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The Role of Small, Comprehensive Universities in Regional Economic Development: Experiences from Two Nordic cases

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The Role of Small, Comprehensive Universities in Regional Economic Development: Experiences from Two Nordic Cases

Paper for the 43rd ERSA Congress, Jyväskylä, 27-30 August 2003

Peter Arbo*, Heikki Eskelinen**

*Norwegian College of Fishery Science, University of Tromsø, 9037 Tromso, Norway; email: petera@nfh.uit.no
** Department of Geography and Karelian Institute; University of Joensuu, PO Box 111, FIN-80101 Joensuu, Finland; email: Heikki.Eskelinen@joensuu.fi

ABSTRACT

In the recent past, expectations concerning universities have emphasised their active role as driving forces in industrial and regional development. Obviously, this challenge is especially demanding in the universities which have primarily focussed on traditional academic teaching and research activities, and which are located in regions suffering from structural problems.

The paper investigates the experience of two Nordic universities, Joensuu in Finland, and Tromsø in Norway, which are comparable in several respects. The triple helix framework is used as the theoretical point of reference. In particular, the investigation attempts to clarify the factors which condition the transformation of a university from the academic unit producing qualified labour force for the welfare state towards a policy actor initiating new economic activities. Drawing from the comparison of the two cases, the conclusions focus on the realisation of a university's local and regional development potential.

Key words: university, regional development, regional policy, university-industry links, triple helix model

1. INTRODUCTION

This is a comparative investigation of two Nordic universities - Joensuu in Finland and Tromsø in Norway. The study focuses on the roles played by the universities in regional economic development. The two cases have not been selected randomly. The comparison is motivated by the observation that they have several things in common: Both are small, comprehensive universities, both were established in the 1960s, and

they originated as part of a welfare state project with a strong commitment to provide qualified labour to a growing public sector. In addition, both these universities are located as outposts in the periphery of the western European university network. Joensuu is the capital of North Karelia, the easternmost region of the current European Union, while Tromsø, well above the Arctic Circle, is the main city of northern Norway, which the Nobel Prize awarded writer Knut Hamsun once called "the land behind the hundreds of miles".

Against this background, it is easy to understand that the potential of the universities in promoting regional development has been a standing concern in Joensuu and Tromsø ever since the institutions were established. However, their expected importance and the roles attributed to them have been changing. Today, they are seen as prime levers of the knowledge-based society. In research and policy documents universities are generally represented as engines of growth and regional competitiveness, assumed to spur innovation in close interaction with industry. This makes the two universities in the periphery interesting points of departure for a critical examination of the roles that universities actually play. How do such universities engage with and impact on their surroundings? What are the prerequisites for realising the high-tech visions that they are now associated with? Both regions have undergone major transformations, and they have also experienced shifts in the relevant policy regimes and the scope and structure of higher education and research.

The paper starts with a short introduction to the regional context of the universities of Joensuu and Tromsø. Then follows an account on the origin and development of the institutions. On this basis, attention is turned to how the two universities in recent years have responded to the challenge of changing their roles and enlarging their contribution to industrial growth and regional development. The national systems of innovation approach and the triple helix model are used as conceptual frameworks for the investigation.[1] This implies that the analysis put an emphasis on the interplay between universities, industry and government. The paper ends with a discussion of the

[1] These conceptual and theoretical underpinnings are discussed in Nilsson (2003).

opportunities and constraints that small, comprehensive universities are faced with in order to become more vital sources of growth and development in peripheral areas.

2. THE REGIONAL CONTEXT

Both Finland and Norway have today 20 regional councils, including Åland as an autonomous part of Finland. In Finland the councils are municipal associations, whereas in Norway they are directly elected. The two countries have 446 and 434 municipalities, respectively. The province of Eastern Finland comprises North Karelia, South Savo and South Karelia, covering an area of 38 000 square kilometres. The total number of inhabitants is 470 000, which is 9.1 per cent of Finland's population. Northern Norway comprises the three counties of Finnmark, Tromsø and Nordland, with a total area of 113 000 square kilometres. The total number of inhabitants is 463 000, which is 10.2 per cent of Norway's population. This means that the two regions are quite similar in terms of population size, although northern Norway is more sparsely populated with greater internal distances. Another similarity is that both regions have been regarded as remote and backward areas.

Eastern Finland has for a long time lagged behind in the socio-economic development of the country. Its northern part, where the University of Joensuu is located, underwent a major structural crisis from around 1960 until the mid-1970s. The most important reason for this was the collapse of the traditional economic base of rural areas - the occupational combination of small-scale farming and forestry work. The resulting migration - known in Finland as the Great Move - gave an impetus to policy intervention in various forms. Specific legislative measures for supporting industrial development in more peripheral areas were put into force in 1966, and several reforms upgraded the provision of public services. Overall, these measures (of small and large regional policies) led to more balanced regional developments which continued until the serious economic crisis of the 1990s.

Table 1 summarises the socio-economic profiles of the home base of Joensuu University. In addition to North Karelia, the table includes South Savo, where the second campus of Joensuu University is located in the town of Savonlinna.

Table 1. North Karelia and South Savo: baseline figures 1970-2000

	North Karelia				South Savo			
	1970	1980	1990	2000	1970	1980	1990	2000
Population	185 303	176 650	176 836	171 609	187 122	176 467	176 089	167 369
Employment structure								
Primary production	39 %	24 %	16 %	9 %	34 %	23 %	17 %	11 %
Manufacturing (incl. construction)	21 %	26 %	24 %	26 %	27 %	29 %	27 %	24 %
Services	38 %	47 %	58 %	62 %	38 %	45 %	53 %	62 %

Source: Statistics Finland

North Karelia and South Savo are relatively similar regions, and they are seen as archetypal examples of structural regional problems in Finland. Both have suffered from population loss for decades, and the net outward migration accelerated again around the mid-1990s.

The Joensuu region is an illustrative example of rural industrialisation supported by active regional policy measures. At the time when the decision about the expansion of higher education to eastern Finland was made, the local industrial base largely relied on mechanical forest industries (sawn goods, plywood etc.) and food industries (dairy, slaughtering houses). In the following years, the stratum of branch plants, especially in metal and clothing industries, grew rapidly. Although not all of them succeeded, some have grown, diversified the production structure, and created a local industrial fabric by

means of subcontracting and other relationships. Currently, the two most important industrial companies (Perlos Ltd and Assa-Abloy Ltd) employ directly about 2 500 people in the Joensuu region.

Even if Joensuu has not been a success story in a national context, its development has greatly outperformed the more rural parts of the region. As a result, the Joensuu urban region now accounts for more than 50 per cent of the population and economic activities of North Karelia. This polarisation has proceeded simultaneously as urban centres as engines of growth are increasingly emphasised in regional development policies.

Northern Norway has also seen a rapid industrialisation with a concomitant exodus from the rural areas during the post-war period. The region was heavily hit by the inter-war economic crises, and it suffered great devastation during the Second World War. In 1946, 46 per cent of the working population were still occupied in primary industries. People made a living from various combinations of seasonal fishing, whaling, small-scale farming, forestry work and reindeer herding. Regional policy in Norway emanated from the reconstruction efforts in northern Norway after the war. The government wanted to improve the standards of living and increase the region's contribution to national economic growth. In 1951, a ten-years' regional development program was launched. The main strategy was to build modern fillet plants and trawlers, ironworks, and processing industries based on hydroelectric power. This should be achieved by public investments in infrastructure, favourable loans, grants, tax exemptions and other measures. As the cold war intensified, the development of the region, bordering on the Soviet Union, was given extra priority. Regional policy was institutionalised in 1961 by the establishment of the Rural Development Fund.

As in eastern Finland, the state-led modernisation partly created a branch-plant economy. Fisheries, like agriculture, were strongly regulated industries, and the new companies were usually put under a system of centralised export, i.e. they produced according to specifications given by export agencies outside the region. This led to capitalisation and specialisation, but no discernible diversification of the economy. By

the end of the 1960s, there also was a growing political reaction against the top-down planning, enforced industrialisation, and depopulation of rural areas that had taken place during the previous decades.[2] Regional policy in Norway gradually shifted from a growth- and development-oriented approach to a more distribution- and conservation-oriented approach. Maintenance of the settlement pattern was formulated as the central goal.

This was accompanied by an expansion and decentralisation of the welfare state. To give all inhabitants the same access to basic public services of equal standard, the municipal level had to be strengthened. Consequently, in 1964 the government reduced the number of municipalities from 744 to 454. At the same time they were given new responsibilities in the fields of health care, social services, education, planning and administration. The realisation of the welfare state thus implied the creation of the welfare commune. This development especially had strong effects in northern Norway, where the level of public services had been very low from the outset. Table 2 gives some basic figures on the transformation of northern Norway and the Tromsø region.

Table 2. Northern Norway and Tromsø region: baseline figures 1970-2001

	Northern Norway				Tromsø region[3]			
	1970	1980	1990	2001	1970	1980	1990	2001
Population	456 121	468 496	460 274	464 159	53 967	61 759	65 131	73 342
Employment structure								
Primary production	20%	12%	9%	7%	21%	10%	7%	5%
Manufacturing (incl. construction)	30%	26%	22%	17%	24%	20%	19%	14%
Services	50%	62%	69%	76%	55%	70%	74%	81%

Source: Statistics Norway, Population and Housing Census

[2] The popular protest found its most pregnant expression in a book written by Ottar Brox (1966), who later became a professor at the University of Tromsø.
[3] The Tromsø region comprises the municipalities of Tromsø, Balsfjord, Karlsøy, Lyngen and Storfjord.

Compared to eastern Finland, northern Norway has to a larger extent maintained its population, although there has been a net out-migration in most years since the 1950s. Migration has increased in times of hardships and crises in leading regional industries, but the decisive factor has been the state of the national economy. Typically, the migration waves coincide with boom periods and strong labour demand in other parts of the country. Another characteristic is the rapid de-industrialisation and growth in services in northern Norway. Today, 43 per cent of the region's working population is employed in public services, while the national average is 36 per cent. This must be seen in light of the oil revenues and the favourable fiscal position of the Norwegian state, but it also reflects the strong regional dimension of Norwegian politics. Northern Norway has, so to say, jumped from an almost pre-industrial society to a post-industrial society within some few decades. This has been a relatively smooth process without the severe structural problems, strong polarisation, and high levels of unemployment witnessed in eastern Finland.

3. BACKGROUND AND EARLY HISTORY

The origin and development of universities in Finland and Norway has been tightly linked with national socio-economic and political developments ever since the first university in the current Finnish territory was founded in Turku (Åbo) in 1640, and the first university in the current Norwegian territory in Oslo in 1811. University education was for a long time the privilege of a small elite, destined to leading positions in the church, public administration or a few liberal occupations. Civil servants could spend years of their careers in rural areas, but for most people higher education was unattainable. Until the 1960s, no institutions of higher education existed in eastern Finland or in northern Norway. The common pattern was that the rising generation, just like their parents, entered the "school of life". They started to work as youngsters and learned by doing and by taking part in the relevant communities of practice. The majority of the adult population barely had the years of elementary schooling as their highest level of education.

However, after the post-war reconstruction period, the pressure to improve educational opportunities was fuelled by several factors. These included rapid economic growth, an increase in the number of people with general upper secondary education, growing demand for academically educated labour especially in the public sector, and a political strive for educational equality. In Finland as well as in Norway the 1960s was a decade of ambitious reforms at all levels of education. The newly established OECD acted as an important transmitter of new ideas about the economics of education (Eide 1995, Marcussen 2002), and education was generally seen as a means both to economic growth, social equality, political democratisation, cultural blossoming, and individual self-fulfilment. These trends affected the decisions to expand the university network to northern and eastern Finland and to northern Norway.

In Finland, the first step was the establishment of the University of Oulu in 1958. About one decade later, the current University of Joensuu was founded as a university college (korkeakoulu, högskola). This took place in the context of a reform that academised the traditional system of teachers' training. In Joensuu, the predecessor was a teacher-training seminary, which had been originally established in Sortavala, currently part of the Russian territory, in 1880. It had been moved to Joensuu after the Second World War. The decision to establish a university college in Joensuu was made simultaneously with the establishment of two other such units in eastern Finland: a school of medicine in Kuopio and a school of technology in Lappeenranta. This geographical division reflects the region's settlement structure; there are several small urban regions of approximately the same size in different parts of the large Saimaa Lake district, but since the Second World War, there has been no capital in eastern Finland.

The first specific regional policy legislation was decreed in Finland in 1966, that is, in the same year as the tripartite, and highly contested decision on extending higher education to eastern Finland was made. Although these two strategies for alleviating regional problems were parallel, they formed actually quite separate policy sectors. The regional policy legislation aimed at a diversification of the industrial base of the country's peripheral areas by means of financial incentives, whereas the regional expansion of the higher education system was primarily linked to welfare state policies.

In the latter context, the prime purposes of the university college in Joensuu was both to widen the recruitment base of students socially and regionally, and to increase the supply of qualified teachers in the region, which suffered from the lack of competent public sector workforce (Nevala 1983). Although the policy debate on the role of new universities (or the university network in the making) was extended already in the early 1970s to cover issues such as the regional impacts of research and cultural enrichment, the orientation of the new university unit was defined mainly according to the prevailing national priorities. This is summarised in the conclusion by Antikainen, who carried out the first detailed evaluation of the new regional universities:

> *"The higher education system has been expanded, including the establishment of the new universities, in the fields where there has been national need and demand for education and whenever there have been resources to do so. Universities have not primarily been established to satisfy the needs of their environments but to provide education opportunities and to bring knowledge to new regions...(universities) are integrating their environments into industrial society on the conditions that the economic and societal structure of the environment provides."* (Antikainen 1980, 66-67)

In its early years, the new university college of Joensuu was in practice merely an extension of the teacher-training seminary. In its first academic year 1969-70, there were only 145 students and the number of professorships was not more than 4. At that stage, the target enrolment was set modestly only at 2 000 students, and the college was seen mainly as a teaching institute. If these plans had been followed, it would have resulted in a two-tier system of higher education in Finland.[4] However, the scope and nature of higher education in Joensuu was gradually developed - without any single clear-cut strategic decision by the central government or the college itself - beyond its original assignment.

This strive towards a full research university was clearly the ambition of the key figures of the newly established college. In particular, professor Heikki Kirkinen, who was

[4] In fact, such a system was not created until in the 1990s, when polytechnics were established.

Rector throughout the 1970s, played an important role in this respect. Yet developments towards a *de facto* university would not have been possible without the dynamics derived from the built-in logic of the higher education system. Young academics, who came from the established universities, did not want to confine their ambitions to running a college of education, but set their targets according to the national and international academic standards, applying for financial support for research (Vartiainen & Viiri 2002, 84). Interestingly enough, this activity was not constrained by the Ministry of Education, which exerted a detailed control over the development of the universities. In addition, there had been one exception to the teacher training-orientation already from the early 1970s: affiliated with the university college, a specialised research institute had been established "for carrying out basic and applied research which supports material and intellectual development of eastern Finland and Karelia". This decision on the Karelian Institute largely derived from the cultural heritage of the region, which once played a distinctive role in the formation of a national consciousness of the Finnish people and nation.

In Norway, the most important steps in the reforms of higher education in the 1960s were the establishments of new universities in Trondheim and Tromsø and the subsequent introduction of a parallel system of regional colleges. At the beginning of the decade, it was envisaged that the existing institutions would be able to capture the expected growth in the number of students for the years ahead. Norway had at this time two universities in Oslo and Bergen; the latter established in 1946. In addition there was a number of specialised colleges at university level in agriculture, technology, veterinary medicine, and economics and business administration. A committee appointed to prepare a ten-year plan for the development of higher education, concluded that there was no need for new universities in Norway.

However, in the following White Paper presented to the parliament, the Ministry of Education proposed that a new university should be established in Trondheim, and it also put forth that northern Norway was the most likely candidate for a next university. Although this was relegated to a more distant future, the government soon decided to start the planning for a new university in Tromsø. One reason was that the ministry

realised it would be difficult for the established institutions to handle the student growth. But another and more important reason was that access to and provision of higher education now was seen in light of the development of the welfare state. There was an increasing regional pressure for a more even distribution of public goods, which also included higher education. To avoid that the new university in Trondheim should block the prospects of a university in Tromsø, the two projects were launched in parallel.

The committee that was set up to investigate the preconditions and opportunities for the Tromsø University delivered its plan in 1965. The committee favoured a gradual build-up in close connection with existing scientific institutions like the Tromsø Museum, the Northern Light Observatory, the Tromsø College of education, and Holt experimental farm. These institutions had been established in the late 19th and the early 20th century. Hence, there was a small scientific community in Tromsø before the university arrived. The committee proposed that the main areas of research and education should be medicine, Sámi culture and language, cosmic physics, and fishery science. It soon became evident that medical education was a highly controversial point. The whole discussion on establishing a new university in Tromsø came to be centred on the issue of the medical school (Fulsås 1993).

The proposal met with strong resistance from the established circles of the medical profession, notably in Oslo. They argued that it would be impossible to create a medical school of acceptable quality at the latitude of nearly 70º North. The student recruitment basis was too small, and since no professors presumably would be willing to settle permanently in Tromsø, one should rather maintain and strengthen the existing institutions in Oslo and Bergen. Thus, a new medical school was both unrealistic and unnecessary. The resistance from the Oslo camp had a mobilising effect in Tromsø, where the local campaign for the new university now received a fresh impetus. Heated debates followed, and there was a lot of publicity on the lack of doctors, dentists, and secondary school teachers in northern Norway. After some hesitation, the government decided to go for a new university in Tromsø.

When the Norwegian Parliament made its decision in March 1968, the University of Tromsø was referred to as a vehicle for the general economic, social, and cultural development of the region. It was emphasised that the new university was meant to be a first-rank national institution located in northern Norway, not a second-rank regional institution. The preparations started immediately after the parliamentary decision. An interim board was set up and an enterprising rector, Peter F. Hjort, was appointed. Hjort was a respected professor of medicine from Oslo. Before taking the job, he demanded a guarantee from the government that it would back a rapid build-up of the university including a fully integrated medical school and a university hospital, and this was approved. The next steps were to begin the recruitment of staff and to define the purpose and scope of the new university. Compared with the first plan, social sciences, marine biology, and Arctic research were added to the list of important areas of research and education. In the meanwhile, a national committee had been appointed to prepare the education in fishery science, which became a shared responsibility between the universities in Bergen, Trondheim and Tromsø. In addition, a specialised institute of applied research was founded - the Institute of Fisheries Technology.

A central element in the plans that were drawn for the new university was to create something different from the old, established universities. The University of Tromsø should be more democratic. Students and non-academic staff should hold a stronger position in the governing bodies. The university should also have a more interdisciplinary and problem-oriented approach. The aim was to combine scientific disciplines and subjects in new ways and to integrate theory and practice. This led to the introduction of novel models and curricula in the preparatory studies, the medical education, the social sciences, and the fishery studies. The traditional faculty organisation was avoided and replaced by a number of departments. Another stated ambition was that the new university should be relevant to the region and serve the people of the region. For most of the participants in the planning process this meant that the university should act as a defender of the small communities and rural ways of life in northern Norway. This partisan view was especially pronounced in the profile and content of the study programmes in social sciences.

There was no dispute on locating the new university to Tromsø. Its geographical position, the existing scientific institutions, the local campaign for the university, and the fact that Tromsø had been mentioned already in 1918 when the idea of a university in northern Norway was expressed for the first time, made Tromsø the obvious choice. However, strong disagreements arouse when it came to the location of the university in Tromsø. The university board favoured a location on the most pleasant southern part of the Tromsø Island, but the local authorities wanted to build the new university in the backwater area on the northern part of the island. The university should not only serve as a vehicle for regional development; it should also be a spearhead for local development and town renewal. At this crossroad the ministry sided with the local authorities against the university board. Hence, after some years in rented buildings all over the town, the university gradually moved to a new campus three kilometres north of the city centre.

Comparing the background and early history of the two universities, there are striking similarities: Both are linked to a democratisation and activation of the state, resulting in deliberate attempts to integrate and develop peripheral areas of the countries. The new institutions were welcomed as symbols of government responsibility and recognition of the regions. They marked that the welfare state was to include everyone. In spite of the regional considerations that were involved in the extension of higher education, regional policy authorities were disengaged in both countries. Regional policy was still preoccupied with industrial development by means of financial support. The decisions concerning the new universities were also highly contested in both countries. The academic elites, mainly located in the national capitals, were strongly against a diffusion of higher education.

Another similarity is that both universities came to regions with natural resource-based economies and low levels of formal education, but at a stage when the welfare state was expanding and in train of gaining a local foothold. Although their public sector orientation was strong, both universities got affiliated institutes of applied and commissioned research related to basic industries of the regions. We can also see how the present academic division of labour conditioned the profile of the new universities.

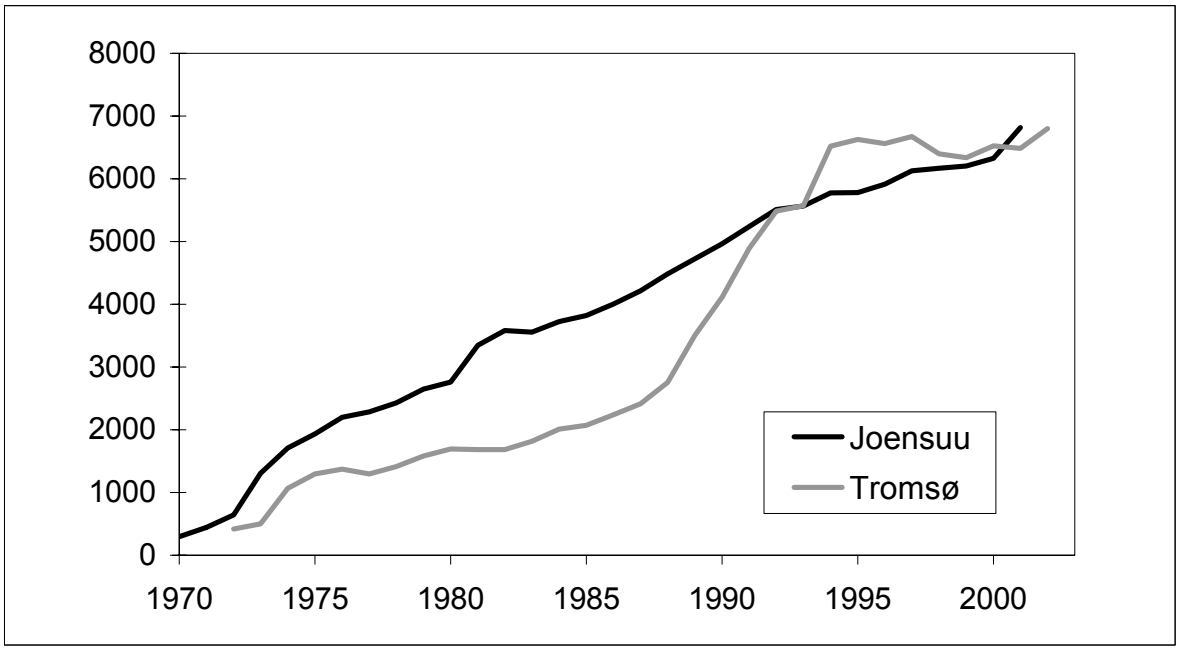
In the Joensuu case, technology and medicine were excluded because they formed the backbones of the two other universities established simultaneously in eastern Finland, while in the Tromsø case, the technology and engineering education in Trondheim and Narvik made parallel lines of study out of question. Likewise, key figures mattered in both cases. The academic entrepreneur in Joensuu was Heikki Kirkinen, a passionate Karelian activist, who came from Sorbonne and became a professor of history and rector from 1971 to 1981. In Tromsø, Peter F. Hjort played an important initial role, but the university was also endowed with many other strong personalities. In 1973, when the Socialist Left Party (SV) made a big success in the parliamentary election in the wake of the referendum on Norwegian EEC membership, no less than three professors from Tromsø became members of parliament.

There are, however, also some clear differences between Joensuu and Tromsø: In Finland, the university college was initiated without much preparation and without large investments in new infrastructure. The Norwegian approach was quite different in this respect, with comprehensive plans for a brand-new university. And in contrast to Tromsø, there were no scientific institutions in Joensuu before the university college, except the teachers' training college that was upgraded. In Tromsø the new university included the Tromsø Museum and the Northern Light Observatory, but not the existing college of education.

4. GROWTH PATHS

The universities of Joensuu and Tromsø are of approximately the same size today, but they have undergone somewhat different stages of growth. The expansion in Joensuu has been relatively stable from the very humble beginnings, whereas Tromsø experienced a longer period of slower development before a sudden jump upwards. Figure 1 shows how the number of students has developed at the two institutions.

Figure 1. Number of students 1970-2002



In Joensuu, the number of students was approaching 3 000 at the end of the 1970s. The relatively rapid expansion partly resulted from the decision to annex the teacher training college of Savonlinna (about 140 kilometre south of Joensuu) to the university college from 1974 onwards. At that time, the university college was already distancing itself from its original narrow role as a teacher-training unit towards a full-scale university, continuously expanding and diversifying its educational supply. The first doctoral degree at the University of Joensuu was awarded in 1977; by 2003 the total amount of doctorates has exceeded 600.

An important institutional step towards a comprehensive university was taken from the late 1970s onwards: chairs, which were not confined to teacher education, were established. In particular, the establishment of forestry education in 1982 turned out to be a major leap in this respect. It was one of the last major decentralisation measures of its kind in Finland, implemented against a fierce opposition from the established national academic and professional community. In the following years, the gloomy expectations on the fate of forestry education and research in Joensuu did not come true; the field developed very positively in terms of academic criteria. By hindsight, it has

also provided the university with resources for an outreach towards the surrounding society later.

Basically, the success story of forestry at the University of Joensuu seems to have resulted, firstly, from the fact that it created a competitive situation in the field, which for a long time had been dominated by only one national champion at the University of Helsinki. Secondly, it was supported by other governmental decisions on decentralisation. The local research station of the Finnish Forest Research Institute (METLA) has been expanded from its tiny origins in 1981 to the second Research Centre of the Institute, and the European Forest Institute (EFI) was established in Joensuu in the early 1990s. Overall, an internationally renowned cluster in forestry research and education has evolved in Joensuu in two decades.

The gradual growth process resulted in that the university college of Joensuu received the official university status from 1984. At the same time, its internal organisation was transformed from an experimental departmental structure into the standard faculty form. Since then, there have been - until the establishment of the faculty of theology in 2002 - five faculties at the University of Joensuu: education, natural sciences, humanities, social sciences, and forestry.

The University of Tromsø was inaugurated in September 1972. Strongly supported by the Ministry of Education, the rector and his team set out for a rapid build-up of the new institution. When the educational programmes started, the university had a staff of 351 persons and 420 students. In 1977, five years later, the number had increased to 557 and 1 294, respectively. Contrary to the fear of many, recruiting staff was no problem. The growing number of academics in Norway, the attractiveness of the new university, the upswing of regionalism, and the fact that many northerners wanted to return when they really got the opportunity, made up for this. However, the student growth became much more sluggish than expected. The university had planned for 2 000 – 2 200 students by 1980, but the number soon stabilised around 1 700.

One important reason was that the university had to compete with the new regional colleges. The same wave of decentralisation that had brought forth the University of Tromsø had also led to the establishment of additional schools of higher education in the region. During the 1970s, regional colleges were set up in Bodø and Alta, and today there are seven such colleges in northern Norway. Initially they were meant to be part of a binary system, providing shorter education and occupational training, but soon they aspired to become more like universities, following the same type of dynamics as we noticed in the Joensuu case. Since the share of young people seeking higher education still was much lower in northern Norway than the national average, and many stuck to the old pattern of leaving the region to study elsewhere, the competition from the colleges was a blow to the new university. Another problem was tighter government budgets. The economic downturn in the mid-1970s implied that public money had to be spent on rescuing crisis-ridden industry. Ambitious plans had also been adopted for the expansion of municipal services and for raising the income level in agriculture. So while the number of universities and regional colleges was growing, the funds allocated for higher education were restricted. The University of Tromsø gradually lost the privileged position it had enjoyed during the founding years.

The fact that the number of students was below target was an issue of great concern. Norway got its first post-war conservative government in 1981, and public expenditures came under greater scrutiny. Without more students, it obviously would be hard to justify the future build-up of the university. The university board responded by trying to broaden the studies offered. This brought the university into a fiercer competition with the colleges. Since new studies needed government approval and financing, lobbyism and horse-trading was part of the game. When Bodø in the early 1980s got education in business administration, Tromsø managed to obtain the education of lawyers and graduate engineers in physics, computer science, geology and biotechnology as a kind of compensation. And in 1988 the Norwegian College of Fishery Science became a Tromsø-based institution.

The new educational facilities and studies increased the student enrolment, but the major change came with the deteriorating labour market conditions in the late 1980s,

which led to a huge influx of new students. Now young people saw higher education as a necessary ticket to the labour market, and the government deliberately wanted to use the institutions to alleviate the unemployment problems. Although the universities and colleges were strained by acting as reception areas, the University of Tromsø decided to seize the opportunity and maintain an open door's policy. This stance was rewarded. In 1992 the number of students had risen to 5 484, and the number of staff reached 903. Among the new study programmes launched since the end of the 1980s are aquaculture, fish health, psychology, pharmacy, public health, documentation studies, art history, religious studies, and visual anthropology. Other important events were the opening of the new centre of medicine and health in connection with the new university hospital in 1991 and the new building of the Norwegian College of Fishery Science in 1994.

However, the University of Tromsø did not only grow in size. The changes also affected the character of the institution. On the one hand, the stronger element of professional degree programmes made the university more similar to the regional colleges. In fact, during the last decades the distinction between universities and colleges in Norway has become more and more blurred. On the other hand, the university went through an academisation. From being an unorthodox and innovative newcomer, the University of Tromsø gradually adapted to the established universities. There has been a return to old disciplinary structures, the traditional faculty organisation has been introduced, and academic rituals and symbols have seen a revival.

Today, the University of Tromsø has 6 800 students, of which 54 per cent are women. 68 per cent of the students are from northern Norway, 24 per cent from the rest of Norway, and 8 per cent are foreign students. The university has 1 900 employees, of which half are academic staff. The first doctoral degree was awarded in 1973; by 2003 the total number of doctorates is approaching 750. The institution offers a broad range of studies and is organised in five faculties and a college; the Faculty of Social Science, the Faculty of Science, the Faculty of Humanities, the Faculty of Law, the Faculty of Medicine, and The Norwegian College of Fishery Sciences. The Norwegian College of Fishery Sciences is semi-autonomous, but is still regarded as an integrated part of the

university. There are also other centres and departments connected to the university.[5] The Faculty of Social Sciences is the biggest faculty with 2 500 students. This includes in Tromsø both archaeology, history, philosophy and psychology. The second biggest is Faculty of Medicine, with 1 125 students. However, in terms of employment, medicine far outweighs the other faculties by having one-third of all employees at the university. The University of Tromsø is profiled in the following research areas: Arctic research, fisheries research, Northern lights and space research, social medicine, research on multi-cultural and multi-language societies and research on Sámi culture.

Comparing the universities of Joensuu and Tromsø, it is interesting to note how both successively have extended and diversified their portfolios of studies. The expansion has been brought about by a combination of local entrepreneurial initiatives, competition with other institutions of higher education, and government considerations and endeavours, which have entrusted the universities with new tasks. None of the universities have developed according to a fixed plan or an overall strategy. In fact, their rooms of manoeuvre for an independent policy formulation or initiation of new academic and professional studies have been highly restricted. Both Finnish and Norwegian universities have traditionally been strongly regulated from above. It has, for instance, been said with only a slight exaggeration that there was until the 1980s actually only one university in Finland, but it was run by means of many organisations in many locations. On the other hand, government policies have also been based upon the assumption that the universities themselves are rather unmalleable and immune to new influences, which is clearly shown in the attempts to go beyond the old institutions and establish new universities and regional colleges in Norway.

The universities of Joensuu and Tromsø have both seen a trend towards academisation. At the outset they were seeking for distinctive, experimental models, but gradually they have become more familiar in their setup. This trend towards institutional isomorphism is probably due to several factors. One reason is the educational background and

[5] The Roald Amundsen Centre for Arctic Research, The Museum of Tromsø, Centre for Development and Environment Research, Centre for Sámi Studies, Centre for Women's Studies and Women in Research, The Norwegian Historical Data Centre, The Centre of Teacher Education, and The Centre of Further and Distance Education.

socialisation of staff, identifying with their national and international academic tribes. Another reason is the harmonisation requirements stemming from student's exchange, validation of degrees, formal and informal meetings between representatives of the universities, and legally imposed governance systems. And a third reason is the general struggle for recognition and prestige, leading new and small universities to copy their peers. Here the merit system and the associated distribution of symbolic capital are of great importance.

The majority of the students in Joensuu and Tromsø are from the respective regions. In Finland there has been no serious intraregional competition in the field of higher education, even if universities in other regions are relatively more accessible in Finland than in Norway. In the two-tier Norwegian system competition was an important issue already in the 1970s and 1980s.

5. UNIVERSITY AND ITS SURROUNDINGS: TOWARDS NEW FORMS OF INTERACTION

The 1980s saw an incipient redefinition of the mission of universities. From an emphasis on education and public sector occupations, research and private sector development came to the forefront. This was linked to the economic, social and political upheavals of the 1970s. Central government planning and regulation lost credibility, while the market was hailed for its freedom of choice and abundant opportunities. The shift also implied a new interpretation of economic growth, based on science, technology and industrial innovations. The assumption was that future prosperity hinged on rising knowledge-intensive industries, which needed redemption. In this context the universities acquired a new meaning. They emerged as central pillars of the post-industrial society (Bell 1974). Instead of being closely tied to the welfare state project, they came to be seen as the vanguards of the information and knowledge society. The success stories of Silicon Valley, Cambridge and similar high-tech regions brought the message home. Both in Finland and Norway an active science and technology policy was initiated.

In Finland this led to a rapid increase in R&D investments so that their share of GDP is now among the highest in the world. The national emphasis on science and technology has also become an important impetus for the developments that are currently discussed in terms of the so-called third task of the universities. However, a purposeful outreach towards a triple helix-type of regional dynamics was not a major concern of the Finnish university system in the 1980s when the university college of Joensuu received its university status. In fact, the strategic issues of smaller regional universities such as Joensuu were seen in a quite different way. They set their focus on the strengthening of their scientific base and credibility, and especially on securing growth of student and staff numbers, which was seen as a key precondition for a long-term survival.

For keeping up with the development of the Finnish academic community, the University of Joensuu initiated a major internal transformation process in the mid-1980s (Hölttä 2000). It served as a national testing arena for new practices, which were later taken into use in other Finnish universities. According to the comparative analysis of Burton C. Clark (1998), Joensuu was one of those innovative European universities that redefined their roles in terms of "entrepreneurial response", paving the way for innovative practices in the university system of their respective countries.

The internal reform of Joensuu University proceeded in several steps from the 1980s onwards. The measures included lump-sum budgeting to departments, increased discretion in resource allocation (first to the library and computer centre), appointment of representatives of the region in the University Council, establishment of a Science Park, introduction of flexible work load of teachers, experimental leading group, and shareholding in companies through the university foundation. In an international comparison, some of these changes cannot be regarded path-breaking at all, but in the Finnish context, many of them were implemented first by the University of Joensuu, which was seen as a most suitable pilot case by the Ministry of Education: a small unit without deeply rooted academic traditions, committed to the reform process, could be assumed to be flexible for testing new administrative practices.

The key characteristic of the internal reform was a lump-sum funding system at all levels, from the university level to individual departments and other units. The purpose was to axe administrative procedures by levelling-down hierarchies, decentralising decision-making and increasing autonomy. By definition, the funding reform created independent space for action to the university and its units, which became less subordinate to ministerial control. As a result, the university could at least in principle formulate conscious strategies concerning its distinctive role and tasks in relation to the surrounding society. This kind of internal transformation is also seen as one precondition for, or dimension of, the triple helix model (see, e.g., Etzkowitz 2002).

Clearly, the University of Joensuu was not alone here; other Finnish universities soon followed along similar lines. However, in this case a peripheral university was not an imitator, but rather one of the first movers in internal reforms.

In addition to the organisational changes at the university, other preconditions for a triple helix-type of dynamics have also evolved in the environments of the Joensuu University from the 1980s onwards. Some administrative regionalisation has taken place, and industrial developments have not to the same degree as earlier been confined to branch plants.

The Finnish governmental system is essentially bipolar: the strong central administration and the local level with relatively autonomous municipalities. The intermediate level has traditionally been weak. As regards the Joensuu University, its surrounding region, North Karelia, was institutionalised into a unit of the state's regional administration (*lääni, län)* in 1960. However, the authority responsible for higher education, the Ministry of Education, has not had any intermediate level of administration for universities, and thus the university college was, and the university still is, directly under the Ministry. The surrounding region, North Karelia, comprises 19 municipalities, and the travel-to-work region of Joensuu six municipalities (with the total population of about 90 000). Until recent years, the inter-municipal institutional structures have remained almost nonexistent.

From the point of view of the Joensuu University, what is outlined above suggests that due to the administrative structure of its surrounding region, potential public sector partners have been difficult to find. However, some significant changes have taken place during the last ten years or so.

Firstly, as part of the preparations for the EU membership, regional councils (19 + Åland) were established in Finland from 1994. They are municipal associations, that is, organised on a bottom-up basis and not as part of the top-down state administration. These councils have been given responsibility for co-ordinating regional development activities (including the Structural Funds operations of the EU) at an intermediate level. Secondly, also the state's regional administration was reorganised somewhat later; currently its main components are *lääni*s (11 until 1997, 5 since then), and regional employment and business development centres (*TE-keskus*, 15). The latter ones represent the ministries of trade and industry, labour, and agriculture and forestry at an intermediate level. Thirdly, inter-municipal co-operation, which has been pushed forward by the initiatives of national regional policies, has evolved in different forms. In the Joensuu region, this can be seen most clearly in the fact the municipalities of the city region established a joint regional development agency, JOSEK Ltd, in 2001.

Thus, there are currently both top-down and bottom-up governance structures at an intermediate level, although the whole system is seen even in Finland (not only from outside) as an impenetrable jungle. The former *lääni* of North Karelia is nowadays part of the *lääni* of eastern Finland, but on the other hand, the very same region forms an institutional and functional unit both in terms of regional councils and TE-centres. From the point of view of the university, these administrative and organisational changes imply that the preconditions for inter-organisational co-operation and partnerships with the public sector in its surroundings have improved.

Also, the economic base of the surrounding region of the Joensuu University has undergone major changes. As shown in table 1, the regional economies of North Karelia and South Savo were three decades ago still very much dominated by the primary sector, and the manufacturing base mostly comprised processing plants of local raw

materials. The diversification of the region's economic base, which was boosted by earmarked regional policy measures and improvements in the infrastructure networks from the 1960s onwards, had typical characteristics of rural industrialisation. However, parts of the traditional sectors managed to diversify their activities and develop sub-contracting networks in the region. The new layer in the industrial base of North Karelia includes companies in printing and publishing, metal and engineering production, plastic and stone industries, of which three with their headquarters in the region have also been listed on the Helsinki Stock Exchange.

Overall, notwithstanding of its serious structural problems (high unemployment, etc.), the Joensuu region has been relatively successful in industrial development in the recent past. However, this has neither been based on industries with close links with the university nor have spinout firms from the university been important. The university is still quite apart from the local industrial scene, although it is not any more completely separate from the economic life of the region as it used to be in its early years. Also, the expectations of companies in the region towards the university have become more visible. The expectations have been boosted by local and regional development initiatives, the strategies of which have been formulated in terms of so-called regional clusters.

In addition to the above outlined transformations of the regional economic base, also the partial opening of the Russian border for interaction and co-operation has raised interest in the university's potential role. In particular, the university is seen as a source of expertise in, for instance, cross-border co-operation, forestry, environmental issues and Russian culture and language. For strengthening this activity, it has defined 'research on the social and cultural development of the European peripheral areas and border regions' as one of its four focal points.

Turning to the Norwegian context, the science and technology policy that developed during the 1980s had no immediate consequences for the universities. The ambitious attempts at creating new science-based industries were translated into strategic programmes, which typically involved large and centrally localised companies and non-

university research institutes. Norway has a relatively large sector of research institutes established by business associations, ministries and, most notably, the former Norwegian Technical-Scientific Research Council (NTNF). This is a peculiarity of the Norwegian research system. Since industry-related R&D first and foremost has been the responsibility of the research institutes, they were the main beneficiaries of the new priorities. The reforms that were launched in higher education by the end of the decade, aimed at strengthening the traditional roles of the universities and colleges. The division of labour between the research institutes and the higher education institutions was not an issue on the agenda, and there were no internal reforms of budgeting procedures or governance systems that could prepare the universities for a new triple helix-type of engagement with the surroundings. Nevertheless, there was a growing awareness inside the academia of the potential of a closer collaboration with industry. The same applied to parts of industry, where the system of higher education and research now was reckoned with as a source of new ideas and competencies. The University of Tromsø is an illustrative case.

When the University of Tromsø was established, there was a great distance between the university and the industrial base of the region. The traditional industries were specialised in the production of raw materials and semi-processed goods, and they mainly relied on low-skilled labour. The companies were generally small and family-owned or they were subsidiaries of industrial groups with their headquarters outside the region. The business sector expected neither to recruit candidates from the university nor to benefit from university research. The university was a big tenant in the local real estate market and a buyer of goods and services, but in general it was met with an attitude of benign neglect from industry. This turned into a more hostile relationship as the left-wing students movement gained the hegemony at the University of Tromsø. The university was rapidly labelled ‘the red university’. This made the university seem even more irrelevant to industry. Similarly, the combination of a strong anti-capitalist ideology and rural nostalgia among the university people limited their interest of establishing ties with industry. So both sides kept an arms-length distance. The lack of contact was amplified by the time-consuming efforts to build up the new institution, which demanded much of the university staff’s attention.

During the 1980s, a new opening emerged in the relationship between university and industry. The mutual distrust slowly decreased. This reorientation was clearly linked to the new framework of discourse epitomised in the concepts of the information and knowledge society, which also lent lustre to the universities. The radical students' movement was declining, and the image of industry was changing. Tomorrow's industries were assumed to be intelligent, flexible, humane and environment-friendly. The new science-based industries of ICT, aquaculture etc. promised a bright future of rural revival. Hence, the idea that the university should be a partner to industry was not outright suspicious anymore. The contact with industry was also enlarged as the first generations of graduates left the university. Although most of them found a public sector occupation, some – especially from the fishery studies - went to private companies, banks or business associations, forging new links between the university and industry. In addition, the Norwegian oil sector was blooming. At the beginning of the 1980s, fresh money became available through the so-called technology and goodwill agreements that the Norwegian authorities imposed on foreign oil companies operating in the North Sea. The objective was to make them contribute to indigenous research and industry development. The sea outside northern Norway was regarded as the next spot for drilling and extraction, and the oil companies were eager to show their generosity in this part of the country. So while the university budgets became tighter, oil money and new schemes of government support allured.

This created a new willingness to engage with industry inside the academia. The new signals and opportunities were also caught by regional industry, where entrepreneurs and business leaders started to re-evaluate their opinions about the university. The new research milieu in Tromsø emerged as a more visible and relevant partner. The number of collaborative projects initiated by the university and the Institute of Fisheries Technology increased, and the first spin-off companies were established. As the field broadened for commercial initiatives, new local role models arose. Among these was professor Jan Raa, who was a strong proponent of a more entrepreneurial and business-oriented approach. The great idea that inspired him was to increase the value of the marine resources by developing aquaculture and biochemical processing. Raa and his

colleagues were called upon to help solve specific problems in industry, and they always had the business opportunities and regional development potentials of their research projects in mind. Such role models provided by distinguished professors are obviously important for fostering university-industry co-operation (cf. Zucker & Darby 1996).

This approximation between university and industry was paralleled by a change in the relationship between university and government. The University of Tromsø no more benefited from the same protection from the Ministry of Education, but it found a new supporter and alley at the regional level. By the 1975 county reform, Norway got a directly elected regional level of government in charge of regional planning, hospitals, upper secondary schools, transport, communications, and culture. The 1980s saw devolution of authority in regional development issues. Within the targeted support area, the handling of applications and allocation of loans and grants for business development was delegated from the head office of the Regional Development Fund to the relevant counties. Moreover, the Ministry of Local Government increasingly engaged to secure that the new national strategies for knowledge-based growth should have a regional dimension. The Ministry had not taken any active part in the founding period of the university (Solhjell 1977), but this time it sided with the counties to encourage technology transfer and dissemination of scientific knowledge to small and medium-sized enterprises in rural areas.

In Tromsø this led to the establishment in 1984 of FORUT, an institute of applied and contract research linked to the university. FORUT got four departments specialised in R&D related to ICT and earth observation, marine biotechnology, social sciences, and cold climate technology. The latter was located in connection with the college of engineering in Narvik. The new institute represented a regional policy equivalent to the system of industrial research institutes built up under the auspices of NTNF. FORUT was reorganised and merged with Institute of Fisheries Technology in the early 1990s under the name of the NORUT Group Ltd. Today, the NORUT Group has seven subsidiary institutes: Norwegian Institute of Fisheries and Aquaculture Research, NORUT Information Technology, NORUT Medicine and Health, NORUT Technology,

NORUT Social Science Research, and NORUT NIBR Finnmark. Another initiative was the planning of the Tromsø Science Park, which was established in 1990 and had its official opening in 1994. By these regional policy measures a new infrastructure was created in Tromsø for bridging university research and industry.

However, the devolution of authority to the counties was mainly linked to the old paradigm of regional policy. When science, technology and innovation became the new guiding stars, the formulation and implementation of policy was re-centralised. In the first stage, the Ministry of Local Government tried to spur regional innovation by launching strategic programmes and establishing research facilities like FORUT, which could compensate for the lack of regional considerations in Norwegian industrial and research policy. In the next stage, the distinctions between the three policy fields were blurred, regional policy was generally downplayed, and the regional policy instruments were transferred to the Ministry of Trade and Industry. In 1993, the previous five research councils in Norway were merged into the single Norwegian Research Council. Similarly, four development agencies and state banks were combined to the Norwegian Industrial and Regional Development Fund (SND). This implied a concentration of decision-power. Regional development assistance was more or less taken out of the hands of the counties, and the Norwegian Research Council created a Byzantine system of programme boards for the allocation of research funds.

In recent years the trend has turned. SND has developed a system of regional offices with close connections to the county authorities, which now are designated as the prime regional development actors expected to operate in partnership with industry, municipalities, higher education and research, and executive branches of the state. The Norwegian Research Council has maintained its elevated position and top-down approach, but the number of programmes with a regional anchoring is increasing. In addition, SIVA, the Industrial Development Corporation of Norway, has been actively promoting the formation of regional innovation centres with the science parks as main junctions. This has made the science parks more central pillars of the Norwegian innovation support system.

Different ministries have also been eager to decentralise research institutes. Hence, during the last decade Tromsø has seen a continuos growth of research facilities, centres and intermediaries outside the university. The establishment of the new Aquaculture Research Station in 1990, the moving of the Norwegian Polar Institute to Tromsø in 1992, and the Norwegian Centre for Telemedicine, which started as a research project in the ICT company Telenor FoU in 1987, are some of the examples. Today, these non-university research institutions in Tromsø have more than 600 employees. The new institutions have strengthened the local research system in fields of applied research, attracted more research money to Tromsø, and broadened the contact faces towards industry.

Overall, the new knowledge infrastructure created in Tromsø has definitely altered the preconditions for co-operation between university, industry and government in northern Norway. Together with the university hospital, higher education and research now put their visible imprints on the whole city of Tromsø, and the related industrial and commercial activities also play a more prominent part.

Comparing the universities of Joensuu and Tromsø, both have faced new expectations during the last decades, and the trajectories followed show many similarities. Yet, there are striking differences in the general conditions of the two countries and in the ways policies have been implemented. The Finnish switch to an R&D- and innovation-oriented policy took place on the background of a profound economic crisis. The general feeling was that national survival was at stake. Consequently, the 1990s was a break-up from the past (turning to the EU, dramatic changes in industrial structure, a big boost of technology and science policy, etc.) with visible repercussions in the academic world. In Norway there has been a much slower and hesitating adjustment, full of comprises and half-hearted initiatives. When the economic downturn in the late 1980s and early 1990s wiped out some of the Norwegian ICT champions, the reaction rather was: back to basics. The academic institutions are still more encapsulated from the rest of society.

In Finland the EU membership made it necessary to organise a regional level of authority, which could take the responsibility for co-ordinating the comprehensive regional development programmes associated with the Structural Funds. The Norwegian system of governance already included a democratic intermediate level, but as a non-member country the county councils were never entrusted similar responsibilities. Policy formulation in Finland has also been quite different in recent years. In Finland several ministries normally set joint targets and launch large-scale parcels of programmes, to which various constellations of actors at local and regional level have to respond, thereby forcing them to co-operate and act in a concerted way. In Norway the policy sectors operate more like separate silos, running fragmented and small-scale experiments on their own (Moen 2002). This is reflected in the compartmentalisation of university research and applied research at the local level.

The University of Joensuu has developed strategies to define the entrepreneurial role of the university in the region. There are close links between the university and its surrounding institutions, and the actual and potential role of manufacturing industry in economic life is more pronounced than in the Tromsø region. The University of Tromsø has been less profiled in regional development issues. However, Tromsø has benefited from the fact that Norwegian authorities have pushed forward a decentralisation of research facilities. The impact of separate scientific institutes is therefore much more important in Tromsø (resembling the situation in the Finnish Lapland) than in Joensuu, where only two institutes have been created, both with forestry-related activities.

6. LINKS WITH ECONOMIC LIFE IN THE NEW MILLENNIUM: INSTITUTIONS, STRATEGIES AND PRACTICES

The institutions and practices of interaction between the university and its regional surroundings have evolved along somewhat different paths in the two cases under consideration. The following parallel accounts discuss most recent developments.

The University of Joensuu has - on good grounds - in various official or semi-official evaluations emphasised that its impact on its surroundings should mainly be assessed on

other criteria than whether its educational and research activity has produced spin-outs by means of technological R&D and university/industry interaction (see, e.g., The Regional Impact of the University 1998, Dahllöf et al 1998, Antikainen et al 2002). The university college of Joensuu was established to produce qualified work force for the welfare state in the peripheral region, which was undergoing a profound structural change. The university has reached its original targets, and it has indisputably had a considerable positive impact on the development of its surroundings and eastern Finland in general. Yet, this impact is often taken as a given, self-evident fact, and the evaluations and consequent setting of the university's priorities focus on quite different issues.

In his description of the above outlined setting, the present rector of the Joensuu University has analysed the relation between the university and its environment in terms of "three circles of interaction" (Vartiainen & Viiri 2002, 85-86). The broadest one of these "concerns the general regional environment, in which the sought-after ideal is a creative and tolerant milieu". The intermediate circle derives its motive power from "science and arts in the classical context of academic research and the learning based on it". Relevant as these arguments are, it is in any case obvious that the promotion of the university's role with regard to the "smallest circle" - referred to also as the "regional innovation system" by Vartiainen & Viiri (op. cit.) - is currently defined as a most important priority of the university's outreach to its environments. Here, the university's key instrument is the local science park, which is intended to provide an institutional frame and functional arena for increased interaction of a triple helix type.

The Joensuu Science Park was established already in 1990, but it remained a mini-scale activity in the subsequent years of the economic crises. Towards the end of the 1990s, however, it has grown significantly. It is not primarily a classical technopolis attempting at advancing the process from academic research to marketable products, but rather a leading regional development actor.

Joensuu Science Park Ltd is mainly owned by the City Joensuu (81 per cent), and the other shareholders are the University (incl. its foundation), the regional council, North

Karelian Polytechnic and the North Karelia Educational Federation of Municipalities. The premises of this company comprise some 21 000 m^2, which are mainly rented out to smaller firms. In addition, the Science Park Company runs a business incubator (IDEKA), is responsible for the region's Centre of Expertise Programme, and develops IT activities. The University, the Polytechnic, the City, and the Finnish Forest Research Institute have located some activities in the Science Park.

According to the Finnish regional policy model, the above-mentioned Centre of Expertise Programme is the flagship industrial development activity at the Science Park. The North Karelian Centre of Expertise Programme, which is one of the 14 such programmes for developing regional innovation systems in Finland, concern two specialised fields. The Wood Technology and Forestry Programme (Puugia) focuses on the modernisation of the traditional backbone of the regional economy. The second programme is the Injection Moulding and Tooling Engineering (IMTEC). Both the University of Joensuu and the North Karelian Polytechnic have developed their activities with the aim of supporting industrial activities in these two fields (see, e.g., Vartiainen & Viiri 2002).

According to a survey carried out in spring 2003, there are currently about 50 companies in the science park (Eskelinen & Saukkonen 2003). Almost all of them are very small; the total number of jobs being slightly less than 300. Approximately 50 per cent of the firms are in the IT field; they are either start-ups in their teething stages, or they have been established elsewhere and then moved to the brand new premises of the science park. Marketing and consultancy firms form the second main group, whereas only a few of the companies in the Science Park represent a technopolis model in the sense that they aim at creating business activities deriving from university research. Given the fact that the Joensuu Science Park has been developed according to its current strategy only a few years, the latter observation comes as no surprise.

Most companies in the Science Park do not have active co-operative relationships with the University of Joensuu or with the North Karelian Polytechnic. However, almost all of them are satisfied with their location and available services, including the business

incubator unit, and some 40 per cent of their labour force has a degree from these local institutes of higher education. Thus, the Science Park Company seems to run a successful business park, which is regarded as a premium location in the town. In the coming years, the Science Park community may well develop internal dynamics fairly separately from the University or the Polytechnic.

As a leading actor of regional development policy, the role of the Joensuu Science Park seems to have developed in line with a learning economy. In the wood sector, its main strategy is modernisation, which would be realised through organisational innovations such as novel forms of inter-firm co-operation and the development of new products (design- and technology-intensive ones from composite materials, etc.). In the injection moulding and tooling engineering industry, which has rapidly developed in the Joensuu region, the key strategy is rooting: the aim is to link this industry more tightly with the local surroundings by providing the leading firms with competitive advantages. Both these strategies would be greatly enhanced if the largest firms would invest in R&D units or laboratories in the region, but this has not as yet come true.

Obviously, interaction between the university and industry will definitely continue and evolve in the context of the science park. Even if growth processes would need more time, the science park is an important forum for several reasons. Firstly, it provides the university with an additional possibility to utilise national and EU-funded research and technology programmes. Secondly, the departments of the university itself keep learning practical co-operation with industry, such as various liaison services and small-scale product development. Thirdly, even if anticipations concerning spin-out type firms seem to be exaggerated in the Joensuu region, interaction is also seen fruitful from the opposite direction: the active participation of the university raises the profile of science park-based activities, and also supports the access of local and regional actors to national and international networks.

On the other hand, the Joensuu case illustrates some of the factors, which set constraints to the initiation of triple helix-type of dynamics in Nordic peripheral regions.

Firstly, even if the university has undergone a profound transformation in several respects, it is still clearly linked with its origin, that is, oriented towards teacher education. More than 60 per cent of those who graduated in the 1990s worked in the educational sector in the end of 1999, and the share of the private sector was only about 15 per cent (Antikainen et al 2002, Appendix, tables 5 and 6). Although these figures are often seen as a source of concern in these days when the university is conceptualised as a potential engine for industrial growth, the other interpretation is also valid: with regard to regional development, it is probably of major importance that the school system of eastern Finland with its qualified teachers fares very well according to international comparisons.

Related to the above mentioned orientation of the university, several such disciplines, which are seen to be of decisive importance in creating links between universities and companies, are missing from its activities: medicine and technology, and until 2001, also business studies at a master's level. However, the strive for a more active regional role has been clearly visible in the strategic priorities of the university. A number of chairs in the specific fields, which are seen in this respect salient, have been established in recent years: typical examples include wood technology, material chemistry, optics, and nanotechnology. On the other hand, this drive for all that seems promising tends to create exaggerated expectations and may run counter to the development of well-established research traditions in a long run.

Secondly, although the university has acquired - by means of the funding reform - increased autonomy in the sense that it is less dependent on annual fluctuations in the funding by the Ministry,[6] the search of funding sources has in practice linked it with the exogenously given strategies. The universities, Joensuu among them, have oriented towards programme- and project-based funding, which is mainly provided by the ministries and the EU. It is mostly technology-oriented, and therefore, the universities have been linked tightly to the official targets of the national science and technology policies (for the national trends: see Husso 2001).

[6] Still in 1990, the share of external funding was less 10 per cent of the incomes of the Joensuu university. Five years later, the share was one-fourth, and currently it is around one-third.

It is probably no exaggeration to say that this "national survival strategy"[7] has been widely accepted at the Finnish universities, because the science- and technology-based strategies tend to emphasise their strategic role. In Joensuu, this is seen in, for instance, the specialisation of physics and chemistry departments in narrow niches of optics and material technologies. As part of the same tendency, additional emphasis has been put on natural sciences in teacher education. A similar coalition between the interests of the university and state can also be seen in regional development policies. The two most distinctive programmes of the domestic regional policies, the Centres of Excellence Programme and Regional Centre Programme, are implemented in Joensuu by means of partnerships in which the university plays a key role.

Thirdly, the characteristics of the regional economic base probably form the most binding constraint to increased interaction between the university and industry at the regional and local level. Table 3 summarises the distribution of public and private R&D funding by region.

Table 3. R&D funding in Finland in 2000, by major region.

	R&D per capita index (Finland=100)			
	Total R&D	Private R&D	Public R&D	Share of Public R&D
Uusimaa	172	165	188	32%
Southern Finland	86	93	70	24%
Eastern Finland	29	17	60	59%
North Karelia	38	22	75	58%
South Savo	12	9	19	47%
Mid-Finland	52	53	50	28%
Northern Finland	116	125	94	24%

[7] Castells & Himanen (2001) discuss the information society as a new survival project and as a legitimiser of the nation-state in Finland.

The main message of Table 3 is clear-cut. Overall, the share of R&D is well below the national average in the peripheral regions such as in North Karelia, and it is mostly public money. The reasons for this pattern are obvious: The industrial structure of the university's surrounding region is still oriented towards such sectors which do not rely on product development in the sense this activity is practised in university/industry-partnerships. The company structures also have similar implications due to the fact that the location of the headquarters tends to have a decisive impact on the choice of university partners. In addition to these structural explanations, it is also obvious that the opening up of the university towards local industry is a relatively novel phenomenon, and it has not yet led to any major R&D efforts.

In the case of the University of Tromsø, the university has maintained its concentration on the primary activities of research and education. The current strategy document, which was prepared in 1998[8], does acknowledge that the university is expected to contribute to regional development and industrial growth, but it emphasises that this is not the prime aim of the university. Its main functions are to generate new knowledge, to be a bridgehead to leading knowledge centres of the world, and to provide research-based education and well-qualified graduates. The university, it is said, cannot be the region's problem-solver. The same message is stressed in a recent follow-up document[9], which might be seen as a manifesto for the new rector in the context of the so-called Quality Reform in Norwegian higher education. The emphasis is put on excellence in education and research. The document states that University of Tromsø should give priority to areas of research where it has a natural advantage due to its geographical location, but this is mainly regarded as a means to achieving reputation and esteem in the international academic community.

Nevertheless, the general assessment in Tromsø is that the university has fulfilled many of its original obligations. It has given young people from northern Norway an opportunity to study in their home region and has raised the inclination to take up higher education. Like the University of Joensuu, the University of Tromsø has improved the regional supply of highly qualified personnel, made it easier to recruit and keep

[8] Strateginotat for Universitetet i Tromsø for perioden fram til år 2010.

professionals from outside the region, and contributed to a better provision of public services in northern Norway. It has also channelled public and private investments to Tromsø, leading to new research activities, establishments, and a visible change in the social composition and cultural life of the city. Furthermore, the university has acted as a meeting-place and builder of social capital in the region, and it has provided important links to networks and knowledge centres outside the region. In addition, it has raised the profile of the region, highlighted its history and current conditions, and put regional issues on the national agenda. The University of Tromsø has therefore been characterised as the most successful regional policy measure in northern Norway (Arbo & Fulsås 2002).

The main vehicle and arena for the promotion of research-based industrial development is the Tromsø Science Park, which is erected on the campus. The science park is owned by the NORUT Group (50.4 per cent), SIVA (24.1 per cent), Troms county (10.6 per cent) and five private companies (together 14.9 per cent). With its second phase of building, which is under completion, the premises comprises some 20 000 m^2. The Tromsø Science Park operates according to the international science park concept. Its main aim is to turn research-based ideas into fruition in the forms of commercial products, patents and licences, and viable new companies. The park is also meant to be a place for co-location of innovative firms, R&D and venture capital. Tromsø Science Park has an incubator and a commercialisation unit equipped with a seed capital fund of 20 MNOK.

The science park has some forty tenants, which can be divided into four categories: Firstly, research institutes and departments. This includes big tenants like the University of Tromsø (university teacher training and further and distance education), the NORUT Group, Institute of Marine Research, etc. Secondly, innovation programmes, business development enterprises and investment and venture capital funds. Thirdly, large established companies locating some of their activities in the science park, e.g. Siemens, Telenor, and the Sparebank1 Group. Fourthly, a number of small and young companies,

[9] Universitetet i Tromsø mot 2005.

mainly in the fields of IT and consultancy. When completed, nearly 600 people will be working in the science park.

Like in Joensuu, the tenants are generally satisfied with the location and available services of the Tromsø Science Park. The science park offers excellent facilities and professional assistance in business start-up, patenting and licensing. However, besides the reputation enhancing element of being located there, the idea of the science park as a melting pot, creating new synergies in the direct meeting between research and industry, is of little relevance. Interactions mainly seem to follow already established patterns of contact and communication. The project development and commercialisation unit of the science park has so far facilitated the realisation of about ten new firms, which is a relatively modest share of the about 60 spinout companies that have been established in Tromsø.

The most important aspect of the Tromsø Science Park is probably the co-location of institutional actors with a catalyser function. The fact that it includes the management of the science park, the NORUT Group and various innovation programmes and support schemes, implies that it serves as a platform for formal and informal policy-making, co-ordination and network development at the interface of research and industry. The science park is not only a visible point of reference in the vicinities of the university, symbolising the visions of high-technology growth, but a hotbed for new initiatives aimed at furthering industry relevant research and collaboration based in Tromsø. The Tromsø Science Park may not yet be described as the leading regional development actor, but its role and impact is surely increasing.

The Tromsø case also reveals some of the limitations and constraints to a triple helix-type of dynamics in Nordic peripheral regions. Firstly, the profile of the university and the compartmentalisation of the local research system represent a challenge. The University of Tromsø has basically kept its public sector orientation. The main argument for establishing applied research institutes at the fringe of the university was that the university should be sheltered from outside interference so that it could concentrate on basic research and education. In addition, it was argued that a

professional organisation able to deal with customers and carry out contract research could not be part of the university. This may be right. Institutions premised on the principle of academic freedom are notoriously difficult to govern. The disciplinary structure of the university does not fit very well with interdisciplinary research. But the effect has been to relieve the university from taking any serious measures on its own.

Certainly, the outreach function of the University of Tromsø has been strengthened by the introduction of some new curricula and study subjects more relevant to industry. Distance and further education has been developed to give a more flexible supply of higher education. The Norwegian universities have also been instructed to raise more funds through externally financed projects, and regional representatives appointed by the Ministry of Education have got a stronger position on the university board. Moreover, recent reorganisations in Tromsø have made the university the biggest shareholder in the NORUT Group, which again is the biggest shareholder in the Tromsø Science Park. The director of the university is currently chairman on the board of the science park. However, there have only been insignificant changes in the university's orientation and mode of operation. The so-called Quality Reform, which is now implemented in Norwegian higher education, seems to strengthen the focus on efficient production of graduates and high-quality academic research. Consequently, research-based innovation and industrial development is restricted to the belt of outside institutions only loosely coupled to the university. This division of labour makes it difficult for the two sets of institutions to supplement each other.

Secondly, the Norwegian innovation support system is still highly fragmented, with a lot of small programmes, competing operators and uncoordinated initiatives. The Tromsø Science Park is now hosting a few of them. The Innovation and Technology Diffusion Programme of northern Norway (NT-programmet) was launched already in 1987 and is still running. This was the first programme with its own secretariat in the region. Another programme is FORNY, a programme for commercialisation of research and promotion of new ventures from the university and adjacent research institutes. A third programme is the Incubator Programme, and a fourth one is MABIT, an acronym

for marine biotechnology in Tromsø. MABIT supports both research projects and industrial development projects.

The evaluation of MABIT (Arbo & Isaksen 2002) clearly shows the importance of having focused and flexible programmes at the regional level. The strength of such programmes is that they know the relevant landscapes, are able to remove bottlenecks, and can take care of both horizontal and vertical co-ordination between the main actors. Unfortunately, MABIT is a rare exception, running counter to the centrally governed models pursued by the Research Council of Norway. The Research Council is promoting national and sectoral systems of innovation, but has been reluctant to regionalise its activities. Most Norwegian programmes, whether the Research Council or SND runs them, are poorly financed and give very few incentives to cross-sectoral regional co-operation.

Thirdly, the regional economic context sets its limitations, as in Finland. Most companies in northern Norway are small, economically week, and exposed to great fluctuations. The industrial structure is also dominated by industries, which normally perform very little R&D. While northern Norway has 10.2 per cent of Norway's population, the region's industry performs only 3.1 per cent of all R&D in Norway's industry. 60 per cent of total R&D in northern Norway is performed in the Tromsø region, with the university as the main actor. More than in any other regions, R&D is funded by public sources. Table 4 shows the level of R&D expenditures in the Norwegian regions.

Table 4. R&D expenditures in Norway, by major regions and performing sectors in 2001. MNOK

Region	Industry	Universities and colleges	Research institutes
Oslo	2 883	2 199.4	1 659.4
Rest of eastern Norway	5 715	589.8	1 346.4
Southern Norway	1 552	177.0	216.8
Western Norway	1 407	1 296.0	762.2
Mid-Norway	669	1 261.5	316.1
Northern Norway	389	750.5	80.6
Total	12 615	6 274.2	5 581.5

Most companies in northern Norway are not innovating by means of research, but by investments in machinery, equipment and tools mainly imported to the region. The regional support system has normally facilitated such investments, but, on the other hand, it has tended towards creating surplus capacity and individual client relationships. The deregulation and liberalisation of economic activities during the 1980s and 1990s have in many respects strengthened the peripheral character of the economy. Thus, there are few engines of growth to be co-ordinated with the institutions of higher education and research.

The research institutions in Tromsø are, however, collaborating with industry. Their partners can be grouped into three according to their degree of nearness. The first group includes the spin-off companies from the university and the affiliated research institutes, which mostly are in the fields of marine biotechnology, aquaculture, ICT, diagnostics, and satellite remote sensing. These companies operate in close symbiosis with the university milieu. They are mostly based in Tromsø, their staff often share their time between the company and the university, they buy assistance from the research institutions, have collaborative research projects, and recruit graduates from the university. The spin-off companies are important links between the university and other parts of industry. They mirror the research institutions that have raised them, and they

serve as their business heroes and ambassadors. The second group includes firms and industries interested in the competence provided by the university. Here we mainly find marine companies, oil companies, banks and consulting firms. They buy assistance, recruit graduates, elect university staff to their boards, and demand tailor-made educational programmes for their employees. Most of them are based in the region. The third group includes the companies that in one way or another are exposed to the university by, for instance, recruiting graduates or attending conferences and meetings where university people present their research and opinions. This is a much larger and more diffuse category of enterprises, without any regular co-operation with the university or the research institutes. Overall, this pattern indicates that regional partnerships between research and industry is dependent on the existence of an industry, which to some degree resembles the research institutions.

Comparing the two universities, it must be concluded that neither Joensuu nor Tromsø can be regarded as a success story of vigorous economic transformation based on close interaction between the actors focussed in the triple helix model. Yet, this conclusion does not imply that the universities have been passive in their interaction with the surroundings or that they have failed in their initiatives. The two stories presented, do not show growing insulation and irrelevance, but rather increasing mutual interference and more permeable boundaries. In both cases the universities have brought about changes in their regions by a multitude of media and mechanisms. Their most salient contribution has probably been linked to their educational function and the translations and transactions rendered possible in the regions by the increasing levels of education. However, the legacies of the universities and the characteristics of the regions put obvious constraints to their contribution in technology-driven industrial growth.

In the Finnish system a lot of emphasis has been put on establishing a policy framework with streamlined institutions and strategies. The universities have been linked to the national priorities of science and technology policy by means of large and visible programmes, which due to the new budget systems of the universities also affect the priorities of the universities. The Norwegian universities have remained more sheltered. The main reasons are the division of labour established between the universities and the

research institutes, the much less determined and coherent push for a science and technology policy, and the high levels of basic government funding of the universities. Nevertheless, in both countries the universities are now exposed to market-oriented reforms in administration and financing, which make them more responsive to external programmes and projects.

Both in Joensuu and in Tromsø the central pivots for research-based innovation and industrial development are the science parks, situated at the boundaries of the universities. As boundary-spanning institutions they are meant to act as brokers and mediators, building bridges and facilitating exchange. The science parks are currently strengthening their roles. Their ability to foster co-operation and mutual trust will be decisive, but the two cases also point to the importance of striking the right institutional balances between the considerations of academic quality versus industrial relevance, of separation versus integration, and of long-term aims versus short-term priorities.

7. FINAL NOTES

The universities of Joensuu and Tromsø highlight how the growth and increasing importance of higher education has equipped the institutions with multiple functions and a variety of users. The corollary is a set of contradictory expectations. Today, the demands on the universities are accentuated and reconfigured: Firstly, they are expected to be centres of scientific excellence according to the standards of the international academic community. This is underpinned by the well-known merit system. Jobs, promotions, and academic reputation are based upon publication of peer-reviewed research. The same system applies to grants from the research councils. However, the new elements are the introduction of standardised reporting systems, external evaluations, comparisons, and the concentration of resources to designated centres of excellence. Secondly, the universities are expected to be efficient and effective educational institutions. Central approval of new study programmes and dimensioning of capacity are past arrangements. Instead, student production measured in credit points and systems' throughput is the decisive element when it comes to basic government funding of the institutions. Thirdly, the universities are expected to be engines of

industrial growth and regional development. They are presented as service institutions deeply involved with their regional partners. This co-operation is assumed to generate additional income to the universities, alleviating the government's financial burden.

These expectations are difficult to meet, especially for small, peripheral universities premised on a different historical mission. They hardly have the "critical mass" to be counted for in the elite division of scientific research. They have a more limited student recruitment base than centrally located universities. In addition, they do not have powerful industrial supporters and allies in the region able to sponsor considerable parts of their activities. This makes them vulnerable.

Notwithstanding the specific characteristics of the universities of Joensuu and Tromsø, these threats pose difficult questions: Which strategy to choose? Shall they try to remain as comprehensive universities, or shall they reorient themselves towards more specialised niche universities? Shall they emphasise research or education? Shall they be general universities in their respective regions, or shall they be profiled universities of their regions? Shall they opt for strategic alliances with the leading international centres of research and education, or shall they go for regional collaboration and integration with their neighbouring colleges and polytechnics? The choices are not only up to the universities of Joensuu and Tromsø to make, and the questions probably do not have any clear-cut answers. They belong to the complexities and ambiguities that the universities must learn to live with. In that case, the universities must find ways to build the contradictory signals, expectation and logics of action into the their organisation and leadership structures. How they manage to handle these tasks, will certainly be of importance to the future.

Another key issue both in Finland and Norway concerns whether government policies will be committed to maintaining a national system of decentralised higher education and research. The universities of Joensuu and Tromsø have both been closely linked to the state-building and modernisation projects that evolved during the 1960s. The universities were integrated parts to the development of the welfare states. Today, competition has become the name of the game. Higher education is turning into an

international business. Education is offered on the Internet, and the students are more mobile. Governments also want to see value for money. It is not obvious that the existing public system of higher education will remain. The diagnosis of a shift in the mode of knowledge production (Gibbons et al. 1994) points in the same direction. According to this view, knowledge is becoming more distributed, fragmented and contested. This is interpreted as a threat to the universities. The venerable institutions lose their knowledge monopoly. The ivory towers are dismantled.

However, the idea of a globalising knowledge economy is not necessarily a threat to the universities. When knowledge is presented as the vital source of riches, the universities are likely to be given a strategic role. The new conditions rather lay the foundation for joint knowledge production. The universities will no more be regarded as distant oracles, but as partners and contributors to a stock of knowledge that can only be tapped into by creating new communities of practice. This is likely to make the universities even more relevant to the surrounding society. The crucial question is whether national authorities will go for a concentration of resources in an all-out effort to boost national competitiveness, or they will prioritise a broader mobilisation.

The comparison between Joensuu and Tromsø shows that in Finland the government has put great emphasis on developing the university centres as nodal points in networks of innovation. Regional considerations are combined with attempts at national specialisation. Norwegian authorities have not formulated a science and technology policy assigning the universities a similar role, but the university cities are to an increasing extent pointed out as the main levers of industrial and regional development. This is partly based on inspiration from Finland, although both countries now draw on the common stock of implicit theories that are underpinning current policies in most OECD-countries. Given that they will be gravitating towards the same model of regional innovation support, the assumptions underlying these strategies need consideration.

The notions of triple helixes and regional innovation systems are constructions of an imagined system, with defined actors, institutions and relationships. In practical use, a

hypostatisation very often takes place, i.e. the imagined systems are taken for real systems, to be replicated everywhere. This raises the problem of sensitivity to the regional context. From the Joensuu and Tromsø cases we learn that there is no single regional innovation system. There is a multitude of networks, social structures, mixes of institutions, and patterns of innovation. The universities interact with sections of their regions, but they are also part of the global networks of the academic community. Hence, relevant policy formulation must take the distinctive characteristics of the universities and their regions into account. Another problem is linked to the downscaling of innovation measures. When models developed on the basis of megacities and international success stories are translated to the sparsely populated areas of the Nordic countries, the recipes undergo a miniaturisation, which imply that the policy instruments will work quite differently. Hence, proportions matter. The effects of the downscaling must also be taken into account.

In this paper we have focussed upon the shifting expectations meeting the universities and the ways that the universities in Joensuu and Tromsø have responded. As a last reflection, the continuity of the general projects to which the universities have adhered to should be emphasised. Bringing innovation systems from intention to reality might be regarded as a process akin to the processes of state formation, nation-building, and welfare state creation. They are the projects of ruling regimes, and they involve the construction of imagined communities, with new mindsets, orientations and feelings of solidarity. Similar to the other projects, the building of innovation systems is a dynamic process that will bring about contradictory results, unresolved problems, and new challenges.

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