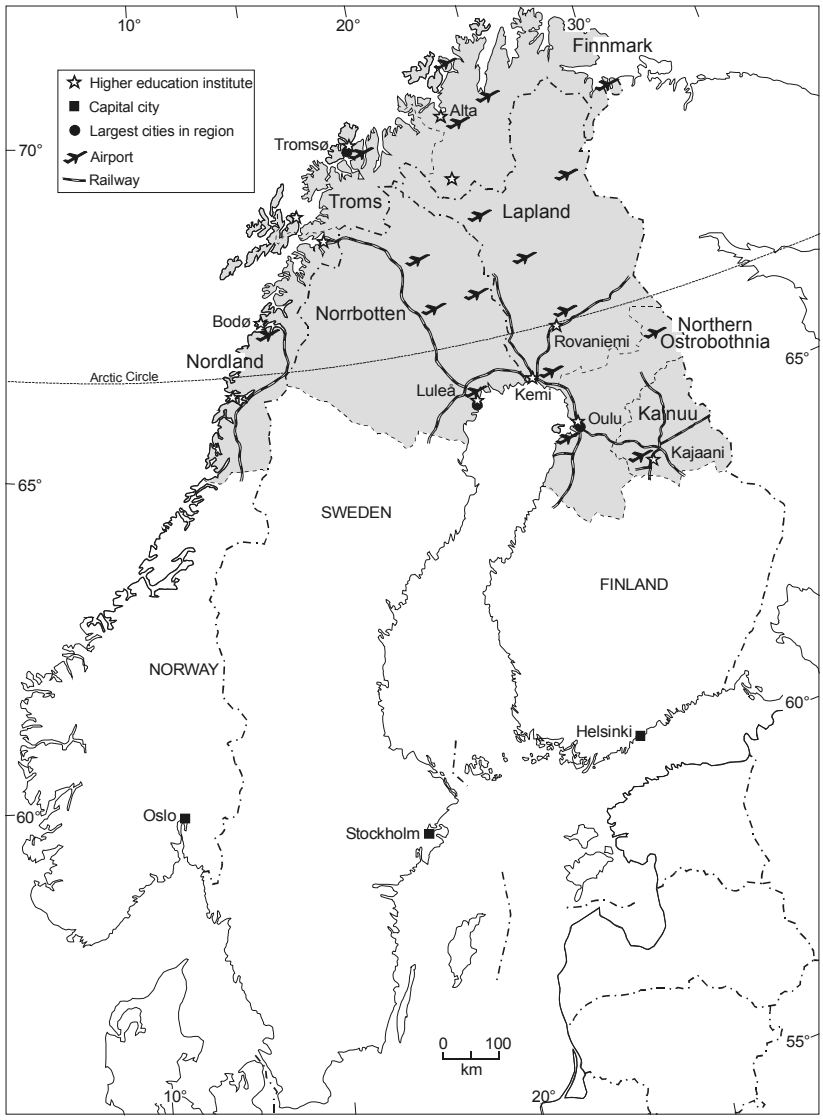

Fig. 1. Research area: northernmost Finland, Sweden and Norway.

Table 1. Statistics of the research area. Sources: Statistics Finland 2006; Statistics Norway 2006; Statistics Sweden 2006.

	Northern Finland			Northern Sweden	Northern Norway		
	Northern Ostrobothnia	Kainuu	Lapland	Norrbotten	Nordland	Troms	Finnmark
Land area (km²)	35,290	21,567	93,004	98,249	36,074	24,884	45,757
Population	378,006	85,303	185,800	251,740	236,257	153,585	72,937
Population density (people/km²)	10.7	4.0	2.0	2.6	6.5	6.2	1.6
Netmigration	344	–593	–719	–347	–774	285	–402
GDP per capita (€)	26,309	20,620	24,870	28,324	27,236	28,376	24,667
GDP per capita (index: country average=100)	92	70	85	93	80	83	72
Tax revenue (Million €) (per cent of total national)	1840 (6.1)	386 (1.3)	924 (3.1)	1164 (2.7)	1844 (2.4)	1240 (1.6)	412 (0.5)
Unemployment rate	10.5	17.5	12.9	7.7	4.7	4.1	5.7

the area of Finland, but the population (649,000) is only 13.7 percent of the whole population of Finland. Northern Norway (107,000 km^2) contains 33.0 percent of the land surface of Norway, and the population (462,000) is 10.1 percent of the population. Norrbotten County (98,000 km^2) covers 22.4 percent of the land area of Sweden, while the population (252,000) is 2.8 percent of the population of Sweden. The municipalities are relatively small. The largest city is Oulu (population 126,000) in northern Finland. Other large cities are Luleå (population 72,000) in northern Sweden and Tromsø (population 62,000) in northern Norway (Fig. 1). Except for Northern Ostrobothnia in Finland and Troms in Norway, the regions in the research area lost inhabitants in 2005 (Statistics Finland 2006; Statistics Norway 2006; Statistics Sweden 2006).

As Morgan (2004) states, localised learning is important in the innovation activities of firms (see also Morgan & Nauwelaers 1999; Lorenzen 2001). For localised learning, universities are important while they create new knowledge and educate people. The research area contains four universities and 10 university colleges or universities of applied sciences. They are relatively small, especially in Norway (Table 2 and Fig. 1).

Education statistics differ from each other in Sweden, Norway and Finland. Therefore, comparison is difficult. In this study, I define higher education as lasting about 13–14 years (including compulsory school). In all, the level of education in the research region is lower than the national average, which is 25 percent in Finland, 34 percent in Sweden and 24 percent in Norway (Statistics Finland 2006; Statistics Norway 2006; Statistics Sweden 2006). Furthermore, the level of education is higher in regions with a university. Similarly, economic performance seems better in regions where the level of education is higher.

Economic peripherality

ESPON Project 2.1.1 (2007) calculates the typologies of lagging regions on the basis of GDP per inhabitant and unemployment rate. In 2001, Kainuu and Lapland were identified as lagging regions, Northern Ostrobothnia as a potentially lagging region and the other regions in the research area as non-lagging. Compared with the respective national averages, the unemployment rates in northern Finland, northern Sweden and northern Norway are higher (Table 1). The national average in Finland is 6.4 percent; in Sweden, 4.6 percent; and in Norway, 4.1 percent (Statistics Finland 2006; Statistics Norway 2006; Statistics Sweden 2006). The gross domestic product per capita is also lower than the national average. However, there are differences in the economic situations between the regions in the research area. Northern Ostrobothnia and Norrbotten are close to the national average, whereas Kainuu and Finnmark are

Table 2. Education statistics in northernmost Finland, Sweden and Norway. Sources: Ministry of Education 2005; Statistics Finland 2006; Statistics Norway 2006; Statistics Sweden 2006.

Region	People with a degree on higher education (per cent)	Higher education institute (number of students in 2002)
Northern Finland	Northern Ostrobothnia 23.6	University of Oulu (15,800)
		University of Lapland (Rovaniemi) (7900)
		Oulu University of Applied Sciences (4000)
	Kainuu 18.8	Rovaniemi University of Applied Sciences (3000)
		Kemi-Tornio University of Applied Sciences (2800)
	Lapland 20.7	Kajaani Polytechnic (2000)
Northern Sweden	29.0	Luleå University of Technology (10,200)
Northern Norway	Nordland 20.9	University of Tromsø (5500)
		Bodø university college (4100)
		Finnmark University College (Alta) (1900)
	Troms 22.6	Harstad university college (1400)
		Nesna university college (1100)
		Narvik university college (1100)
	Finnmark 19.8	Saami University College (Kautokeino) (200)

quite far from it. The tax revenue that the state got from those areas is low. The state got 6.1 percent of its tax revenues from Northern Ostrobothnia in 2002, and only 1.3 percent from Kainuu and 3.1 percent from Lapland. The tax revenue from Norrbotten county was 2.7 percent of the total tax revenue of Sweden in 2004. Norway offers a tax reduction to the residents of the most northern parts of the country. Therefore, the tax revenues were very low, namely 2.4 percent from Nordland, 1.6 percent from Troms and 0.5 percent from Finnmark in 2006. The most important employment sectors are similar in all the research regions. Most people are employed in the service sector (especially health care and social work), in industry and trade, hotels and restaurants (Eures 2006; Statistics Finland 2006; Statistics Norway 2006). However, manufacturing, mining and quarrying also employ people in northern Sweden and northern Norway (Eures 2006).

Research questions and materials

The present article discusses the ways the national innovation policies in Finland, Sweden and Norway consider regionality. By regionality I mean regions as such, activities that happen at the regional level, and the qualities of locations and regions. The main focus is on less-favoured peripheral regions. I discuss how much the regions are considered, what are the main themes connected them and what kinds of regions are considered in the innovation policy documents in Finland, Sweden and Norway, using the northernmost parts of the countries as examples (Fig. 1).

This study is based on the policy strategy documents for innovation in the countries in question. I investigated the most recent documents from the most important public actors of the innovation systems in Finland, Norway and Sweden. The study material consists of 20 documents, ten from Finland, six from Sweden and four from Norway. Nine of them are written in English, four in Finnish, five in Swedish and three in Norwegian. The analysed documents are from public funding organisations and public administration, and they are the most significant innovation policy documents from the investigated countries. The documents include the actors' innovation strategies (e.g. the education and research strategy of the Finnish Ministry of Education) and the innovation policy guidelines of the governments. The same documents have been used also in other studies (e.g. GoodNIP 2003; *European trend chart*… 2005a, 2005b, 2005c).

The documents will be examined using qualitative content analysis. Content analysis is the most often used method in qualitative research and can be performed in many different ways (Tuomi & Sarajärvi 2002: 105), making it a flexible tool of analysis (White & Marsh 2006). I have chosen qualitative content analysis as my purpose is to gain a general idea of the innovation policy documents in the context of regionality and find out how the regions are discussed in the text. My aim is to analyse the documents as a text, not as a means to construct reality (cf. discursive analysis). This makes qualitative content analysis the most suitable tool (see Tuomi & Sarajärvi 2002: 105). However, there are some weaknesses in the method. For example, Tuomi and Sarajärvi (2002) argue that the analysis of the content analysis is often only a superficial presentation of the results that are not interpreted properly. White and Marsh (2006) maintain that the qualitative method is subjective. Researchers may miss some of the analytical concepts because the analysis involves interpreting the text while simultaneously counting the concepts and words. Also the categorisation might change during the research (i.e. when the researcher finds different or better ways of categorising). In this study I adhered to my first categorisation. However, another person might have used other categories or interpreted the concepts differently, which might have yielded different study results.

The categories, or analytical constructs (see White & Marsh 2006), are based on existing theories and previous research. Regionality and the northern periphery are used as the main themes. First I marked all the paragraphs that dealt with regions (e.g. regional innovation systems, regional development, the regional task of universities) and innovation activities (e.g. education, R&D). In all, 285 paragraphs were selected from Finnish documents, 441 from the Swedish and 301 from the Norwegian ones. After that I analysed the selected paragraphs according to the following three categories: society, practical activities and governance. The categories were divided in subcategories (see Table 3). I counted the number of times a category was used in each document and also studied which categories were combined in the documents. After that I studied what kinds of regions were discussed and how the peripheral regions were taken into consideration in innovation-related policy documents.

Table 3. Categories used in the analysis.

Themes	Categories		
	Society	Practical activities	Governance
Regionality	economy	technology	policy
Northern periphery	regional development	education, research co-operation	programmes, financial support

Empirical analysis of innovation policies

Despite the similarities in the social structures of Finland, Sweden and Norway, there are differences in their innovation policies. This derives mostly from the differences in their economic structure (see Cooke 2004). Norway has rich natural resources (e.g. oil) and is dependent on export of raw materials. Therefore, it has just recently developed a comprehensive research, technology and innovation policy. There are large international corporations in Sweden that are active in R&D. Therefore, expenditure on R&D is high in the private sector. Public R&D funding is relatively low, but the amount of money invested in it is rising. In Finland the public sector has influenced the economy, especially the research and innovation policy, since the 1960s. One reason is that Finland has no natural resources besides wood, and has not had any large, internationally active R&D corporations before Nokia (Gergils 2006; see also *European trend chart*… 2006a, 2006b, 2006c).

In Finland, Sweden and Norway, the concept of an innovation system is used in innovation policy. The main public actors are almost the same in these three countries. However, in terms of regionality, there are some differences. In Finland and Sweden there are no actors that would directly deal with regional aspects on the national level, whereas in Norway the Ministry of Local Government and Regional Development is a main actor in the national innovation policy. The tasks of the actors also differ slightly between the countries. In Sweden the parliament, the council of state and the ministries design the general policy. The public funding organisations formulate and realise technology and innovation policies (*European trend chart*… 2005a). In Finland the Science and Technology Council and in Norway the Research Council of Norway formulate the innovation policy which is then implemented by public funding organisations and R&D institutes (*European trend chart*… 2005b, 2005c). Finland, Sweden and even Norway (although not a member of the EU) are part of the European System of Innovation. For example, the structural funds, the innovation policy of the EU and the innovation and regional development programmes have an effect on innovation policy and systems in the research countries (Gregersen & Johnson 1997: 486–489). The main actors of the innovation systems in Finland, Sweden and Norway are mentioned in Appendix 1.

The role of the regional level in innovation policy has strengthened during the recent years. Several programmes are directed to the development of regions. The most important are the Centre of Expertise Programme and Regional Centre Programme organised by the Ministry of the Interior in Finland; Regional Growth Programmes and VINNVÄXT organised by VINNOVA in Sweden; and SkatteFUNN in Norway. In addition, there are regional technology parks in several locations in Finland, Sweden and Norway (*European trend chart*… 2006a, 2006b, 2006c). The innovation policy programmes of the regions mostly deal with higher education and business development. Nevertheless, the organising actors of the national innovation systems are physically located in the core regions (i.e. the capital city region) of the studied countries. Most of the implementing actors (higher educational institutes, enterprises, technology centres, research institutes) are distributed more widely, although they also tend to be concentrated in certain regions (see Gergils 2006).

Innovation policy documents in the studied countries

The material regarding national innovation policies in Finland, Sweden and Norway is varied in terms of their specific purpose. Documents written by ministries or governments are mostly proposals on how to improve the innovation or research policies. These documents are more detailed and longer, especially the Swedish and Norwegian proposals from the government. The length of the 20 analysed documents varies from 15 pages (85 paragraphs) to 110 pages (455 paragraphs) in Finland, from 49 pages (172 paragraphs) to 301 pages

(1336 paragraphs) in Sweden and from 41 pages (189 paragraphs) to 201 pages (1139 paragraphs) in Norway (see Appendix 2).

The analysis shows that in Sweden the innovation policy is more focused on the research policy than in the other two countries. Especially the headings of the documents mostly deal with education and research. The Swedish documents did not mention the terms 'innovation policy' or 'innovation system' as often as the Norwegian and Finnish ones. 'Innovation system' was a popular term particularly in the Finnish documents. This observation is related to the differences in national innovation systems and policies which are more holistic in Finland than in Sweden, where innovation-related policies are mostly directed at education and research systems (see Gergils 2006). The organisation that published the document affected its content. This was especially evident in Finland, where innovation policy is defined by more actors than in Sweden and Norway. For example, documents by the Ministry of Education and the Academy of Finland mostly deal with education and research subjects. Documents from Tekes (Finnish Funding Agency for Technology and Innovation) and the Ministry of Trade and Industry consider economic topics. All the documents were future-oriented: their purpose was to find solutions for creating successful future policies to develop the country in question. Nevertheless, most of them also discussed the past innovation policy, education and research systems and economic progress as well as present threats to the economy. All the documents emphasised the importance of co-operation between actors, and therefore the idea of an innovation system was built into the texts. Nevertheless, the innovation system or its actors were not defined in any document.

The analysis indicated that regional aspects were not considered as important in the national innovation policy documents. Only 835 of 9641 paragraphs (8.7 per cent) mentioned regionality and innovation activities together. There were slight differences between countries. In Finland, the total number of paragraphs in the analysed documents was 2459, and regionality and innovation activities were mentioned in 285 (11.6 percent) of them, in Sweden the total number was 4583 and regionality and innovation activities were mentioned in 441 paragraphs (9.7 percent), while in Norway the total number of paragraphs was 2644 and regionality and innovation activities were mentioned in 109 of them (4.1 percent). There were differences between documents. Some focused more on regionality and innovation activities than the others. The difference was based only on the purpose of the document, not on the organisation that had published the document. Some documents were directed more to the regional level, while the aim of the other documents was to develop the whole nation. In Finland, the document that considered regionality the most was *Alueiden elinvoima syntyy innovaatioista* ("The vitality of regions arise from innovations") by Tekes (47.8 percent); in Sweden, *En politik för tillväxt och livskraft i hela landet* ("A policy for growth and vitality for the whole country") by the government (22.0 percent); and in Norway, *From idea to value* by the Ministry of Trade and Industry (21.7 percent).

Regionality in innovation policy documents

When considering regionality, innovation policy documents in Finland, Sweden and Norway dealt mainly with the same themes (Table 4). The most

Table 4. Main themes in innovation policy documents (number of paragraphs; percents in brackets).

Country	Economy	Regional development	Education, research	Cooperation	Technology	Programmes, financing	Policy	Total
Finland	34 (11.9)	39 (13.7)	84 (29.5)	28 (9.8)	2 (0.7)	58 (20.4)	40 (14.0)	285 (100)
Sweden	60 (13.6)	25 (5.7)	140 (31.7)	35 (7.9)	13 (2.9)	118 (26.8)	50 (11.3)	441 (100)
Norway	46 (15.3)	13 (4.3)	71 (23.6)	12 (4.0)	6 (2.0)	109 (36.2)	44 (14.6)	301 (100)
Total	140 (13.6)	77 (7.5)	295 (28.7)	75 (7.3)	21 (2.0)	285 (27.8)	134 (13.0)	1027 (100)

frequently occurring main theme in Finland and Sweden was that of practical activities, especially research and education. The role of the education system, not only higher education but also basic and adult education, was considered important for the development of regions. The documents also emphasised that research in different sectors affect the economy as well as the social development and welfare of regions. In Norway the main theme was governance, especially programmes and financing, which were the second in Finland and Sweden. Programmes and funding were either concrete programmes or funds aiming to develop regions (e.g. funds for less favoured regions in Sweden) or ideas of programmes aiming to increase networking and co-operation between actors within a region and between regions. This refers to the general idea of innovation policy as a tool for promoting financing and co-operation between actors. However, the documents did not consider regional differences or the actors missing in regions. This refers to a regional innovation paradox: the need to fund innovation activities in all regions whether or not they can benefit from funding (see Oughton et al. 2002).

I attempted to find out which themes were mentioned together by first selecting the main category and then categorising the other themes that were referred to. Therefore, there could be many subcategories with one main category. The themes most often mentioned together were programmes dealing with the economy (130 paragraphs) and education and research (101 paragraphs) (Table 5). These paragraphs dealt mostly with financial aid or programmes with the purpose of boosting the economic growth of the regions, or education and research programmes to enhance either the educational level of people or research in every region. Most aid and programmes were only ideas, not concrete programmes. Education and research were also often mentioned together with economy (106 paragraphs) and co-operation (116 paragraphs). These paragraphs dealt mostly with higher education institutions, the importance of education and research for regional economical development, and co-operation between research institutes and other regional actors. These issues were emphasised even more when the main category and subcategory were combined (e.g. economy and education + education and economy, 186 paragraphs). This kind of analysis also shows that most of the programmes were directed to education and research (225 paragraphs), economic (144 paragraphs) and co-operation (122 paragraphs) issues rather than to regional development (73 paragraphs).

Despite today's stressed importance of ICT, technology as such was not often mentioned when regarding innovation activities and regions (see Tables 4 and 5). The themes addressed with technology were mainly broadband connections that should cover the whole country or distance education that is carried out via the Internet.

Peripheral regions in innovation policy documents

This study shows that the term 'region' was a vague concept in innovation policy documents in Finland, Sweden and Norway. The regions that were named were mostly municipalities or counties, especially when talking about less-favoured regions. Successful city regions and rural areas were also mentioned. Otherwise the term 'region' was quite abstract, e.g. "regions should enhance their

Table 5. Themes mentioned together in innovation policy documents.

	Subcategory						
Main category	economy	regional development	education, research	cooperation	technology	programmes	policy
economy		42	80	36	19	14	15
regional development	37		44	16	21	9	9
education, research	106	79		116	21	39	21
cooperation	33	17	58		4	21	11
technology	7	8	5	0		0	0
programmes	130	64	186	101	24		45
policy	55	54	68	38	12	35	

strengths", "co-operation between universities and other regional actors", "universities improve the regional economy", etc. When emphasising higher education and the role of universities in regional development, peripheral regions with only a few educational and research institutes are left outside the innovation policy measures that are directed to co-operation and building of new knowledge. Universities' spheres of influence were not identified, either.

Regions are mostly regarded as homogenous in innovation policy documents. Regional differences were not considered. Nonetheless, the documents emphasised that regionally specific characteristics need to be taken into account when targeting innovation policy measures. Regarding differences between regions, Finland was different than the other two studied countries. The Finnish documents mostly dealt with growth centres and their responsibility to develop the surrounding regions that are lagging behind in development. The northern parts of Finland were not mentioned at all. This goes to indicate that the Finnish innovation policy is directed more to strong regions than economically lagging regions. In Sweden and in Norway the documents were more detailed and also peripheral, northern regions were mentioned. For example, the documents discussed the challenges (e.g. lack of skilled workforce, entrepreneurs and innovative firms) as well as the strengths (e.g. the strong space technology cluster in northern Sweden) of the northern parts of the countries. The Norwegian documents named a number of programmes directed to northern Norway. The differences between countries in the amount of details in the documents reflect the differences in their innovation policies. According to Gergils (2006), innovation policies in Sweden and Norway are more top-down governed than in Finland, where proposals to concrete actions come from the regions themselves or sectors that implement the actions. This is why the Finnish national innovation policy documents do not discuss regions in much detail.

The principles of the welfare state were well illustrated by the documents. For example, the documents considered it important for all regions to have the same opportunities for education, recreation, entrepreneurship and culture. This was especially the case in education and research documents. However, regions should also take responsibility for their economical development by enhancing their areas of strength, since the documents regarded the growing economical gap between regions as a threat to the society. Nevertheless, the documents considered the concentration of economic activities in certain regions with educated workforce and research opportunities as economically more effective. This shows that the ideas of a welfare society, and especially regional policies focusing on the even development of the whole country and gaining global competitiveness, are often in mismatch. However, some documents emphasised that competitiveness is gained through balanced regional development.

Conclusions

The purpose of this study was to investigate how the national innovation policies in Finland, Sweden and Norway take regionality, especially the less-favoured peripheral regions, into consideration. The analysis shows that regionality is not widely discussed in the Finnish, Swedish and Norwegian national innovation policy documents. Regional innovation systems, and especially the role of institutions of higher education, are seen as important for the countries' economic development, competitiveness and national innovation systems. It is also considered important for every region to have the same opportunities for economic and social development. Every region should use its own strengths in economic development.

Innovation policy at the national level does not consider the differences between regions. In fact, the concept of regionality remains quite abstract in innovation policy documents. The regions (or their boundaries) are not defined. This is interesting, because in the academic debate innovation activities are seen as regional phenomena (e.g. Lundvall & Maskell 2000). Furthermore, institutions of higher education are considered vital for the economic development of the countries. The co-operation of institutions of higher education and actors in regions and between regions is emphasised. However, regional differences in e.g. the amount of actors are not considered in the documents. What exactly is the effective geographical distance between actors and how large is the geographical coverage of the influence of an institution of higher education? For example, the institutions of higher education in northern Finland, Sweden and Norway are small and distances between them large.

The national innovation policies in Finland, Sweden and Norway consider balanced regional

development important. However, most measures are targeted at regions that already have more possibilities and strengths than the peripheral regions in the northern parts of the countries. The threat is that regional disparities will grow. To secure balanced regional development, public policies need to create programmes to develop regional opportunities for regional innovation activities. However, the reality ("what is done") and the strategies ("what should be done") are not in line. The challenges of peripheral regions, for example, the northern parts of Finland, are well recognised. Especially in Kainuu and Lapland, the population is declining and ageing, unemployment is high and regions do not attract new businesses or people. Many innovation policy measures are supposed to develop the whole country. In reality, some actions even decrease the opportunities of less-favoured regions and innovation policy measures do not reach them. For example, the Ministry of Education is, at present, studying whether there are too many institutions of higher education in Finland and discussing whether the teaching in certain fields of science should be closed in smaller university units or whether the universities should be united into larger ones. Such decreases in education funding will have an effect on the affected regions' ability to make use of innovation policy measures and programmes (see Oughton et al. 2002). Most innovation policy programmes are directed to co-operation between institutions of higher education and industry.

As was already mentioned above, national innovation policies do not seem to consider regional differences and the challenges that, for example, the northernmost parts of Finland, Sweden and Norway face in the context of innovation activities. Therefore, it would be interesting to study further how national innovation policies are implemented in less-favoured regions. Especially the co-operation between the few small existing institutions of high education and local firms needs to be studied further, as their effective interaction is considered important for the economical development of the regions, at least in policies and theories.

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European trend chart on innovation. Annual innovation policy report for Norway 2004–2005 (2006c). 61 p. European Commission, Enterprise Directorate-General.

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APPENDIX 1. Main actors of innovation systems in Finland, Sweden and Norway (based on *European trend chart*… 2006a, 2006b, 2006c).

	Finland			Sweden			Norway		
General policy	The Government			The Government			The Parliament (Stortinget)		
	Science and Technology Council	Parliament Ministry of education, Ministry of Trade and Industry, Other ministries		Ministry of Finance	Ministry of Education, Industry etc., Ministry of Environment, Ministry of Defence, other ministries		Ministry of Education	Ministry of Local Government and Regional Development	Ministry of Industry and Trade
Promoting and supporting organisations	Academy of Finland	TEKES		Research Council	VINNOVA	Knowledge Foundation	Research Council of Norway	Innovation Norway	SIVA
Education and public research organisations	Universities (20) Polytechnics (29)	Technical Research Centre (VTT)	Other public research institutes (19)	Universities (21) Colleges (42)			Universities (7) Colleges (26)	SINTEF	
Linkages and technology transfer	Science and Technology Parks	Foundation for Finnish Invention	Employment and Economic Development Centres	Innovation Bridge	NUTEK	Invest in Sweden Agency	SINTEF	GIEK	Innovation Norway
Venture capital support	Sitra Finnvera Finpro	Industry Investment LTD	Private Venture Capitalists	Industrifonden	ALMI Business Partner	Swedish Private Equity & Venture Capital	Argentum		

APPENDIX 2. Research material.

Document[1]	Published	Language	Pages/ paragraphs	Analyzed paragraphs (number)	Main theme
Finland					
1	2003	English	140 / 373	19	Governance (programmes, financing 8)
2	2001	English	52 / 170	26	Governance (programmes, financing 7, policy 6)
3	2004	English	56 / 402	55	Innovation (education, research 35)
4	2003	Finnish	20 / 84	4	Society (regional development 3)
5	2004	Finnish	110 / 455	43	Governance (programmes, financing 11, policy 19)
6	2003	Finnish	31 / 182	87	Innovation (education, research 23, cooperation 11)
7	2002	English	31 / 230	2	Society
8	2001	English	15 / 85	5	no main theme
9	2003	English	63 / 231	27	Society (economy 4, regional development 10)
10	2006	Finnish	40 / 247	15	Innovation (education, research 16)
Sweden					
11	2004	English	49 / 172	17	no main themes
12	2000	Swedish	49 / 196	2	no main themes
13	2000	Swedish	301 / 1336	63	Innovation (education, research 36, cooperation 5, technology 2)
14	2001	Swedish	49 / 199	14	Governance (programmes, financing 3, policy 3)
15	2001	Swedish	207 / 1205	266	Governance (programmes, financing 74, policy 33)
16	2005	Swedish	290 / 1430	75	Innovation (education, research 33, cooperation 8)
Norway					
17		English	41 / 189	40	Governance (programmes, financing 11, policy 9)
18	2003	Norwegian	48 / 353	58	Governance (programmes, financing 32, policy 9)
19	2005	Norwegian (nynorsk)	151 / 963	142	Governance (programmes, financing 49, policy 25)
20	2005	Norwegian	201 / 1139	61	Innovation (education, research 35, cooperation 4)

[1] Analysed documents

Finland
1 Academy of Finland: Scientific Research in Finland – A Review of Its Quality and Impact in the Early 2000s; 2 Ministry of Trade and Industry: Business Environment Policy in the New Economy; 3 Ministry of Education: Education and Research 2003–2008. Development Plan; 4 Ministry of Education: Strategy of Ministry of Education 2015 (Opetusministeriön strategia 2015); 5 Council of State: Strategy document of the Government 2004 (Hallituksen strategia-asiakirja 2004. Hallituksen poikkihallinnolliset politiikkaohjelmat ja politiikat); 6 Tekes: Alueiden elinvoima syntyy innovaatioista; 7 Tekes: The future is in knowledge and competence; 8 Science and Technology Policy Council of Finland: Innovation Policy: Competent, Learning Competitive Finland; 9 Science and Technology Policy Council of Finland: Knowledge, innovation and internationalisation; 10 Science and Technology Policy Council of Finland: Science, Technology, Innovations (Tiede, Teknologia, innovaatiot)

Sweden
11 Ministry of Industry: Employment and Communication; Ministry of Education: Innovative Sweden; 12 Regeringens proposition 1999/2000:81. Forskning för framtiden – en ny organisation för forskningsfinansiering; 13 Regeringens proposition 2000/01:3. Forskning och förnyelse; 14 Regeringens proposition 2001/02:2. FoU och samverkan i innovationssystemet; 15 Regeringens proposition 2001/02:4. En politik för tillväxt och livskraft i hela landet; 16 Regeringens proposition 2004/05:80. Forskning för ett bättre liv

Norway
17 Ministry of Trade and Industry: From Idea to Value. The Government's Plan for a Comprehensive Innovation Policy; 18 St.prp.nr.51 (2002–2003). Virkemidler for et innovativt og nyskapende næringsliv; 19 St.meld.nr.25 (2004–2005). Om regionalpolitiken; 20 St.meld.nr.20 (2004–2005). Vilje til forskning